

ENERGY TAX ACT OF 1977

HEARINGS
BEFORE THE
COMMITTEE ON FINANCE
UNITED STATES SENATE
NINETY-FIFTH CONGRESS
FIRST SESSION
ON
TITLE II of H.R. 8444
THE ENERGY TAX ACT OF 1977

AUGUST 8, 9, 10, 11, AND 12, SEPTEMBER 8, 9, 12, 13, 14, AND 15, 1977

PART 3
ORAL TESTIMONY
SEPTEMBER 8, 9, AND 12, 1977



Printed for the use of the Committee on Finance

U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1978

96-684

For sale by the Superintendent of Documents, U.S. Government Printing Office
Washington, D.C. 20402

5361-17

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ENERGY TAX ACT OF 1977

THURSDAY, SEPTEMBER 8, 1977

U.S. SENATE,
COMMITTEE ON FINANCE,
Washington, D.C.

The committee met, pursuant to notice, at 10:05 a.m., in room 2221, Dirksen Senate Office Building, Hon. Russell B. Long (chairman of the committee) presiding.

Present: Senators Long, Byrd, Jr., of Virginia, Gravel, Bentsen, Curtis, Hansen, Dole, and Packwood.

The CHAIRMAN. The hearing will come to order.

STATEMENT OF SENATOR CARL T. CURTIS

Senator CURTIS. Mr. Chairman, due to prior commitments, I was unable to participate in the energy hearings held in the August recess by the Committee on Finance. I did, however, have an opportunity to review the testimony and to study the bill sent to us by the House of Representatives, and the key provisions of the bill are disturbing.

H.R. 8444 would raise and rebate billions of dollars in what the Wall Street Journal calls a pea-and-nutshell shuffling with figures. I have been informed that there is substantial disagreement regarding the numbers involved and even if we had precise figures the provisions of this bill would appear to lead to sharply reduced production and growth rates.

For example, the administration estimated that the national energy plan will have no significant impact on the growth of real GNP or upon employment over the next 4 years.

On the other hand, Chase Econometrics Associates, Inc., has reported that the national energy plan would in 1985 result in—

- (1) A decrease of GNP of over 3 percent—in constant 1972 dollars;
- (2) A decrease of net exports of more than 25 percent;
- (3) A 1.3-percent greater unemployment rate; and
- (4) A 4-percent decrease in industrial production.

While I am strongly in favor of letting market price mechanisms work, I also realize that this committee has no jurisdiction over that subject. We do have jurisdiction over the crude oil equalization and user taxes with accompanying rebates and it is essential that these provisions, if approved, be structured so as not to cripple our economy.

Further, if we have an energy shortage as severe as portrayed by the administration, we must provide production incentives in any legislation approved by this committee.

I ask unanimous consent that an editorial from the Wall Street Journal of September 7, 1977, be inserted in the record.

[The editorial follows:]

Arthur B. Laffer, professor of economics at the University of Southern California graduate business school and former chief economist for the Office of Management and Budget, testifying before the Joint Economic Committee:

The National Energy Plan will raise enormous revenues through new and expanded taxes. These receipts will then be put back into the economy in the form of rebates, tax incentives and transfer payments.

A number of economists argue that the destimulative aspects of the higher taxes are offset by the stimulative aspects of the rebates and transfers. They conclude that output or GNP will not be much affected. This is clearly the logic put forth by the administration.

In my opinion, the above view makes no sense whatsoever. If output resulted solely from aggregate demand, one could construe some logic out of the position. Output, however, results from both aggregate demand and aggregate supply. The above analysis totally ignores aggregate supply and, as such, is completely off the mark.

An increase in tax receipts matched by an equal increase in rebates and transfer payments will unambiguously reduce output and output growth. The bigger the tax increase cum rebate, the greater will be the fall in both output and employment.

To see this point clearly, imagine an increase in U.S. taxes of over \$1 trillion, matched by an equal rebate right up to the point where workers and producers receive nothing for their work effort, and nonworkers and nonproducers receive everything. Output will fall to zero. While the example is extreme in most instances, the point is clear. Taxes matched by spending reduce output.

The administration's energy package, if put into effect, would raise taxes by an enormous amount annually. * * * Estimates of the ultimate revenue from these tax increases range well over \$100 billion per year. When one compares these numbers with the total cost of the Vietnam war, over a six-year period, of say \$200 billion, one obtains the proper perspective of the proposal's magnitude. As such, the discrepancy between market values and the amounts workers and producers receive would increase dramatically. If ever enacted, this would constitute an enormous increase in the wedge and would lead to sharply curtailed production in the market place. Growth rates would be greatly reduced.

THE CARTER TAX INCREASE

As the Senate returns from its recess, it finds on its desk the largest peacetime tax increase in the nation's history. Mr. Carter calls his tax boost an "energy program," but in fact it is a cleverly disguised grab for the nation's paychecks.

A great deal of pettifoggery has been devoted to camouflaging the enormity of the tax implications in the energy package. The Treasury, the House Ways and Means Committee and the staff of the Joint Committee on Taxation have made estimates of its revenue effects based on a common set of figures. The estimates vary depending on how the figures are stacked up, but the most common result is a finding that the House-passed bill would produce "net" revenues of \$52.9 billion between now and 1985. This is a tax increase averaging \$6.6 billion a year, not inconsiderable in itself. But the estimate is so loaded with gimmicks it borders on fraud.

First, by "net" revenues the estimate means what's left over after various rebates. In other words, the \$6.6 billion a year is what's left over in receipts after the bill's expenditure. Second, the period chosen is the time over which the taxes are phased in, thus underestimating their ultimate impact. Third, because the House bill extends the crude oil tax only until 1981, the \$52.9 billion estimate assumes this tax will expire halfway through the period studied, though it is both a huge money raiser and the guts of the Carter energy program. And of course, this estimate entirely excludes the administration's 50-cents-a-gallon standby gasoline tax, which was not included in the House package.

A somewhat more realistic picture can be developed by sorting out the gross figures in the Joint Committee tables, isolating its 1981 estimates to avoid the distortion of assuming the expiration of the crude oil tax. This reveals a tax boost of \$18.5 billion a year. But by 1981 the bill's taxes would not yet be fully applied. In 1983, for example, there would be a new tax of \$1.50 a barrel on all

oil used to generate electricity, surely not a small item. Even on the official numbers, the Carter tax increase ultimately exceeds \$20 billion a year.

Watching the pea-and-nutshell shuffling being done with these official figures, though, one wonders what other games were played in generating them in the first place. The estimates of revenue effect depend heavily on assumptions about how fast the economy will respond to conservation incentives. Will people pay the gas guzzler tax, or simply stop buying cars? Will industry actually be able to convert to coal, or will it get stuck with the tax?

An independent estimate by the U.S. Chamber of Commerce came up with considerably higher revenues from both the gas guzzler and industrial use taxes. The Chamber also calculated the higher taxes the program would cause by generating inflation and pushing taxpayers into higher personal income tax brackets. The Chamber points out that as originally proposed the energy package would increase the federal government share of GNP to 23 percent from 21 percent.

To grasp the general magnitude of the program, it's also useful to go through a few back-of-the-envelope calculations of what the ultimate tax rates would do if applied to the 1977 economy. At current consumption levels, for example, a penny-a-gallon tax on gasoline would yield a billion dollars, so 50 cents is worth \$50 billion. Based on current production of "old" and "new" oil, the crude oil tax would yield something like \$15 billion.

THE CARTER TAX INCREASE
(Dollar amounts in billion 1977 dollars)

Tax	Joint Commission staff, 1981	Chamber of Commerce, 1985	Final rates applied to 1977
Gas guzzler.....	\$0.1	2	12
Crude oil.....	14.6	12	15
Industrial use.....	2.8	8	God knows
Miscellaneous.....	1.0		1
Subtotal.....	18.5	22	28+
Gasoline tax.....		35	50
Subtotal.....	18.5	57	78
Inflation impact.....		16	Sight
Grand total.....	18.5	73	78+

The gas guzzler tax is more complicated. This year the auto industry will sell about 10 million cars with fuel economy averaging 16 to 17 miles a gallon. By 1985 such a car would be taxed about \$2,000, so the tax is worth \$20 billion. If you can cajole someone in the auto business to do a more exact calculation applying the 1985 rates to present auto models, you get a figure of about \$12 billion. Even without the new tax, of course, auto sales over the next few years will tilt toward high-mileage models. But will the adjustment be enormous enough to justify estimating the gas guzzler tax receipts at only \$100 million?

If you look at the tax on industrial use of oil and gas, finally, you realize that a good prediction of its revenue effect is impossible. No one has more than the fuzziest notion what this part of the bill means. (See the attempted explanation in Notable and Quotable nearby.) Burning the light bulbs of the accountants and lawyers as they work through that monster will take enough oil to keep the sheiks in business for at least a decade.

In all, the Carter program would increase taxes by well over \$20 billion, and perhaps more than \$100 billion if the administration succeeds in its attempts to revive the gasoline tax. To judge the resulting jolt, note that \$100 billion is the total after-tax profit of all U.S. corporations. Somehow the economy would have to adjust, either by paying the new taxes or by avoiding them, for example, by closing down Detroit for a year or two.

Now, conventional Keynesian economics holds that taxes won't hurt output so long as government expenditures at least keep pace. If this were true, the World's top economic performer over the last decade would have been Great Britain. The general Western economic problems today are that governments route too much of income away from productive private uses, that high tax rates destroy the rewards for production and capricious economic policies and tenacious inflation destroy the climate for investment to produce jobs and income.

No matter how the receipts were spent or rebated, the energy taxes would be a massive new dose of precisely these kinds of poison.

And for what? There is no danger that the earth will run out of energy in any time span the mind can comprehend. Even the government is not truly serious about an "energy crisis"; if it were its programs would include production incentives. Dependence on imported oil is a legitimate national security problem, but the answer lies in the ongoing oil storage program and not in a huge tax increase. The real energy problem, and the real chance for a crisis, is the government refusing to let market pricing mechanisms work.

The Carter tax increase would do nothing whatever to solve any of our real energy problems, but it would run terrible risks with the economy on which we all depend. If Congress does pass this bill, it will be the most ill-conceived piece of economic legislation since the Smoot-Hawley Tariff of 1930.

The CHAIRMAN. The first witness this morning is the Honorable John Tower. Is Senator Tower here?

I was led to believe that he might be a little late, and we will call him later on.

The next witness is Mr. Robert M. Brandon, director, Public Citizen, Tax Reform Research Group, accompanied by Mr. William Pietz, staff attorney, public citizen.

Gentlemen, we are pleased to have you here today.

**STATEMENT OF ROBERT M. BRANDON, DIRECTOR, PUBLIC CITIZEN'S
TAX REFORM RESEARCH GROUP, ACCOMPANIED BY WILLIAM
PIETZ, STAFF ATTORNEY**

Mr. BRANDON. Thank you, Mr. Chairman. We have a rather lengthy statement we would like to submit for the record, and just spend a little time highlighting some of the points that we would like to make before the committee, and then answer any questions.

We are here to provide our general support for the administration's energy plan and the House-passed Energy Act. We feel particularly strongly that the conservation measures in this proposal are worthy of strong support in the Senate, particularly in terms of trying to meet our energy needs. We feel that it is very important to consider the balance between conservation and increased production. As long as we have finite energy resources, continually speeding up production and using valuable financial resources to get more and more of our finite energy out of the ground is a bad bargain. We can save the same barrel of oil through conservation at a much cheaper price. And we have some specific examples in our testimony.

Let me turn specifically to several items in the bill.

First of all, the residential tax credits for insulation and other weatherization. We feel, while they may have some psychological effect, these credits are basically ineffective in promoting increased utilization of insulation materials and would go primarily to people who are already insulating their homes because of the higher price of home heating oil, gas, et cetera.

In addition, the credits are going to exacerbate an already terrible supply problem in the insulation industry. The industry is at full capacity, and we are concerned that the credit and any stimulus in this area is simply going to bid up the price of insulation to the detriment of the homeowners trying to insulate their homes.

Second, the credits themselves just add to the complexity of the Tax Code and will be counter to the goals of tax simplification that the Chairman of this committee and the President has expressed.

We are concerned about the fact that the fiberglass industry is dominated by several major producers. As a result, there is very little price competition and prices will just go up as a result of this tax credit.

In terms of cellulose insulation, where boric acid is needed as a flame retardant, the same problem exists. Boric acid is produced by a relatively small number of manufacturers, 75 percent of it by just one manufacturer alone. Again, prices will go up. There will be no protection for the consumer in terms of keeping prices down.

If there is going to be any move to stimulate residential insulation beyond where it is now, we feel a much better approach would be to provide low-interest loans for those people who do not have the capital to pay for insulation materials and to provide easier access to FHA-type loans for other middle income taxpayers.

Let me turn to the gas guzzler tax. We support the gas guzzler tax. We supported the original administration proposal, although we had some problems with the small car rebate which has since been taken off in the House. We do feel that the gas guzzler tax needs to be kept, and in fact strengthened. We think it provides, more than mandatory standards do, a consumer signal that will begin to change the mix of consumer purchases to smaller and more efficient cars. It will help manufacturers meet the existing fleet standards.

We think that the impact of the tax on the industry will be relatively minor; in fact, it will probably just shift the industry toward producing and selling more small cars.

They have adequate leadtime based on the gas guzzler tax now in place. Additionally, a number of studies cited in our testimony conclude that, with present technology, the industry can meet and exceed those standards. Those conclusions do not include the use of technology that is here but has not been utilized very much by the American automobile industry such as diesel engines and lighter cars, mini-computers in engines, and so on.

One of the major flaws in the gas guzzler tax as passed by the House was the lack of any tax applying to recreational vehicles, light trucks and vans. Whereas, 20 years ago, 7 cars were sold for every light truck or recreational vehicle, today for every 1.8 cars sold, there is 1 light truck, van or recreational vehicle sold.

I was just out in the Northwest. These vehicles are all over the road, filled with vacationers, and very few are fuel efficient. Unless there is a gas guzzler tax applied to these vehicles as well, there will be no stimulus to get more efficient engines or more efficiency out of them. The recreational use of vehicles, after all, is the area where we could cut gasoline consumption the most.

We support the crude oil equalization tax. We feel as long as there are going to be higher prices, and the President's plan contemplates it and Congress' plan contemplates that higher prices is one way to go to provide more conservation and to make energy prices more realistically reflect replacement costs, it is absolutely essential that those higher prices not become an income transfer from consumers to producers.

The crude oil equalization tax accomplishes that goal by recouping the higher prices to the Treasury to be returned to taxpayers, basically, dollar for dollar. We think it is important in this regard that all of that money be returned. If there is \$14 billion taken out of the economy, that will create too much of a fiscal drag. It is crucial that the

rebate go back to taxpayers immediately and into the spending stream. There is some argument that the rebate will have a minimal effect in terms of conservation because you are simply going to return money to people after you take it away in higher prices, but that misses the whole point.

There is obviously going to be an incentive for people to conserve energy because they will come out ahead, once they get the rebate and on top of reducing their energy costs.

The final important point on the crude oil equalization tax is that unless all of that money is rebated to taxpayers, this bill becomes just another tax bill, a huge revenue measure that will be used—the money could be used later on to fund tax reform or welfare reform or anything else. We feel it is important that the money go back now and not be used simply as a huge tax bill to pay for some other tax programs down the road.

Let's turn to the industrial use tax and credits against that tax. We are disappointed that there are not more mandatory efficiency standards, for instance, in commercial buildings, as there are in residential buildings, and would favor mandatory standards in a lot of areas to provide energy conservation to the commercial/industrial sector which uses the majority of the energy in the country. But we recognize that it would be administratively difficult if not impossible to try to dictate to every business with every kind of standard how to buy efficient machinery, et cetera.

We feel the fiscal signal that the industrial use tax provides is probably the best way to achieve savings. It becomes less meddlesome than standards.

The tax, we think, will provide the fiscal signal to business to conserve energy. Business can respond to the tax quite well to convert to coal, and also to conserve in their industrial processes. For this reason, we think if conservation in this area is going to be significant, the tax has to apply pretty much across the board. We cannot simply turn our back on the fact that there is energy waste in industrial processes and think there is only energy waste in heating and electrical generation. We want to try to convert people to coal from oil and gas, but there is waste across the board, and there is plenty of room for improvement. We think both the lower tier tax on processes and the upper-tier tax on heat use and other electric generation is important.

Finally, we think the tax needs to be simple, without loopholes, to make it more administrable. It is, after all, the biggest energy saver in the bill.

Turning to production incentives, we think that the promise of higher prices is certainly the best incentive we know. The price incentives in the bill are already quite adequate—\$14 for newly discovered oil, offshore oil and hard-to-get and recover oil; \$1.75 for natural gas in the same situation. Those prices are far above what most energy companies thought that they would be getting a few years ago and we feel they are adequate. When we look at the profit picture and cash picture of the energy industry, they seem to confirm our view that these are more than adequate price incentives, higher than at present.

For example, Mitchell Energy Corp. has a 30-percent return on equity right now. In the last 6 years, it has experienced a 1,000-percent

increase in profits. One-half of their natural gas contracts are held at 33 cents. They are going to expire this year and the company will be able to get to as high as \$1.45 per million cubic feet under the House-passed bill. We think to do anything else in the way of tax incentives to provide more incentive for energy production is simply wasteful and inefficient.

As the attached article from *Forbes* in our testimony indicates, and as Secretary Schlesinger testified, under the energy bill, the price incentives for the oil industry will allow them to make more money in the United States on oil and gas production than any place else in the world. In terms of their capital needs, chief executive officers are saying that they have more cash than they know what to do with, and they are beginning to look for other things to do with their cash.

Again, we have specific examples and direct quotes in our testimony.

In conclusion, we are here generally to support the administration and the House bill. We feel it is an important move in the right direction toward improving our energy situation.

We ask that this committee not weaken any of the conservation provisions. It is tempting to cut some of the tax conservation provisions that people are not going to be comfortable with. But this is an uncomfortable situation.

We feel the committee should not undermine any of the conservation provisions; in fact, should make some of them stronger.

It would be a temptation to add tax breaks for selected groups that have come in and asked for them under the name of increasing energy and so on, and here again, we feel incentives that exist today are more than adequate.

I would be happy to answer any questions.

The CHAIRMAN. Senator Bentsen?

Senator BENTSEN. Thank you very much, Mr. Chairman.

I have been one of the supporters of the residential insulation credit, but I think that you have cited some real problems about the fact that we have full production now and the price is escalating. I am, frankly, having some second thoughts about this proposal.

I would have to agree with you also on this problem of light trucks and vans. I do not know why—do you know the rationale for the exemption in the House bill?

Mr. PIETZ. Principally, the farm lobby in the Ways and Means Committee has a vital interest in small trucks. There is a problem there. When you automatically exclude all small trucks, you exclude vans and RV's with the same stroke.

Senator BENTSEN. I know the problem. You often watch a fellow go by with a CB and he puts the pedal to the metal and lets it roll and he wants to buy the biggest motor he can buy. I can see that too often happen.

Mr. BRANDON. Our feeling on that is if the gas guzzler tax works the way it should work, it will be a signal to consumers to begin to purchase and look for more efficient light pickups and Detroit will be able to build more. They are already beginning to.

We have an article in the appendix to our testimony which talks about the boom toward this light truck purchasing. Really we are talking about a vast majority of these purchases being made for recrea-

tional use, or pleasure use, or just a general family car and not agricultural use.

Mr. PIETZ. The Business Week article we cited points out that some of the consumers are beginning to fly to the showrooms to buy these small trucks, thinking this will be a means of avoiding the gas guzzler tax.

Mr. BRANDON. For example, citing the article,

Some 90 percent of the Chevy light truck buyers pay extra for power steering, 75 percent for automatic transmission, 50 percent for air conditioning. A California Dodge dealer says he recently sold a van for \$16,000 rigged with a television "Pong" game and stereo.

These are the kinds of things that I am seeing on the road as well.

Senator BENTSEN. I would have to disagree with you on the question of interstate sales of natural gas. If you talk about a \$1.75 price in my own State of Texas, you are talking about a rollback on a lot of contracts when those contracts expire. You will see a rollback from a \$2 price to \$1.75. I think you would have some very serious economic consequences in those kinds of contractual agreements.

The other problem you run into is that this does not really equate to \$14 oil on a Btu equivalency. You get a situation there where you have a finite resource again, where you are encouraging utilization of natural gas and not its highest end use.

You also have a lot of marginal situations where you would not develop that resource and find that those wells are getting deeper—costs are getting higher.

You have cited some specific companies, but to cite one, two, or a few is not necessarily a generalization of what is happening.

Mr. BRANDON. Senator, let me respond.

In terms of the \$1.75 price being a rollback of the \$2 price, we have to keep in mind that the \$2 and \$1.75 price is a result of a precipitous increase in the OPEC oil price with natural gas tracking that price. Just as that was an unexpected increase in the price of natural gas to producers who were producing, in many cases, profitably at a much lower rate, we feel that the \$1.75 is still very generous and should not provide any problem.

In fact, most of the testimony that I have seen that has come, certainly from the administration, is that the \$1.75 is more than adequate. We feel it happens to be much too high. We think that the FPC price at \$1.42 is too high. But it was certainly adequate as an incentive price to find new natural gas.

Senator BENTSEN. That is obviously where we would differ. You are not going to get the marginal field to develop. We are going to have to pay at the higher price to get as much of this developed as we possibly can, as we try to buy the time to bring on coal and the alternate sources of energy.

Thank you very much, Mr. Chairman.

The CHAIRMAN. Senator Byrd had to leave.

Senator Curtis?

Senator CURTIS. Thank you, Mr. Chairman.

Mr. Chairman, I was not here to participate in the August hearings. I ask unanimous consent that an opening statement of mine be inserted in today's record at the beginning of the session.*

The CHAIRMAN. Without objection.

*See p. 659.

Senator CURTIS. I only have one question. The interest of this committee, you realize, is primarily the tax issue of this proposal. This question I will direct to the entire bill.

You are supporting the House-passed bill?

Mr. BRANDON. Yes, that is right.

Senator CURTIS. Would you point out the specific sections and provisions of the House-passed bill which are directed toward increasing production of petroleum and natural gas in the United States?

Mr. PIETZ. We think the \$1.75 price established for natural gas is the principal measure along these lines, Senator.

Senator CURTIS. How does that vary from the present?

Mr. BRANDON. The present price on interstate tax is \$1.42 on new contracts. On existing contracts, it is as low as 33 cents. We think that is a precipitous increase for new production.

Senator CURTIS. That is the only section?

Mr. BRANDON. It is the major section, but the additional point that must be kept in mind is that the Congress last year passed a very comprehensive oil pricing bill that provides for significant increases in the price of new oil as well and this bill continues that and actually allows the Secretary to move some difficult-to-find oil into a higher \$14 price at the same time.

Senator CURTIS. In reference to this \$1.75 price for natural gas, does it bring any portion of the industry under control that is not controlled now?

Mr. BRANDON. Certainly the interstate gas that was selling at a higher price will now be under the \$1.75 price.

Senator CURTIS. In other words, it extends the price control mechanism; is that correct?

Mr. BRANDON. That is right.

Senator CURTIS. It extends it to the intrastate production and sale of gas?

Mr. BRANDON. That is correct.

Senator CURTIS. It is your opinion, in the overall it will still lead to an increased production of natural gas?

Mr. BRANDON. Yes, Senator, because when you look at the return on investment of oil and gas at those prices, it is higher, I think, some six times higher, than for instance, the return on oil and gas production in the OPEC countries.

As Secretary Schlesinger testified earlier in August, the production of oil and gas in this country will now be reaping the highest profit of anyplace else in the world. We think that is clearly significant.

Senator CURTIS. My question was not directed to the amount of profit. My question is this: By extending the price control mechanism to all natural gas production and sale, is it your opinion that that will increase production?

Mr. BRANDON. At \$1.75 and at the price on oil; yes

Senator CURTIS. What is the going rate for unregulated intrastate natural gas sales now?

Mr. BRANDON. I do not know exactly what it is. It fluctuates. It is somewhere over \$2, I believe.

Senator CURTIS. It is something over \$2?

Mr. BRANDON. Yes.

Senator CURTIS. That is all, Mr. Chairman.

The CHAIRMAN. Senator Hansen?

Senator HANSEN. Mr. Chairman, I was not able to hear the witness testify. If I may, I would like to reserve the right to submit some questions in writing after I have read the testimony.

The CHAIRMAN. Yes.

Senator HANSEN. Thank you.

The CHAIRMAN. I would like to go over one matter with you. As I understand it, you favor low-interest loans for insulation purposes; is that right?

Mr. BRANDON. Yes.

The CHAIRMAN. You prefer that to the tax credit to help encourage home insulation?

Mr. BRANDON. That is correct.

The CHAIRMAN. Even with the low-interest loan program, would we not be subject to your fear that the price of material for insulation might be advanced?

Mr. BRANDON. We are still very concerned and I think our only interest here is to allow the insulation market to be open to people who presently cannot afford it. You do have a weatherization program for the poor in the bill but we feel that that does not take care of the lower middle income people or middle income people who do not have the \$500 or \$700 to put up to pay for this kind of improvement.

Mr. PIETZ. May I add, our principal concern is simply the impact of this credit upon the simplification of the Tax Code. We have endorsed the chairman's proposal to encourage more and more people to avoid complexity by not itemizing, and this tax credit, by definition, will confront everyone, even those who do not itemize.

We think it is a step backward on that score.

The CHAIRMAN. That is something. Of course, if we are going to enact it, we ought to try to figure a way to make the best advantage of it. Some people are going to face the complexities anyway.

For example, almost all the business operations will have to file an itemized return because they are going to have to itemize their expenses. I do not see much prospect of the average business concern using the short form, do you?

It seems to me that through simplification, we could have 90 percent of taxpayers filing the simple form. I do not think we are going to be able to do that for an ordinary business. It seems to me that they will still have to itemize all of their expenses.

So, if we can enact a credit which benefits taxpayers, it may be we can move taxpayers closer to the simple form. I do not know how the mechanics of it will work. It seems to me that one way or the other we might use the tax system to help carry the burden of energy conservation and benefit the consumer, but now I am concerned about the price of this insulation.

As you know, in World War II—you were pretty young at that time; you might not even have been born, I am finding that more and more, perhaps you were old enough to know what was going on at that time; I know I was—back at that time, the Government created a lot of new competition. The Government, of course, took the view that by throwing a lot of money and manpower into a problem, you can solve it. So the Government advanced the money through the Reconstruction Finance Corporation—RFC—to Kaiser Metals and Reynolds Alumi-

num and various other companies, created a lot of new competition, and provided a vast increase in the production of things that we needed, which has benefited us even since that time. The RFC established plants to produce synthetic rubber. In due course, the RFC transferred the plants to private companies.

If we cannot get the insulation produced at a competitive price, it seems to me that we ought to put somebody else in the insulation business to compete with the existing producers.

In fact, one thing that appeals to me about the money we could raise in this bill is to put it into an energy trust fund for both production and conservation. One of the things the trust fund could do would be to make loans to help people go into areas where more competition is needed. I would be curious to know if you have thought about this, and if it has some appeal to you, to help create more competition?

Mr. PIETZ. We had not thought about it in detail, but it does have a great deal of appeal as far as the insulation question is concerned. Trust funds give us certain concerns, as they do everyone. With respect to the insulation suggestion you just made, that does have a great deal of appeal.

Mr. BRANDON. Let me say along those lines that our concern would also be where that money came from. If we are talking about this particular bill and the significant increase in taxes coming from the general population through the crude oil equalization tax, we feel that money should be returned to taxpayers completely.

We have a chart affixed to the end of our testimony that shows the energy consumption by families is rather higher at the lower income level. If we do not return that money, we are really talking about financing these kinds of worthy objectives in a trust fund with a rather regressive tax, if you look at how that higher cost of energy is reflected to taxpayers.

The CHAIRMAN. I have no problem with returning the money to the lower income group. That does not bother me. But for the middle-income area, it seems to me that the return should be made conditional. It ought to be given back as an incentive for the taxpayer to do something you would like him to do to further our energy goals.

It need not necessarily be on his tax return, either. My thought is, that if a man insulates his home, I do not know why he should not be permitted just to go down to the post office and pick up a form. The Government form would say, in effect, "If you did certain things we would like you to do, you are entitled to a tax credit. Just fill this thing out and send it in." The Government would send him his check. That would appeal more to me than try to make him wait until the end of the year to file his return, and claim his credit. The Government may have to hire a few more people on this end, but I think that would be better than having a man wait all year long after he has done something the Government encouraged him to do.

Mr. BRANDON. I do not think you want to be identified with the Postal Service. Leaving that aside for a minute, I think it is important to focus on the earlier statement you made. It is not enough, we feel to give the crude oil equalization tax revenues back to low-income people to protect them. It is a very strong conservation signal to everybody to know that they will be in a better position if they save the

higher cost energy, because at the end of the year they will come out ahead when they receive money back on their income tax in terms of a rebate.

If they do not save the energy, then they have not come out ahead and may come out behind.

We think that that is a significant part of the crude oil equalization tax.

Mr. PIETZ. We think there is a question of fiscal drag there, Mr. Chairman. Refunding the money to the poor does satisfy our principal concern, but there is this additional question of taking the money out of the economy and perhaps having the Government not pump it in as fast as they took it out of the taxpayers' pockets, even though they be middle income or upper income people.

The CHAIRMAN. If we can do the kind of thing you are talking about, and the kind of thing I am talking about, if we want to help somebody who has a drafty house and a high energy bill, to put in storm windows, to insulate his home and fix it up so he will make the most efficient use of energy, of course we will also be giving him a long-term saving. I like the idea of a low-interest loan. That appeals to me. It would also help, though, if we had the tax credit to go along with the loan, to help ease the burden the first year or two. So if the tax credit can pay for most of the loan payments in the first year or the first 3 years, that could help him into it. I think we ought to try to make it attractive.

I also believe we ought to make it so that the fellow can get his refund, if he has it coming to him, just as quickly as possible. Some would not want to use the postal service. My reaction is fine, let's dispense with the post office idea. A refund could be obtained wherever the Government has somebody working for the Treasury, and that might be at the IRS office at the post office. The taxpayer would hand him the form and let him write a check right then and there.

It seems to me if you are going to do something like that, you ought to let the taxpayer certify that he has the credit coming to him. You give him his check right then and there. If, later on, you find out he cheated, that is deceiving you, he would be subject to tax fraud penalties, just as he would for any other frauds on tax returns.

The thought appeals to me; for the middle and upper income people, it would be a far more effective if we used the credit in ways that encouraged people to do what we would like for them to do. If you ask a fellow to insulate his home or do any one of the many things the Government would like for him to do, he would get the credit. I would like to see him get the credit right then and there, and not wait until next year.

Mr. BRANDON. The basic concern we have, we do not want to see that money used to provide incentives to have people do what they are going to do anyway, whether it be in energy production because the higher price already provides for the incentive, or insulation because higher energy costs provide the incentive.

We think it is just wasteful to use tax dollars in that area. But generally I agree with your point that where you could be using revenues to encourage conservation and other things, it would make sense.

The CHAIRMAN. Thank you very much.

[The prepared statement of Mr. Brandon and Mr. Pietz follows:]

STATEMENT OF ROBERT M. BRANDON AND WILLIAM PIETZ FOR PUBLIC CITIZEN'S
TAX REFORM RESEARCH GROUP

Mr. Chairman and members of the committee, my name is Robert M. Brandon. I am director of Public Citizen's Tax Reform Research Group—a 501(c) (4) organization established by Ralph Nader in 1972 to work for reform of our tax laws. With me is William Pietz, a staff attorney with our group. We welcome the opportunity today to testify on the tax aspects of the President's National Energy Plan and the House passed energy bill.

We strongly support most of the specific proposals in both Plans and urge this committee to reject the efforts of various special interest groups to obtain unwarranted exemptions or benefits.

Solutions to our energy problem must be grounded on a clear understanding of the situation. The basic cause of our present difficulty is that the nonrenewable energy sources on which we have relied for so long to meet our energy needs are fast running out. Exactly when those energy sources will be totally depleted is open to some debate, but it is clear that we cannot continue to rely on them for long.

Exacerbating this problem is the fact that we use too much energy. We do so because our national lifestyle has demanded high consumption, but has never put a premium on efficiency. Thus, we not only feel a national need for electric toothbrushes but we power them with energy-inefficient motors.

The only truly long term solution to our energy problem is to replace present nonrenewable energy sources with renewable ones. That process will take time but we must start now. To survive, ultimately our economy must be based almost exclusively on safe, reliable, renewable energy. There is no other choice but solar energy.

This is where the President's energy bill is most deficient. The President's plan acknowledges the importance of solar energy and the reservation of less reliable, less safe, and costlier nuclear power to use only as a last resort. But in practice the plan contemplates that solar energy will constitute only 2 percent of the additional energy demand while nuclear power will constitute 23 percent of additional supplies.

Solar energy includes the production of space heat and hot water and the production of methane from organic wastes (applications which are now available and economically competitive); wind power (available and in some areas economically competitive); photovoltaic cells (available, but not yet competitive); and power generation from thermal differences in the ocean (not yet available).

With more emphasis on developing and implementing these technologies solar power could make a significantly greater contribution in meeting our increased energy needs.

Until we have perfected renewable energy, energy conservation will be the main means of reducing demand for our finite energy sources and stretching out their supplies over a longer period of time. On the other hand, by increasing energy production, we only hasten the day when our energy supplies will be exhausted. Therefore, in closing the gap between our supply of energy and our demand for it our emphasis should be on cutting demand. Any increased production must necessarily take a back seat to conservation.

Long range, we could cut our energy consumption by 30 to 50 percent. In the short term, unfortunately, saving would not be that high but could be significantly greater than the 4 percent reduction called for in the President's plan. Conservation is our best bargain and it is up to the Congress to determine how many "barrels of conservation energy" we should buy. If we do not totally exploit this supply of energy we are practicing bad economics.

For example, a recent FEA study concluded that the average family, through attic insulation, improved thermostats and other retrofitting, could save a thousand cubic feet (MCF) of gas at a cost of \$1.35. The replacement cost of gas is \$1.75 per mcw or higher, and it may increase to \$4 or \$5 as more exotic forms of gas are needed. An equivalent amount of heat from electricity would cost \$8. We are obviously much better off to conserve for \$1.35 than to pay for more energy at two, three, or five times the price.

We should be effectively "drilling and mining for energy" through conservation. Every dollar this committee decides to spend on stimulating actual production is less effective than a dollars worth of conservation.

During the next few weeks this committee will be making basic decisions on how to spend our limited financial resources to meet the energy problem. In doing so, we urge you to keep the foregoing considerations always in mind. If

this committee decides to spend an additional dollar through tax incentives or foregiveness on existing or proposed taxes to increase supplies by the equivalent of one barrel of oil, you will be wasting the public's money and energy if that same dollar "spent" to promote conservation would reduce our energy gap by three barrels of oil.

Similarly, if the committee decides to "spend" money to accomplish goals through the tax system that could be accomplished more efficiently through direct budget assistance, you will be wasting more money. Without jurisdiction over direct assistance, loan programs or market incentives, you will undoubtedly find it difficult to resist calls for more tax breaks to "encourage" various energy goals. But keep in mind that a decision not to spend money through the tax system will make money available for more efficient energy goals. Moreover, if conservation standards were mandated rather than coaxed along with tax incentives the economy would save at a rate of \$14 a barrel of oil and the Treasury would save tax revenues.

Finally, you must realize that along with further tax changes comes complexity. Each tax credit, deduction or special writeoff you approve moves us further and further away from a simple to understand, simple to comply with and simple to administer tax system. This is particularly true of insulation credits which must be available even to those who don't itemize. This undercuts the administration's plans to achieve simplification by inducing people not to itemize.

THE NATIONAL ENERGY PLAN

The main thrust of the President's proposal—conservation of the nation's finite energy resources and development of abundant or inexhaustible fuel supplies—should be welcomed by most citizens. The specific proposals in the tax area, however, are of varying merit.

Ironically, those tax provisions which are likely to raise the most public concern—taxes on gasoline, inefficient cars, and crude oil—will probably accomplish the most and, because of the accompanying general rebates, actually hurt the least. At the same time, unfortunately, the tax changes which will undoubtedly be the most popular in Congress—the tax incentives—are the least fair, least efficient, and most costly.

The Carter plan seeks to curb wasteful energy consumption primarily by inducing higher fuel costs. In addition, the plan offers tax breaks and other incentives intended further to stimulate conservation of scarce energy such as oil and gas and conversion to more abundant energy such as coal and solar. Mandatory conservation measures, including utility rate restructuring and improvement of home appliance and auto efficiency standards, are also employed, but on a much less massive scale.

The new taxes on energy are designed to make energy prices reflect the actual cost of replacing energy with more energy, with the OPEC cartel oil prices essentially being the benchmark. This makes good sense from an economic and conservation point of view, but creates problems for those people—the rural poor with old, inefficient cars, for example—who are not really in a position to curb their energy use.

In its handout called "Economic Impact on the American Family" the Administration offers figures to show that, in general, low and middle income families who make even moderate efforts to save energy will actually receive more in tax rebates than they pay in increased fuel costs, and that only those who continue to waste will be hurt. These statistics appear to be accurate as far as they go, but they have been criticized for failing to include the indirect costs higher energy prices will almost certainly create, such as increased prices for the products of energy intensive industries and general inflationary effects. These secondary costs may be reduced, however, if business successfully adopt conservation techniques. Even taking indirect costs into account, the Administration's plan to raise the cost of wasting energy while minimizing the burden on energy savers seems to be the least painful way to deal with the energy problem.

OIL AND NATURAL GAS PRICING POLICY

Under the Administration's energy plan, by 1980 the cost to consumers of all oil would rise to the current OPEC-determined price of \$13.50 per barrel (with further adjustments for inflation). The benefits of this price increase would go to oil companies only in the case of "new" oil, to offshore oil from new leases, and to oil obtained from an onshore well drilled more than 2½ miles from an existing

well or more than 1,000 feet deeper if closer and a House amendment would extend the definition to oil determined by state regulatory bodies to be from new reservoirs. For most oil, the difference between its current, controlled price (\$5.25 or \$11.28 per barrel) and the OPEC price would be made up by a new federal wellhead tax.

The revenues from the new oil tax would be returned to the public, first in dollar-for-dollar reductions in the price of home heating oil, and the remainder—about \$47 per person—on a per capita basis, in the form of tax credits or direct payments for those who have no tax liability.

The ceiling price of "new" natural gas including intrastate gas would be raised to \$1.75 per thousand cubic feet, a price which is considered the energy equivalent of the OPEC price for oil. The price of other natural gas (\$1.42) would remain unchanged except for inflation and, to protect residential and commercial users, the cost of the high-priced new gas would be first allocated to industrial users since they can most easily convert to other energy sources.

This pricing and wellhead tax policy is a mixed blessing. On the positive side it increases energy prices to their true replacement cost, allowing for more realistic decisions of using energy thereby promoting greater conservation. Higher prices also mean greater profit and incentive for energy producers to find new reserves.

On the negative side, pegging energy prices to the world cartel price could provide windfall profits for domestic producers. Simply raising prices would amount to a 14 to 15 billion dollar annual transfer of income from energy consumers to producers. The wellhead tax and rebate is designed to recapture this windfall and return it to consumers generally. It is crucial, therefore, for any wellhead tax to absorb all the difference between the price of oil profitably flowing at old oil prices and the price of new oil. Any attempt to reduce that tax directly or through plowback provisions amounts to taking money from consumers to provide pure windfalls to energy producers.

In fact, even under the President's plan, taxpayers will be paying for some two billion dollars in windfall profits through the existing depletion allowance and intangible drilling deduction tax subsidies. This committee should take the opportunity to make the system more rational by removing these subsidies for new free market-priced oil and gas which are presently borne by all other taxpayers and rebating the money to consumers.

GAS GUZZLER TAX AND EFFICIENT CAR REBATE

An attractive approach to conserving gasoline is the proposed tax on inefficient automobiles and rebates on fuel efficient ones.

The gas guzzler tax approach has a number of beneficial features. Unlike the gasoline tax, it does not victimize the poor, who must drive the often inefficient cars previously used by the better off. Also, it is a voluntary tax, allowing individuals to avoid it by electing to conserve energy. Finally, if it is effective, it will eventually make the used car fleet more efficient as well, to the further benefit of the less well off.

Perhaps the only major criticism of the proposal is that the rebate might be a "subsidy for Volkswagen." Proposals have been made to exclude foreign cars from the rebate system, to negotiate quotas with foreign countries, or to limit their rebates to monies collected from foreign gas guzzlers, but each of these solutions has raised new problems. If the committee deletes the rebate it will be all the more essential to enact the tax schedule proposed by the Administration rather than the House approved schedule which was weakened to the point that in 1979 it evidently applies to only one car—the Chrysler New Yorker.

The tax should also apply to light trucks and vans. As the attached Business Week article notes Chevrolet now sells one light truck for every 1.8 autos while in 1960 the ratio was one for every 6.3 cars and Detroit literally cannot produce enough of them at present partly because buyers are seeking to avoid the shrinking size of standard sedans and wagons.

Existing fleet penalties on manufacturers create incentives for manufacturers to build more efficient vehicles but they don't influence consumer choices. Dissuading consumers from choosing wasteful vehicles may help auto-makers surpass the existing legal standards. In any case they will reduce the likelihood that the auto-makers will seek a relaxation of existing standards during the 1980's on the grounds that fleet averages can't be improved because gas guzzlers are outselling efficient cars.

A gas guzzler tax which simply boosts the likelihood that existing efficiency standards will in fact be met is not likely to disrupt or damage the auto industry. In enacting and reviewing the existing standards the Congress has relied on the following reports supporting the feasibility of meeting the statutory fuel economy and emission standards: (1) National Academy of Sciences, "Report of the Conference on Air Quality and Automobile Emission" (June 5, 1975); (2) California Institute of Technology, Jet Propulsion Laboratory, "Should We have a New Engine?" (August 1975); (3) FEA-EPA, "Estimate of Fuel Economy Impact of Alternative Emission Standards Level for Passenger Vehicles" (February 20, 1976); (4) FEA-EPA-DOT, "Analysis of Some Effects of Several Specified Alternative Automobile Emission Control Schedules" (April 8, 1976); (5) EPA, "Automobile Emission Control—The Current Status and Development Trends as of March 1976" (April 1976); and (6) FEA, "Gasoline Consumption Model" (July 22, 1975).

In fact a gas guzzler tax which in effect mandates even greater fuel savings than the existing law calls for would not be disruptive. Studies conducted since the above ones cited by the Commerce Committees have more firmly established that not only can the 1985 fuel economy standard of 27.5 MPG be met while meeting statutory emission standards but the 27.5 MPG standards can be bettered. The most recent study is the five agency (Commerce, LOT, ERDA, EPA and FEA) "Analysis of Effects of Several Specified Alternate Automobile Emission Control Schedules Upon Fuel Economy and Costs" dated February 1977. This study concludes that by using advanced technology, average new car fuel economy in 1985 can easily be 29.7 MPG regardless of whether the present statutory emissions standards are retained intact or relaxed.

The Interagency Task Force finding that the statutory emission standards can be met while getting average 1985 new car fuel economy of 29.7 MPG is all the more impressive because of the conservative assumptions in the report. First, the report assumes that the 1976 model mix of 40 percent full size cars, 30 percent intermediate and 30 percent small will not change. The 29.7 for 1985 new car fuel economy would improve by another 1 to 2 MPG with the shift to smaller cars projected in the FEA report "Gasoline Consumption Model" (July 22, 1975). The fact that the public will buy smaller cars is clearly indicated by the trend-setting California market where small cars comprise 48 percent of new cars sold as compared to 30 percent in the other 49 states. Other conservative assumptions include the discounting of an upper range fuel economy of 32.5 MPG which could be obtained by the rise of electronic engine controls, more efficient engines and lower acceleration capability; and the failure to consider any diesel engine production by 1985 which would add another 1 MPG to the average new car fuel economy. Recent research by Teledyne Continental Motors, an ERDA contractor and manufacturer of diesel engines for tanks, found that diesel engine vehicles can meet the statutory emission standards while attaining fuel economy 55 percent better than comparable gasoline engines.

We also support the ban on gas guzzlers approved by the Senate Energy Committee. But the fact that the House has approved a reasonable tax but has not considered a ban may suggest that a tax stands a better chance of emerging from Conference without dilution. In any case, recent experience in the areas of safety, emissions, and fuel economy suggest that an auto-maker won't take significant action unless it and its competitors are prodded by Congress.

HOMEOWNER TAX CREDITS

A series of proposals are included to assist or induce homeowners to make energy saving investments in insulation, weatherstripping, storm windows and doors, etc. For low-income groups, there would be an expansion of the current weatherization program providing direct assistance in purchasing energy saving materials. Many who could not otherwise afford the cost of insulation would be helped by a program requiring utility companies to offer customers an energy conservation service (insulating attics, etc.) to be performed by the utility and financed by loans repaid through monthly utility bills. Other federally-backed loans will also be offered.

The Administration has proposed homeowner tax credits equal to 25 percent of the first \$800 and 15 percent of the next \$1,400 spent (for a total of \$410) on approved conservation measures.

The tax credit will obviously have some good psychological effect on consumers who may buy energy saving devices because they are "getting a tax break;" but its actual economic effect will be marginal for most. In fact, the insulation

tax credit is very expensive and very wasteful (cost estimates are as high as \$400 million). The maximum credit will go to people who can afford to spend up to \$2,200 on conservation improvements. Taxpayers with that kind of cash are already making the decision to insulate their homes because of higher energy costs. Most of the credit, therefore, will go to those kinds of people already motivated to make energy conservation investments. The money involved would be better spent providing more subsidized loans to hard-pressed taxpayers who otherwise cannot afford the initial cost of insulation.

Homeowners would also receive a credit of 40 percent of the first \$1,000 and 25 percent of the next \$6,400 paid for installing solar energy generators. Like the insulation credit, the benefits of this proposal go primarily to those who could already afford to install solar equipment.

There is some argument here that, as wasteful as it might be, a large credit will serve as a psychological gimmick and help stimulate a market for solar energy equipment. That is partially true but, in fact, the incentives for solar energy underscore the basic problem with this tax approach. Solar hot water tanks cost over \$1,000 and solar space heating systems cost between \$7,000 and \$12,000. In order to qualify for the tax credit a family must have that much capital to spend on solar heating. Incredibly, there are no provisions in the President's proposal for additional loans or grants to provide the capital necessary to make these solar purchases. Only the very highest income taxpayers can afford solar heating and they will get a government subsidy to buy it. It would be more productive to provide interest subsidies to those who would otherwise not choose solar power.

Tax credits are obviously going to be enacted to help subsidize these purchases, but this committee should contemplate reducing the size of the credits to allow for more direct financial aid for energy conserving home improvements.

To whatever extent the credit is successful in stimulating demand for already scarce insulation supplies its benefits will probably be passed on to insulation suppliers in the form of higher prices. HUD Secretary Harris has recently stated that insulation prices rose by 5-15 percent in the past year or so. In addition a host of consumer abuses will have to be dealt with. (See attached articles from The New York Times, Businessweek and The Wall Street Journal and COWPS press release.)

The Public Citizen Housing Research Group has studied the problems confronting the insulation industry and reached the following conclusions.

Fiberglass insulation amounts to about 80 percent of home thermal insulation materials. As the Federal Trade Commission and others have pointed out, the fiberglass industry is highly concentrated, dominated by, three firms.

In addition to fiberglass, cellulose insulation is also important. The Community Services Administration, for example, utilizes cellulose in the low-income weatherization program. To serve as an insulating material; cellulose must be treated with a flame retardant, generally boric acid. Many observers point out the multiplicity of cellulose firms and ease of entry into the cellulose insulation market. These observers neglect to point out, however, that the production of borates is concentrated in the hands of three firms, of which U.S. Borax occupies about 75 percent of the market.

Our brief survey of markets in California, Colorado, Virginia, and Georgia, reveals shortages of both fiberglass insulation and of the borates essential for cellulose insulation. If the Administration is to meet its home insulation goals—without artificially creating exorbitant prices for insulation—the bottlenecks in the fiberglass and borate industries must be broken.

Three companies, Owens-Corning Fiberglass, Johns-Manville, and Certain-Teed, dominate the fiberglass industry. Owens-Corning is the largest, with about half of the domestic market, while Johns-Manville and Certain-Teed each have about 25 percent of the market. Because of difficulties in transporting fiberglass, imports are negligible.

As the Federal Trade Commission points out, there are serious barriers to entry into the fiberglass home insulation industry, including cost, competitive technology and technical know-how. The FTC quotes one potential entrant to the market, who calculated it would take about ten years and investment of about \$80 million for his company to develop the needed technology and enter the industry with one plant.

The fiberglass industry is operating at or near full capacity. Our brief survey of the market indicates that in fact fiberglass insulation may already be unavailable to smaller users. Both industry and government observers agree that fiberglass producers will be unable to increase their production significantly

before the end of 1978. (See Testimony of Guy O. Mabry, Vice President of the Insulation Operating Division of Owens-Corning, and Stanley L. Matthews, President of the National Mineral Wool Insulation Association, Inc., before the House Housing Subcommittee.)

Predictions of expansion of production after 1978 depend on at least two important assumptions. First, fiberglass production is dependent upon access to energy sources, and natural gas in particular. Stanley Matthews, President of the National Rock Wool Insulation Association, testified that 40 percent of the industry's capacity was shut down this past winter due to the natural gas shortage.

The second assumption is even more important: Predictions of expansion of fiberglass capacity to meet sharply increased demand assume that fiberglass companies want to greatly expand capacity. The industry witnesses before the House Housing and Community Development Subcommittee themselves raised this issue. Excess production capacity plagued the fiberglass industry in the early 1970s. Industry has not desire to invest in greatly expanded capacity, only to face a sagging market a few years later (when the tax credit expires and the Administration reaches its 1985 retrofit goals.) This fear of a temporary "surge" in demand for insulation products also deters potential market entrants from taking advantage of the Administration's program.

As the Congressional Budget Office points out:

"* * * manufacturers will not want to build to meet a sudden demand and then have their factories idle after the demand is met. A more efficient strategy (from the producers' point of view) is to build capacity sufficient to satisfy the new demand over a period that corresponds to the useful life of the plants they build. For this reason, insulation manufacturers may prefer to meet the insulation demand over a longer period than would be suggested by energy-conservation goals alone."

Another home insulation material in significant use is cellulose, typically shredded newspaper. In order to prevent fire danger, the shredded newspaper is mixed with a borax-based fire retardant powder amounting to 18-30 percent of the final product, by weight.

The cellulose industry can potentially expand capacity quickly, and at relatively low cost. Yet, while newspapers are abundant, the necessary borates are in short supply. As a report to the Massachusetts Department of Human Resources notes:

"A major industry-wide problem this past year has been the short supply of boric acid power, mined and marketed primarily by the U.S. Borax Company. Many manufacturers had to curtail production of insulation because of supply problems. U.S. Borax is attempting to increase its output but it is not delivering to new customers at present. A second major producer, the Kerr-McGee Company, is in a similar position. Both companies have allocation systems in which they are providing old customers at approximately 100 percent of 1976 purchases."

The three U.S. borate producers are U.S. Borax and Chemical Corporation, the Kerr-McGee Corporation, and Texas United Corporation. Of these, U.S. Borax is by far the giant, producing 700,000 tons of the 900,000 tons of borate produced annually in the United States.

There are alternatives to fiberglass and cellulose as insulation, but they do not promise to break the supply bottleneck in the next few years. Rock wool is an expanding insulating industry, although experts offer differing predictions on rock wool's future. Foamed plastics may eventually be a viable home insulation material, but present serious potential fire hazards.

Absent significant market substitutes for fiberglass and cellulose in the near future, two problems emerge: (1) The insulation oligopolies can take advantage of increased demand by exorbitantly increasing prices, and (2) some distributors of insulation attempt to cut corners, for example by selling cellulose without the necessary borate flame retardant.

There is no question that the fiberglass and borate industries have the market power to raise prices sharply. In 1970, 1974, and 1975, the fiberglass industry met slackened demand (due to the slump in housing construction) by increasing prices. In 1975, the price of fiberglass insulation rose 18.5 percent even while the volume of shipments declined 5.1 percent. (See "Analysis by Staff of the Joint Committee on Taxation of the Energy Proposals in the Administration's 'National Energy Act'".)

TAX CREDITS FOR COMMERCIAL BUILDINGS AND INDUSTRIAL CONSERVATION

The President's plan includes an additional 10 percent investment tax credit for certain energy saving purchases in buildings, factory processes and cogeneration. These additional tax credits will cost the Treasury \$400 million in fiscal year 1978. Businesses have been and will continue to find energy efficient buildings and machines economically justified because they cut costs. The proposal therefore represents an enormous windfall to business and a wasteful expenditure of tax dollars.

If higher energy costs fail to stimulate business to conserve energy, mandatory standards should be set, just as they are for new residential buildings.

Cogeneration of heat and electricity is economically justified and has only been stopped because of structural and regulatory barriers. With those removed, a 10 percent investment credit (costing \$50 million) is unneeded.

COAL CONVERSION

Price increases in oil and natural gas should encourage utilities and industry to move away from these scarce energy resources toward coal. In order further to stimulate the conversion of oil and gas, industries and utilities using oil or gas would pay a tax penalty for such use, by 1985 averaging \$1.10 per thousand cubic feet of gas (75 cents under the House bill) and \$3 per barrel of oil for industry, and about half these amounts for utilities.

The tax would be minimized, however, if efforts are made to convert to other fuels. Industry would be eligible for either a 10-percent investment tax credit for expenses incurred in converting to coal (or other fuels) or a rebate of any gas or oil tax paid up to the conversion costs. Any taxes paid by utilities would be set aside to help utilities accelerate the retirement of their oil and gas burning equipment and to help pay for coal conversion.

In this case, the plan contemplates an artificial stimulus toward coal conversion or other alternative energy sources. Industries and utilities would pay the higher tax only if they didn't convert from oil or gas to alternative energy supplies. If they did make conversion investments their costs would offset the "conversion" tax. We think this proposal makes sense and unlike the other business tax credits does not represent a windfall because of the additional direct tax imposed.

We realize that the energy problem is a serious one and that in a good faith effort to take some tangible action to deal with it this committee will be risking widespread public criticism if it passes only tax giveaways while rejecting the tougher conservation measures.

PROPOSALS THE COMMITTEE SHOULD REJECT

In the past, our urgent need for an energy policy has been seized upon as a pretext for passage of several special interest tax loopholes which various lobbyists have been peddling for several years. We strongly commend the Administration for omitting some of these "hardy perennials" from its program. We urge the committee to similarly reject them.

TAX SUBSIDIES FOR RECYCLING

Perhaps, the most wasteful of these giveaways is the tax credit for purchases of recyclable scrap. In spite of its phony label as a conservation measure, it has been opposed by virtually every conservation group. The list of its opponents has included the Sierra Club, Environmental Action, the Environmental Policy Center, Friends of the Earth, the Conservation Congress, the Consumer Federation of America, Taxation with Representation and the Department of the Treasury. Recycling credits have been debated and rejected by the floor of both the House and the Senate.

Some of the proposals rejected by the Senate in 1976 would have had a total cumulative cost of up to \$2 billion by 1984. The credit would preempt passage of more desirable recycling measures, and it would prompt only a negligible boost in recycling activity while bestowing a huge windfall on a few businesses for simply continuing their existing level of scrap usage. The additional investment credit for the purchase of recycling equipment apparently represents a much less costly approach but an equally ineffective one. Recycling has been retarded by the disproportionate costs of collection and transportation and by certain technical superiorities of virgin materials. An additional investment credit isn't likely to be adequate to overcome these constraints.

Distortions in our current tax structure should be eliminated through repeal of existing depletion allowances on hard minerals as part of the upcoming tax

revision plan—not by adding enormous additional complexities. In December of 1976, the National Commission on Supplies and Shortages concluded that: "In the absence of compelling evidence for its continuation, the Commission recommends the repeal of the percentage depletion allowance for minerals; the Commission opposes the creation of new tax subsidies for the consumption of recycled materials.

RAILROAD TAX BREAKS

Additional tax breaks will not help most of the railroads since only a handful now show consistent profits for shareholder reporting purposes let alone for tax purposes (after deducting all the special railroad tax breaks just enacted in 1976 such as special tunnel bore, grading, and track improvement writeoffs and removal of the 50-percent investment credit ceiling applicable to industrial firms). Many of these preferences are simply passed through to conglomerates which have taken over railroads for tax shelters.

COAL COMPANIES TAX RELIEF

In the past few years coal producing has become more than profitable enough to attract needed investment capital. Due to the OPEC oil price hikes the price of steam coal in spot markets or under new contracts has risen several hundred percent. According to Forbes magazine the return on equity earned by publicly held coal producers exceeds 25 percent which compares favorably with the 15-percent return of major oil companies and of industry in general. Sources such as Barrons and Forbes report that many major producers will be able to double their output without even having to seek substantial outside debt or equity financing.

The attractiveness of coal as an investment is shown by the fact that various corporations engaged in other businesses have in recent years acquired 15 of the nation's 20 largest coal producers. In fact 20 different oil companies have acquired various large and small coal companies. In 1975 Newsweek reported that in one Appalachia county 150 coal operators had become new millionaires.

Coal producers already receive special tax breaks similar to oil producers. They already save: at least \$300 million per year due to the coal percentage depletion allowance; \$50 million due to the immediate writeoff of development expenses of preparing a site for stripmining or of digging shafts for deep mining; and lesser amounts due to the immediate writeoff of exploration expenses and capital gains treatment on royalties.

TAX RELIEF FOR UTILITIES

We urge the Committee to reject any proposals which may be forthcoming to grant still more tax relief to utilities. It is extremely unwise for those in Washington to legislate blanket tax relief for the hundreds of public utilities across the country. The various public utility commissions are charged by statute with the duty of providing a reasonable rate of return to utilities—including a rate of return necessary to finance future capital requirements. They are the proper governmental body to determine the very specialized needs of each utility. The present investment credit for utilities and other suggested tax relief only interferes with that orderly regulatory process and misdirects resources. These tax breaks will also continue to remove profitable investor owned utilities from the tax rolls.

The following is taken from a 1975 report by the Environmental Action Foundation entitled "Phantom Taxes in Your Electric Bill."

"According to reports filed with the Federal Power Commission, the nation's 150 largest electric utilities paid a total of only \$505 million in Federal income taxes in 1974. Fifty-seven of these companies paid no Federal income tax at all in 1974. Those not paying Federal income taxes included several major utilities, including Duke Power Company, American Electric Power Company, and Philadelphia Electric Company.

"Pre-tax profits for the 150 utilities was \$6.8 billion in 1974. While the statutory tax rate for corporations is 48 percent, these companies paid an average of only 7.4 percent of their taxable income to the Federal government.

"In 1955, when accelerated depreciation was introduced, electric utilities paid more than \$1 billion in Federal income taxes, 48 percent more than 1974. During this 19-year period, when their Federal tax bill was halved, the utilities' annual revenues increased more than sixfold. According to the Federal Power Commis-

sion, Federal taxes as a percent of revenues have dropped from 12.7 percent in 1935 to 1.3 percent in 1974.

"In 1974, these same 150 power companies charged their customers for \$1.4 billion in Federal income tax. This is \$936 million more than they actually paid to the government. Much of this sum was passed on to utility stockholders in the form of extra profits, a transaction which walls outside the normal rate-making process.

"Of the 150 utilities investigated 122 charged their customers for more Federal income tax than they actually paid. For example, Commonwealth Edison in Chicago paid \$26 million in Federal income taxes, but charged its customers over \$100 million. Carolina Power and Light charged its customers for \$14 million in income taxes, even though it received a \$24 million refund from the Internal Revenue Service (IRS). Public Service Gas & Electric in Newark, New Jersey, charged its electric customers for \$13 million while it received a \$13 million refund of back taxes. And Philadelphia Electric received an \$11.2 million credit, but charged its customers for \$48 million in taxes.

"In 1974, the investment tax credit available to utilities was 4 percent, and could be applied to not more than 50 percent of the company's taxable income. In early 1975, the Congress increased the investment tax credit for utilities to 10 percent and removed the 50 percent limitation. Our 1974 figures do not reflect the effect of this increase. This expanded investment tax credit may exempt virtually all of the nation's electric utilities from Federal income tax as long as it is in effect.

"The reason why many of the taxes charged to utility customers will never be paid is that the power industry is growing rapidly in size. If a utility were not growing, it would eventually pay the same amount of tax to the government with accelerated depreciation as with straight line depreciation. But a growing power company is investing in new power plants which cost many times the original cost of the 30-year old plants it is retiring. Accordingly, the tax savings, from accelerated depreciation on its new plants are always much greater than the deferred taxes it must pay on its old plants. And the same will be true 30 years from now. Thus as long as a company keeps growing, it will continue to charge more taxes to its customers every year than it pays to the government.

"Some tax experts question whether it is appropriate for the Federal government to offer tax benefits to utilities. Utilities are required by law to make the investments necessary to provide the public with electricity. To the extent that tax breaks encourage investments beyond this necessary amount, such investments are wasteful. Furthermore, as regulated monopolies, utilities are guaranteed a fair rate of return on their investments. For these reasons, Treasury Secretary C. Douglas Dillon argued in 1962 that utilities need no incentive to invest and should not be allowed any investment tax credits.

"Congress partially accepted Dillon's reasoning in that year, allowing utilities an ITC of only 3 percent, compared to 7 percent for other industries. However, in 1975, Congress responded to the power industry's financial problems by allowing utilities the same 10 percent ITC received by other businesses. Further relief is clearly unneeded."

PARTIAL LIST OF SOME OF THE ELECTRIC UTILITIES WHICH PAID NO TAXES (IN 1974)

Companies	Paid	Charged to electric customers
Appalachian Power Co. (AEP).....	0	0
Blackstone Valley Electric Co. (EUA).....	0	0
Brockton Edison Co. (EUA).....	0	0
Cambridge Electric Light Co. (NEGEA).....	0	0
Canal Electric Co.	0	\$1,269,229
Carolina Power & Light Co.	0	19,329,878
Central Vermont Public Service Corp.	0	0
Connecticut Light & Power Co. (NU).....	0	0
Consolidated Edison Co. of New York.....	0	0
Fall River Electric Light Co.	0	0
Georgia Power Co. (SC).....	0	30,841,142
Granite State Electric Co. (NEES).....	0	110,553
Green Mountain Power Corp.	0	0
Hartford Electric Light Co. (NU).....	0	703,308
Holyoke Power & Electric Co.	0	12,460
Indiana & Michigan Electric Co.	0	0
Iowa Electric Light & Power Co.	0	6,307,640
Kansas Gas & Electric Co.	0	6,674,000
Kentucky Power Co. (AEP).....	0	1,779,682

PARTIAL LIST OF SOME OF THE ELECTRIC UTILITIES WHICH PAID NO TAXES (IN 1974)—Continued

Companies	Paid	Charged to electric customers
Kingsport Power Co. (AEP).....	0	0
Minnesota Power & Light Co.....	0	\$3,869,144
Missouri Edison Co.....	0	0
Nevada Power Co.....	0	0
Newport Electric Corp.....	0	72,825
Niagara Mohawk Power Corp.....	0	0
Northern States Power Co. (Minnesota).....	0	24,446,100
Ohio Power Co. (AEP).....	0	0
Potomac Edison Co. (APS).....	0	0
Public Service Co. of New Hampshire.....	0	1,402,830
Public Service Electric & Gas Co.....	0	3,251,499
San Diego Gas & Electric Co.....	0	0
Savannah Electric & Power Co.....	0	896,958
Tucson Gas & Electric Co.....	0	2,104,844
Utah Power & Light Co.....	0	1,377,951
Virginia Electric & Power Co.....	0	6,196,607
Western Massachusetts Electric Co.....	0	1,694,607
Wheeling Electric Co. (AEP).....	0	0
Wisconsin Power & Light Co.....	0	2,887,902
Wisconsin Public Service Corp.....	0	3,659,000
Total.....	0	118,888,075

FEDERAL INCOME TAXES PAID BY THE PRIVATE ELECTRIC UTILITY INDUSTRY, 1945-74¹

(Dollar amounts in millions)

	Federal income taxes paid	Total utility operating revenues	Taxes paid as a percent of total utility operating revenues	Changes in tax laws affecting utilities
1954.....	\$915	\$7,588	12.1	Accelerated depreciation permitted, 1954.
1955.....	1,064	6,360	12.7	
1956.....	958	9,054	10.6	
1957.....	956	9,670	9.9	
1958.....	970	10,195	9.5	
1959.....	1,119	11,129	10.1	
1960.....	1,218	11,920	10.2	
1961.....	1,306	12,604	10.4	
1962.....	1,362	13,468	10.1	3 percent investment tax credit established; accelerated depreciation increased, 1962
1963.....	1,412	14,180	10.0	
1964.....	1,486	14,991	9.9	
1965.....	1,489	15,820	9.4	
1966.....	1,552	16,959	9.1	
1967.....	1,511	17,985	8.4	
1968.....	1,655	19,405	8.5	
1969.....	1,585	21,085	7.5	3-percent investment tax credit repealed, 1969.
1970.....	1,233	23,128	5.3	
1971.....	1,051	26,027	4.0	4-percent investment tax credit established; accelerated depreciation increased, 1971.
1972.....	974	29,482	3.3	
1973.....	884	33,314	2.7	
1974.....	554	42,174	1.3	
1975.....	883	33,598	1.8	Investment tax credit increased to 10 percent, 1975.
1976.....	(?)	(?)		

¹ The figures in this table differ slightly from those in table 2 for 2 reasons. The entire power industry (rather than only the 150 largest utilities) is included, and taxes and credit on nonutility operations are excluded.

Note: An Environmental Action Foundation publication, "Phantom Taxes in Your Electric Bill—A Report on Federal Income Tax Avoidance by Electric Utilities."

Sources: Federal Power Commission, Internal Revenue Service.

EXEMPTION FROM THE MINIMUM TAX FOR OIL PRODUCERS

We urge you to reject the proposal to exempt individual oil producers from the minimum tax on income sheltered by intangible drilling deductions.

The suggestion that wealthy independent oil drillers should pay no minimum tax on income sheltered by fast drilling writeoffs is the most strikingly ill-advised

provision of the entire energy package. The minimum tax is a 15-percent tax on income that has otherwise avoided taxation because it is offset by tax preferences—and allowing oilmen to writeoff immediately the cost of successful wells, while other businessmen must capitalize their capital expenditures, is one of the unfairest preferences in our tax code. Although the energy package ostensibly calls for sacrifice from all, equally, it includes a \$30-80 million tax break for the wealthiest non-taxpayers in our country.

THE MINIMUM TAX IS VIRTUALLY THE ONLY TAX SOME OILMEN PAY

When the Congress passed a strengthened minimum tax on taxfree income last year most of the nation's oilmen were paying little or no regular income tax. In 1974, the House Ways and Means Committee actually saw tax returns of oilmen with incomes in excess of \$1 million who paid no federal income tax (see other examples set forth below). The reforms enacted last year were designed to insure that these individuals paid at least 15 percent in tax (equal to the lowest bracket for working people). The energy plan would allow these individuals to get off virtually tax free once again. That kind of action is what makes our tax system a disgrace, and we hope the Congress will reject this windfall to a powerful segment of the oil industry.

By ironic coincidence, recent disclosures of the President's voluntary 15-percent tax payment forcefully demonstrates that many individuals with significant income can often escape taxation completely in the absence of a strong minimum tax. Consequently, the President has indicated that his tax reform proposals will probably include a broadened minimum tax or some comparable device designed to assure that all wealthy citizens pay some tax. Yet the Administration's energy proposal directly contravenes this goal. We believe this contradiction arises from an initial failure on the part of the energy experts to understand just how miniscule the tax liability of oilmen is absent the minimum tax. Not surprisingly, the independents have fostered this misunderstanding by grossly exaggerating their tax burden.

The proposal protects the wealthy individual oil interests while cosmetically hitting doctors' and lawyers' tax shelters. It hits only those who use intangible drilling deductions to shelter their non-oil related income, while protecting the other 80 percent who use this tax break—those who shelter their oil and gas income. The President may have been told that this move would increase energy production, but energy tax experts indicate it will have minimal effect on oil production, while significantly undermining the fairness of the tax system.

EVEN WITH THE MINIMUM TAX INDEPENDENT OILMEN ARE BETTER OFF TAXWISE THAN ALMOST ALL OTHER INDUSTRIES

The deduction for intangible drilling costs allows oilmen to deduct a high percentage (usually around 70 percent) of the cost of a successful oil well in the year it is drilled. Deductible costs include the wages, fuel, hauling, and supplies connected with drilling a well. In fact, the only costs which are not immediately deductible are the salvageable pipes and pumping equipment. These expenditures qualify for the investment credit and depreciation. Of course dry holes are immediately deductible and not subject to any minimum tax.

This contrasts sharply with other businesses, which must capitalize the full cost of their long-life income producing equipment, and depreciate it over its useful life.

Thus a businessman who invests \$1 in equipment which will last 10 to 20 years only gets to write off 5 cents or 10 cents the first year (or perhaps 10 or 20 cents under special accelerated depreciation), while an oilman writes off 70 cents plus a portion of the 30 cents spent on depreciable equipment. Compounding the unfairness, come next year the oilman can ignore the fact that he's already deducted his 70 cents. He can actually begin writing off the same 70 cents all over again in the form of annual percentage depletion deductions—which clearly amounts to a "double-dip." What's more, percentage depletion bears no relation to actual costs. It is computed as 22 percent of gross income (not to exceed 50 percent of net annual income from each well). Yearly depletion deductions often add up to many times the cost of the well, which amounts to a "triple-dip," "quadruple-dip," and so on. If any regular tax liability still exists after using these writeoffs, it can often be erased by the investment credit (which can eliminate totally the first \$25,000 of tax owed to the government, plus up to 50 percent of any liability above \$25,000).

In recognition of this situation Congress applied the minimum tax to percentage depletion in 1969 and to intangible deductions in 1976. The energy pro-

posal would retain the minimum tax as to depletion, but the independents are presently relying on intangibles to shelter their incomes to a greater extent than depletion.

THE RATIONALE FOR RESTRICTING THE MINIMUM TAX IS BASED ON MISINFORMATION

Corporations and individuals have the identical tax breaks for intangible drilling. Neither pay much tax, but the Congress made this tax break subject to the minimum tax on individuals. If the President is concerned that the corporations have a competitive advantage he should advocate applying the minimum tax to intangible drilling deductions of corporations.

In fact, any independent can easily incorporate to avoid the minimum tax. But this would necessitate payment of a salary from the corporation to cover living expenses. If drilling is done by the corporation rather than the individual the individual's salary will not be sheltered by drilling deductions and income taxes would be due. The almost complete tax shelter is the major reason individuals choose not to incorporate.

If major oil companies only pay about 5 percent in tax on their vast incomes, it is "tax reform" to say wealthy individuals should pay no more on the grounds of fairness? What's more, with regard to competition, the depletion allowance which was repealed as to the majors, has been retained for the independents.

The independents allege that the minimum tax is a "tax on expenditures." This is simply untrue. The minimum tax applies only to the income that is sheltered by artificially high intangible writeoffs.

The independents allege that the tax is confiscatory because it (somehow) adds up to more than 100 percent of their income and this produces a "negative cash flow." But they define "income" by subtracting percentage depletion and intangible drilling deductions. No other businessmen calculate their "income" this way. In fact neither do oilmen. In their financial statements prepared for bankers and shareholders they capitalize all the costs of drilling.

If any other businessmen were to try to duplicate the oilmen's calculation they would writeoff immediately the total cost of any new equipment or new building which they have just placed in service. Comparisons of the financial statements of oilmen and other businessmen earning comparable economic income suggest that, even if oilmen pay the minimum tax, the liability of the non-oilmen may frequently be 400-500 percent as large as the oilman's. (See following example No. 3.)

EXAMPLES OF OILMEN WHO PAID LITTLE OR NO REGULAR INCOME TAX

Example No. 1.—The Senate Finance Committee Hearings on Tax Reform, March 1976, p. 776, contain the following certification from Arthur Young and Co. C.P.A.s:

"Column (1) illustrates the results for 1974 of an active independent oil and gas operator who followed the practice of maximizing his drilling to the point of reducing his taxable income to a negligible amount. He therefore paid only a minimum tax on the preference items of percentage depletion and capital gains. (This is not to imply that all independent producers historically followed the practice of reducing taxable income to a minimal amount.)"

Oil and gas sales less severance and ad valorem taxes, operating costs, depreciation intangible drilling costs, delay rentals, overhead, etc.	\$1, 500, 000
Depletion (22 percent of gross income limited to 50 percent of net—effective rate 18 percent).....	—850, 000
Adjusted gross income before additional drilling.....	650, 000
Additional drilling to reduce taxable income to zero.....	—617, 000
Adjusted gross income.....	33, 000
Itemized deductions.....	—30, 000
Personal exemptions.....	—3, 000
Taxable income.....	0
Income tax payable (from tax rate schedules).....	0
Minimum tax on depletion allowance.....	84, 000
Total Federal tax.....	84, 000
State income tax (assumed 5.5 percent effective rate).....	0

(Congress has since provided that percentage depletion on oil wells and some gas wells may not exceed 65 percent of taxable income, thereby making such tax avoidance more difficult. But tax avoidance persists as shown by the following 1976 example.)

Example No. 2.—Under the Freedom of Information Act we recently obtained the following financial statement of an individual independent producer which had been submitted to the Treasury to demonstrate the impact of the minimum tax:

Income	\$2,093,223.25
Business deductions (including depreciation of equipment) other than intangible drilling	-492,824.81
Operating profit before intangible drilling	1,600,398.44
Intangible drilling deduction (of this amount only about \$25,000 represents dry holes)	-1,025,698.05
Percentage depletion	-410,103.00
Personal exemptions and deductions	-18,000.00
50 percent of capital gains (deductions)	-11,261.03
Taxable income	135,338.00
Preliminary regular tax (utilizing income averaging)	64,028.00
Less investment credit	-42,765.00
Income tax payable	21,263.00
Minimum tax payable (roughly 15 percent of drilling and depletion deductions)	204,474.00
Total Federal tax	225,737.00

Example No. 2 indicates a regular income tax payment of only 1 percent. With the minimum tax, actual taxes paid on \$1.6 million income is only 14 percent. While some of the minimum tax payment is levied on depletion, most is on income sheltered by intangible deductions. In this example, repeal of the intangibles portion of the minimum tax will result in a total tax burden of no more than 5 percent.

Example No. 3.—If a businessman engaged in some industry other than oil had roughly the same income and expenses as the above oilman and his new investment happens to equal the amount the oilman invests in both intangible drilling expenses and tangible pumping equipment his tax might be computed roughly as follows:

Income	\$2,093,223.25
Business deductions (including depreciation) other than depreciation writeoff of new plant and equipment completed this year	-492,824.81
Operating profit before depreciation of newly completed plant and equipment	1,600,398.44
Personal exemptions and deductions	-18,000.00
50 percent of capital gains (deduction)	-11,261.03
Depreciation writeoff of plant and equipment completed this year (assumes 20-yr. useful life and liberalized double declining balance computation method)	-102,569.00
Taxable income	¹1,468,568.41
Regular income tax per IRS table (approx.)	998,000.00
Investment credit (assumes hypothetically that some percentage of expense represents nonqualifying buildings and structures)	-100,000.00
Federal income tax payable	898,000.00

¹ Calculation ignores State income taxes.

INDEPENDENT PRODUCERS ARE ENJOYING RECORD PROSPERITY AND NEED NO FURTHER TAX BREAKS TO ATTRACT CAPITAL

A December 2, 1974 article in Barrons Financial Weekly describes the independent's advantageous position as follows:

"At the moment, the independents are enjoying their greatest prosperity within memory as the result of towering oil and gas prices. Unlike the big international companies, they do not have extensive interests abroad and are not prey to the grasping tax and royalty collectors of OPEC countries. Nor, since they are unburdened with refineries and marketing organizations, are they plagued by the mounting competition and crude allocation difficulties which, lately, have begun to erode the inventory profits piled up in the early months of this year by the integrated concerns."

The Oil and Gas Journal recently published data on 14 small producers showing that their 1976 income increased by an average of 30 percent over 1975. The independents are getting higher prices than the majors, mainly because a much larger percentage of their production is "new oil." Producers who were in business profitably when oil sold for \$3 per barrel will not be squeezed out by the payment of a minimum tax on their otherwise sheltered profits.

A survey of 75 small over-the-counter and American Exchange listed independents showed that in 1974 their return on equity capital averaged around 23 percent (as compared with 14 percent for all manufacturing industries). Less than 20 percent of these paid any regular income tax at all.

The independents allege that drilling will be sharply curtailed by the minimum tax. But, in fact, the number of drilling rigs in use has risen roughly 25 percent since the minimum tax was applied to income sheltered by excess drilling deductions. The number of rigs in operation has recently reached a 20 year high and has continued to climb through July 1, 1977.

For all these reasons, we urge the Committee to reject the President's ill-advised proposal, and to retain the minimum tax on profits sheltered by intangible drilling deductions.

PLOWBACK CREDIT AGAINST TAXES DUE OR ADDITIONAL TAX INCENTIVES

In the past, energy companies have argued for "plowback provisions" for any new taxes imposed upon them. The Committee should reject all such proposals. A plowback credit against the wellhead tax on oil and gas producers will only transfer money from consumers to producers. Producers are already spending a great deal on new investments. A plowback provision simply forgives taxes in exchange for investments they are making now because of the promise of higher profits.

Of course a plowback provision will increase the petroleum industry's cash, but presently there is no need for taxpayers to subsidize the industry because there is no capital shortage within the petroleum industry.

In its Project Independence Report (Nov. 12, 1974 Final Report the Federal Energy Administration concluded that:

"The oil industry (even), under the accelerated supply scenario, will be able to finance internally all of its investment requirement and still have additional funds to assist other energy projects outside the oil and gas industry."

An early draft (Oct. 14) of this study stated that the amount available to lend or invest in other industries would total \$96 billion by 1985.

The purchases or attempted purchases of MARCOR and Irvine Realty Corp. by Mobil for \$1½ billion in cash and \$300 million in cash respectively and of Ringling Brothers Circus and ONA Financial Corporation by Gulf and the purchase of various coal companies by 19 oil companies in the past decade indicates the absence of a capital shortage. Within the past year or so Atlantic Richfield (ARCO) offered \$165 million for the stock of Anaconda Copper. Standard Oil of California tried to buy stock of Amax Corporation, a coal producer, for \$350 million in cash and Gulf Oil tried to buy giant Rockwell International Corporation which has yearly revenues of \$4 billion. Gulf's President Bob Dorsey, stated: "In the past we put 40 percent of our investment abroad, but now that those areas are shut off to us and now that domestic demand is no longer growing so fast, we have more capital available for diversification."

An August 15, 1977 Forbes article was titled "Does Exxon Have a Future? The Day is Coming When Oil Alone Can No Longer Absorb Exxon's Vast Cash Flow. What Happens Then?" Forbes notes that "enormous amounts of money will roll into Exxon in the early years of North Sea Production * * * and from

Alaska's North Slope. This for a company that is virtually debt free. Exxon has long term debt of \$3.7 billion; on the other hand it has \$5 billion in cash and marketable securities * * * Exxon's huge pileup of assets cannot be blamed on any reluctance to spend money on oil. It plans laying out \$4.4 billion a year for capital projects from 1977 through 1981. * * * But even the continental shelf is unlikely to absorb the \$7 billion a year cash flow that Exxon will have within 5 years. * * * Still the money will pile up. Exxon President Howard C. Kauffman recently told Dalas security analysts that the company's problem is not cash but lack of opportunity."

Mr. Sharbaugh the Chairman of Sun Oil was recently quoted by the Wall Street Transcript as follows: " * * * In the light of a very long-term future * * * the decline of North American producibility of reserves is accelerating, and it should be accelerating by 1985. With a massive financial and management capacity base to work from, we will have to develop well before then some alternatives for ourselves in businesses other than oil and gas. Now the first round of those is likely to be other energy business. * * * But we should be prepared to go well beyond the energy business."

What's more, the independents also have adequate cash flow for capital investment. This is shown by the data cited above in the discussion of the minimum tax on the independent's drilling writeoffs. The generous petroleum pricing provisions will further enhance their position. For example, in 1976, Mitchell Energy and Development (an American Stock Exchange Corporation) earned a 30 percent return on equity and its pretax earnings have grown ten-fold (1,000 percent) since 1971. Yet according to Forbes July 1, 1977, "George Mitchell is in luck in that about half his company's contracts to deliver natural gas expire in December. The current contract price is about 33 cents; if the Carter energy plan goes through, the renewal price could be as high as \$1.44. If deregulation goes through the sky's the limit."

The attached June 1, 1977 Forbes article outlines in detail the substantial incentives to find new production which are embodied in the Administration's program.

Besides being unneeded plowback provisions are bad tax and energy policy. In explaining why the Ford Administration rejected a plowback proposal in their windfall profits tax, former Treasury Secretary William Simon stated:

"The proposal does not include a credit for so-called 'plowback' investments, nor does it include exemptions for certain classes of producers. Plowback is not justified because the amounts oil producers will retain after the tax as it is structured, will provide a price incentive sufficient to attain our energy independence goals. To put it another way, there is no convincing evidence that permitting a plowback credit will produce significantly more energy than not doing so. Further, a plowback credit means that persons already engaged in oil production can make investments with tax dollars supplied by the government, while new investors must use their own money. We do not believe that kind of discrimination and anti-competitive effect can be justified.

"In the case of different classes of producers, we simply believe that a windfall produced by cartel prices is a windfall to large and small producers, high and low cost producers located everywhere. Producers all receive a cartel price and not a free-market price.

"The issue of plowbacks and special exemptions ultimately boils down to whether windfall profits should go to oil producers or to the public in the form of tax reductions. The permanent tax reductions proposed depend upon the government receiving these revenues. If the revenues are curtailed, the tax reductions will need to be curtailed, too. We have tried to design a tax that will not inhibit those investments in oil production which are economic and which are needed to reach our goals. If we believed that the tax would inhibit needed investment, we would not propose it. Plowback credits and special exemptions would undoubtedly make existing oil producers wealthier than they would otherwise be, but would not significantly increase oil production. It is taxpayers generally who pay the prices that produce the windfall, and the revenues should go for the benefit of taxpayers generally."

APPENDIX

- I. A Truck Boom That Won't Stop, Businessweek, July 11, 1977.
- II. Insulation: A Boom Too Soon, Newsweek, August 15, 1977.
- III. Council Fears Price Increase In Fiberglass Insulation, Council on Wage and Price Stability, June 14, 1977.

IV. FTC Scrutinizes Home-Insulation Industry Amid Talk of Preventing "Windfall" Profits, Wall Street Journal, July 19, 1977.

V. Consumer Unit Hears Testimony on Safety Proposals for Insulation, New York Times, August 15, 1977.

VI. Go Get It, Fellows!, Forbes, June 1, 1977.

Chart I. Family Income Spent on Energy.

Chart II. Effects of Solar Tax Credit.

A TRUCK BOOM THAT WON'T STOP

If auto industry executives ever thought that the surge of pickup truck and van sales was a flash in the pan, they do not feel that way any more. "The truck market is literally exploding," says Al D. Imber Jr., Boston zone sales manager for Chrysler Corp.

June will make the seventh straight month in which light truck sales (pickups and vans) will set a record. They are pacing total truck sales, which are running about 20 percent above last year (while autos are 13 percent ahead) and are on the way to 3.8 million units. With medium and heavy trucks beginning to sell now after a 3-year slump, the big truck side of the industry is helping to set the pace (BW—June 7, 1976).

But 90 percent of the truck market is on the light end, and here is where the spectacular growth is taking place. The Chevrolet Motor Division of General Motors Corp., for example, now sells 1 light truck for every 1.8 autos. In 1960 this ratio was 1 for every 6.3 cars.

Family sales.—Detroit's marketing executives can supply plenty of reasons for the sales boom—some call trucks "adult toys"—but they are truly stunned by the rapid growth rate. They saw the beginnings of the truck craze in California—where many auto trends start—during the 1960's, when young people began converting trucks into personalized vehicles and even into homes on wheels. The youth market is still an important factor, but trucks are finding big new markets elsewhere.

Pickups are popular with those who want to haul snowmobiles and motorcycles. But they are also appealing to urban and suburban families that have no such specific uses for them.

"If you clean out your garage or do some gardening, you can't put the trash in the back of your LTD to drive it to the dump," says John Lynch, truck sales manager at Dave Dinger Ford Inc. in Braintree, Mass. "But you can put it in the back of a truck." A 90-percent chunk of the light truck market is controlled by mini-pickups from Japan.

Indeed, truck marketing executives report that only one-third of all light trucks now sold are used primarily as commercial vehicles—the reverse of the situation a decade ago. Most are now used for personal transportation. Ford, for instance, reports that fully one-half of the trade-in vehicles for its new pickups are cars. And cars make up 60 percent of trade-ins for vans.

\$16,000 van.—According to L. P. Schinzing, truck merchandising manager for Chevrolet, people are buying pickups and vans, in part, as a means of avoiding the shrinking size of Detroit's sedans and station wagons. "I love to kid the passenger car sales guys," he quips. A truck, he adds, "has become socially acceptable. It's no longer seen as a big monster."

That view is supported by the expensive options that buyers load on their trucks. Some 90 percent of Chevy light truck buyers pay extra for power steering, 75 percent for automatic transmission, and 50 percent for air-conditioning. A Van Nuys (Calif.) Dodge dealer says he recently sold a van for \$16,000—fully rigged with a television, "Pong" game, and stereo.

While few vans are decked out so completely, the sizzling demand all over the U.S. has pared inventories to the bone. On June 20 some producers had less than 25 days' supply of vans. As a rule, Detroit likes to have 60 days. And inventory for pickups, which is at about 40 days' supply, is not much better. Indeed, with 1977 supplies so tight, Ford asked dealers in April to begin ordering 1978 models for fall delivery.

All auto makers have their van production plants working overtime and on Saturdays. Chrysler lost some 20,000 units of production during a six-week local strike at its St. Louis assembly plant that ended June 11. "We don't know how high is up in the van market," says J. Carver Wood, Ford's light truck operations manager. However, to challenge the market dominance of Chrysler's Dodge vans, Ford plans to add 50 percent more van manufacturing capacity, and GM will add about the same amount of new capacity. "We just don't know how many vans we could sell if we had enough," says Wood.

INSULATION: A BOOM TOO SOON

Of the dozens of proposals in Jimmy Carter's ambitious energy plan, none seemed more straightforward and less controversial than the incentives for home insulation. By offering homeowners a chance to recoup part of their investment in better insulation, Administration energy planners hoped to spark an insulating boom that would reduce fuel consumption in the home and help restrain the nation's growing appetite for imported oil. But now energy officials are wondering whether their strategy can pay off any time soon. For even though the consumer demand is there, the insulation clearly is not. And the reason, says an executive of one company that manufactures the stuff, is "the most monstrous insulation shortage facing us that I have ever seen."

As passed by the House last week, the National Energy Act will provide a tax credit of up to \$400 and a subsidy for low-interest loans to encourage home insulation. It also requires utilities to advise customers on their insulation needs and, in some cases, even to do the actual installation and handle the financing. But there is a growing concern that the legislation may offer too much, too soon. In addition to worsening an existing shortage, the growing demand is also reviving old questions about the safety of insulation materials. Later this month the Consumer Product Safety Commission will hold hearings to examine the risks, including the charge that fiberglass particles cause cancer—an allegation that producers have long denied. And shoddy installation may also prove troublesome, with the legislative boost to insulation serving as a "virtual invitation to unscrupulous, marginal home-improvement contractors," says Federal Trade Commission staffer Robert B. Reich.

Even without the added stimulus from Carter's bill, insulation is in short supply. For instance, cellulose insulation, a product made principally from shredded paper, obviously requires treatment with a flame retardant before it is installed—and production of boric acid, the retardant used, cannot be expanded fast enough to keep up with demand. Fiberglass insulation manufacturers are in a similar bind: their plants now operate near full capacity and they are already rationing supplies to customers. Major plant-expansion programs are in the works, but industry officials say they will take years to complete. Meanwhile, "the whole industry is backlogged," says an executive of Certain-Teed Corp., one major producer. "Right now we're capacity-limited and all those people who want insulation are going to have to wait."

Collusion?—As a result, prices are already rising—and the FTC suspects the shortage may not stem simply from demand pressures. Last week, the commission launched an investigation into collusion by the big three fiberglass manufacturers—Johns-Manville Corp., Owens-Corning Fiberglas Corp., and Certain-Teed. It isn't the first time the FTC has crossed swords with insulation producers: in 1963 it charged several cellulose-insulation makers with faking laboratory claims, and last May, it charged Owens-Corning with making unsubstantiated statements about the money-saving value of its fiberglass.

But the main problems attending a surge in demand will probably be on the local level. Soaring heating bills have already proved a boon to insulation installers, in Massachusetts, for example, the number of insulating firms doubled in the past year, and in Wisconsin, says a state official, new companies are "sprouting like mushrooms." So are the customer complaints, and consumer-protection officials worry that a government-fed surge in home insulation will only make matters worse.

Some unscrupulous companies skip on—or even skip entirely—the application of flame-retardant chemicals to cellulose insulation, and others take advantage of the shortage to jack up installation prices and cut corners. Wisconsin's consumer-protection bureau, for instance, documented cases of a \$1,000 difference in bids for the same job using the same material. And in Denver, the district attorney's office eventually shut down one firm marketing a \$2,000-plus "energy conservation system" that consisted simply of cellulose insulation, an attic fan and caulking—materials that normally would cost no more than \$500.

False Promises.—Consumer watchdogs are finding other examples of false and misleading advertising as well. One increasingly frequent complaint has to do with so-called "R-value"—a numerical measure of the insulation's capacity to resist the flow of heat. Fiberglass insulation, for instance, has an R-value of four per inch of thickness; according to a recent Federal study, it takes between 7 and 8 inches of the material to maximize fuel savings. But some home-insulation

installers inflate potential savings in their ads—and still others fail to advertise the R-value at all. "Without the R-value," says FTC attorney San Simon, "it makes it impossible for the consumer to comparison-shop."

Currently, there are no Federal standards for home insulation, prompting consumer-protection officials to suggest the standard caveat: let the buyer beware. The Massachusetts attorney general's office goes so far as to warn in a media campaign: "If it sounds too good to be true, it probably isn't." But then, given the problems and pitfalls it has already encountered, the same verdict seems to apply to Jimmy Carter's plan to insulate the nation's homes.

[From the Executive Office of the President, June 14, 1977]

COUNCIL ON WAGE AND PRICE STABILITY,
Washington, D.C.

COUNCIL FEARS PRICE INCREASE IN FIBERGLASS INSULATION

The Council on Wage and Price Stability fears that passage of legislation granting tax credits to encourage home insulation would place added pressure on an already tight supply of fiberglass insulation manufacturing for the next 18 months, unless the program is phased in gradually.

This concern is expressed in a study released by the Council today.

It is the view of the Council that production of fiberglass insulation could not be increased enough to meet rising demand in the next year if the legislation is approved without provisions to prevent production bottlenecks. There are few satisfactory substitutes for fiberglass in home insulation. Thus, the result would be that the chief beneficiaries of the tax credit this year would be manufacturers of fiberglass insulation. The Council has no quarrel with the idea that encouraging home insulation is necessary for the conservation of energy. Its concern is only in avoiding sudden price pressures in an industry already operating close to capacity.

Three firms produce 80 to 85 percent of all fiberglass insulation material: Owens-Corning, Johns Manville, and Certain-Teed. While two of the firms expect to have additional capacity available to produce insulating materials by the end of 1978, they are now operating near peak utilization.

FTC SCRUTINIZES HOME-INSULATION INDUSTRY AMID TALK OF PREVENTING "WINDFALL" PROFITS

(By Charles J. Eija)

In one way or another, most stock groups perceived as "energy plays" after President Carter outlined his long-range proposals on April 20 have proven highly controversial. One of the few exceptions has been the insulation stocks.

Indeed, despite close committee votes in the House recently, proposed legislation to encourage greater use of home insulation as a way to save energy has been advancing. The House Commerce energy and power subcommittee voted last week to require most homes to meet federal insulation standards by 1982. And the House Ways and Means Committee last week approved a tax credit of up to \$400 to homeowners who install \$2,000 worth of insulation in their residences.

Stocks of three companies that dominate the home insulation business nationally—Owens-Corning Fiberglas, Johns-Manville and CertainTeed—have fared well this year, relative to the rest of the market, as investors continue to anticipate favorable action in Congress.

Precisely because the three companies are so dominant, however, clouds are gathering on the horizon. It's too early to say they signal a full-blown storm but the talk in Washington centers on possible consideration in Congress of ways to prevent a "windfall" profits situation among home insulation producers.

In a recent report to Congress, the Federal Trade Commission's energy task force expressed concern over apparent concentration in the industry and the possibility that the new energy policy will lead to sharply higher insulation prices for consumers. The FTC staff is in the preliminary stages of preparing a proposal for a formal investigation of the insulation industry.

The Council on Wage and Price Stability expressed similar concerns yesterday in a 12-page study concluding the tax credit would "place added pressure on an

already tight supply of fiber glass insulation" over the next 18 months "unless the program is phased in gradually."

Robert Reich, director of policy planning at the FTC and a cochairman of the FTC energy task force, says the group found that the insulation industry "is quite heavily concentrated."

About 80 percent of home insulation materials are accounted for by glass fiber. The FTC task force study, which was done from publicly available data and was preliminary in nature, shows that Owens-Corning had about 50 percent of the glass fiber insulation market and that Johns-Mansville and CertainTeed shared the other 50 percent, he says.

"The preliminary work shows that rates of return in the industry haven't been excessive in the past," says Mr. Reich, "but there do appear to be severe barriers to new entrants. The barriers are cost, competitive technology and industry know-how.

"Although existing patents on the basic process have expired, the three major producers hold new patents which significantly increase their efficiency."

George M. Shriver 3rd, analyst with Research from Washington, a unit of Smith, Barney, Harris Upham & Co., believes that FTC concern will lead the agency to investigate how the dominance of the three producers has been maintained.

"The objective would be to develop evidence that would support an FTC complaint with compulsory patent licensing as a possible remedy," he says.

However, Mr. Shriver is telling Smith Barney clients that FTC litigation would be a long, roundabout way to prevent so-called "windfall" profits.

"The real question, from an investment point of view, is what safeguards Congress will fashion to protect consumers from rising home insulation prices," Mr. Shriver says, "The near-term significance of the FTC (task force) report, then, is its role in raising a warning flag to Congress that a potential problem exists and in outlining the boundaries of that problem."

Mr. Shriver believes there may be other ways than forced licensing to control costs. "Congress could consider standards similar to the maximum-allowable-cost system used for the drug industry," he says.

The FTC's Mr. Reich, who has testified before several congressional committees recently, says there is "considerable concern" among some Congressmen that the tax credit on home insulation "might be tantamount to a transfer of wealth from the government to fiber glass producers."

While the task force didn't take the position that producers should be made to license others under their patents, Mr. Reich says its report carries "a strong implication that the FTC ought, at least, investigate the possibility of requiring" patent licensing.

"We interviewed a number of other companies," he says, "and were told that it would take 10 years and \$80 million for a new producer to enter the fiber-glass-insulation industry with one plant unless the producer had access to the newer technology.

"Our preliminary inquiries also showed that at least four home-building product manufacturers would be interested in entering this industry if they could get hold of the technology and the plant know-how. Capital wouldn't be a barrier in these cases.

"Meanwhile, we found in our preliminary look at the situation that the effect of the short-term increase in demand likely from President Carter's energy proposals and the tax credit would be to increase insulation prices substantially, given the barriers to entry that we see."

CONSUMER UNIT HEARS TESTIMONY ON SAFETY PROPOSALS FOR INSULATION

(By Francis Cerra)

Special to The New York Times

WASHINGTON, August 22.—Consumers in the market for home insulation have no protection against unscrupulous or inexperienced merchants who may sell them flammable insulation or who may install it improperly, the Consumer Product Safety Commission was told today.

In a crowded auditorium at the General Services Administration building here, the five commissioners heard testimony on a petition for safety standards on various types of insulation.

The petition was filed in October by the Metropolitan Denver District Attorney's consumer office, after that office had investigated a series of fires linked to the use of cellulose insulation that had not been treated adequately for flammability.

Conceding that a recent boom in consumer demand for insulation has spawned numerous small installers and manufacturers who may have little interest in quality control, nearly all the witnesses, including some industry representatives, urged that some standards be imposed.

Most also agreed that a corresponding shortage of insulation materials had increased the possibility that unscrupulous operators would install untested or untreated products that consumers could not distinguish from proved materials.

"I want to stress that there is reason to be concerned about the safety of some insulation products and about their safe installation as well," a Federal Energy Administration official, Paul London, told the commission in urging them to set standards.

He added that the situation "could become even more serious" if the Carter Administration's proposal to give tax credits to people who install insulation becomes law.

Philip S. Stern, a consulting engineer and investigator for the Denver consumer office, gave the commission a demonstration of possible fire hazards associated with insulation. Using a propane torch, he showed that cellulosic insulation—which is usually made from newspaper—would burn readily if the insulation was inadequately treated with a chemical fire retardant. The sample he burned was taken from an attic in a Denver area in which 100 homes in a low-income housing project had been reinsulated with a defective product. The company that did the work is out of business.

Mr. Stern also showed that although fiber-glass insulation is fire retardant, the paper backing on it, which serves as a vapor barrier, burns readily. Current voluntary fire standards for fiber-glass insulation do not cover the vapor barriers.

Mr. Stern also discussed problems with another type of insulation, urea formaldehyde, a plastic foam material that is pumped into walls in a liquid form and then "cures" or hardens. Improper mixing of the foam by installers, who do the mixing at the job site, can cause the substance to give off noxious formaldehyde gas. In one Denver case, the gas made a home unliveable for months.

Charles D. Mesigh, a representative of the Society of International Cellulose Insulation Manufacturers, told the commission that trade groups have no way of guaranteeing that the numerous small manufacturers adhere to voluntary industry standards. "We are asking the commission for a mechanism to enforce these existing standards throughout the industry," he said.

[From Forbes, June 1, 1977]

GO GET IT, FELLOWS!

There's a lot more oil and gas waiting to be found in the U.S. For all the moaning and groaning you've heard, President Carter's energy program does give oilmen powerful incentives to find it.

Many businessmen were disappointed that President Carter's energy program did not permit the price of domestic oil to rise to world levels. But it is wrong to conclude, therefore, that the program does not contain any worthwhile incentives for finding oil and gas. The program does contain a very major incentive: The price of newly discovered oil would be allowed to float up toward world prices. This is a hefty incentive indeed. The world price at present is \$13.50 a barrel, while under present laws and regulations "new" U.S. oil brings only \$11.28. The extra \$2.22 ought to make a great deal of difference toward producing the new oil and gas the Administration privately concedes the U.S. needs for the rest of the century.

Natural gas? There are incentives here, too. "New" new gas would be price controlled at \$1.75 per thousand cubic feet. This is less than new gas produced in Texas sells for in Texas these days (intrastate gas would be brought under the same ceilings as interstate gas under the Carter program). But it is considerably more than gas sells for elsewhere in the nation today. The new price makes the interstate market attractive and assures drillers—who have to see \$1 per mcf before they'll even think about drilling these days—that the price trend for gas is up in the U.S.

You would never realize all this from reading most accounts of the energy program, which tend to put a gloomy interpretation on the program's incentive aspects. You would never realize it, either, from reading the public pronouncements of most oilmen. But don't be deceived. Privately, many oilmen will concede that—for new oil at least—the program contains strong incentives. Why, then, is the industry crying poor mouth? In large part, because it knows too well that its open approval would amount to a kiss of death.

The world market price for oil, which would be adjusted continually for domestic inflation, is the kind of money and policy that is likely to bring about an increase in new-field exploratory drilling. This kind of drilling has been declining since 1974, according to Petroleum Information, Houston's influential statistical service. PI points out that while 25,794 oil and gas wells were drilled last year, the number of them that were in new fields—attempting to establish new reserves—fell 3 percent, to 6,289.

There is more drilling going on in the U.S. today than at any time in almost 20 years, but the trend has been toward reworking old territory, pumping more from reservoirs that were not payworthy when oil was much cheaper. This kind of drilling does not add to proven reserves.

The Carter program means to shift the emphasis to true exploration. If the program—or the pricing part of it—gets through Congress, the way is clear economically for drillers to go deeper into the Gulf of Mexico and to the frontier areas on the U.S. outer continental shelf.

It costs between \$6 and \$8—from lease purchase through production—to bring in a barrel of new oil in the U.S. today. At \$11.28, the more difficult parts of the game may not be worth the risk; at \$13.50, indexed to inflation, they may well be. Oilmen privately concede the price is an incentive. Energy Secretary James Schlesinger is certain: "The oil companies can make more money in the U.S. than anywhere else in the world," he says. After all, the Georges Bank off Massachusetts is no tougher or riskier than Britain's North Sea.

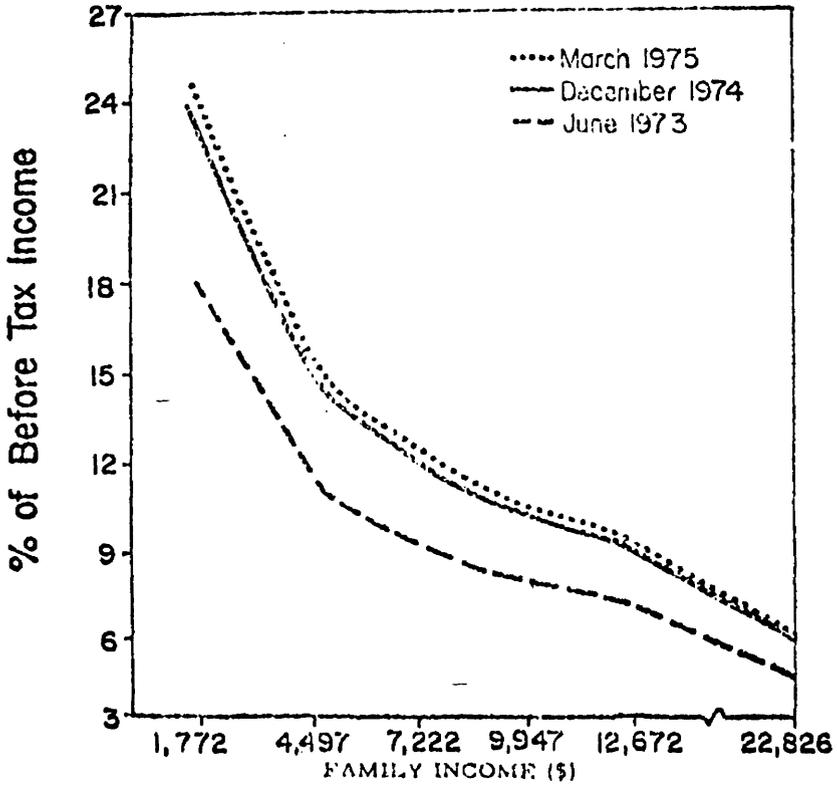
Is the oil there for the finding? A good deal certainly is. The U.S. Geological Survey estimates that, at a statistical mean, there are 82 billion barrels of undiscovered recoverable reserves of oil in the U.S. That dwarfs the current 39 million barrels of proven reserves. The Geological Survey also estimates that 484 trillion cubic feet of natural gas remain to be discovered—roughly equal to the total U.S. gas production to date. Exxon is a little more conservative in its estimates of attainable new reserves, preferring 63 billion barrels of oil and about 287 trillion cubic feet of gas. Shell Oil, on the other hand, is a bit more optimistic than the Geological Survey. It is a choice of riches.

And the oil companies have the cash flow ready and waiting to plunge into a new round of exploration. Exxon alone is running a cash flow of more than \$4 billion a year; Mobil, Texaco and Standard of Indiana are each at \$1.5 billion. The North Sea and North Slope are producing, beginning to return the investments made in them by the oil companies since the mid- to late-Sixties. The costly Alaska pipeline will begin throwing off cash rather than swallowing it. The industry's capital and exploration budget for this year runs to \$30 billion, estimates Dallas' authoritative Energy Management Report. In 1973, before the oil price rise, it stood at \$9 billion. The oil companies want to put it into exploration in the U.S. because geologically its attractiveness is second only to the Persian Gulf, and politically there is no place as attractive.

Frederick Z. Mills, the respected oil services and equipment analyst of Rotan Mosle Inc., has just taken a look backward and forward. He notes that 1956 was the last time the major oil companies plowed back as great a percentage of their wellhead revenues for drilling producers. That was also the year when U.S. oil and gas prices began a long decline in real terms and the majors began in a big way to shift their exploration overseas and to put their investments into refining, transport and marketing and into diversification, importantly in chemicals. But now wellhead revenues in the U.S. are rising again, and Mills sees the majors putting more of their rising revenues into U.S. drilling, not just this year, or next, but out to 1990.

Last year the oil industry pumped up \$1.1 billion for leases in the Baltimore Canyon off New Jersey. That nothing has happened off the New Jersey coast to date is not the industry's fault, but is due to a court battle in which environmental groups and the Long Island counties of Nassau and Suffolk are trying to prevent development, preferring to get their oil and gas from offshore Galveston, Tex.

CHART I.—Percent of before tax income spent on energy by urban and rural families and single customers



Source: "The National Energy Plan: A Critique" by Barry Commoner.

CHART II.—Effects of solar tax credit

YEARS TO RECOVER THE COST OF A SOLAR INSTALLATION IN A HOME THROUGH SAVINGS OVER
ELECTRIC FURNACE HEATING

City	Without Carter plan	With Carter plan
Atlanta.....	14	12
Bismarck, N. Dak.....	14	13
Boston.....	14	12
Charleston, S.C.....	11	10
Columbia, Mo.....	14	11
Dallas/Fort Worth.....	13	12
Grand Junction, Colo.....	12	8
Los Angeles.....	10	7
Madison, Wis.....	14	11
Miami.....	9	7
New York.....	12	8
Seattle.....	(1)	(1)
Washington.....	14	11

¹ Not economic.

Data: Mitre Corp., Energy Research and Development Administration.

The CHAIRMAN. The next witness is Dr. Charles Masters, Chief, Office of Energy Resources, U.S. Geological Survey.

Mr. Masters, we are very pleased to have you with us today.

Mr. MASTERS. I brought with me my Deputy for Oil and Gas Resources, if it would be all right for him to come up to the table, too.

The CHAIRMAN. Yes.

Mr. MASTERS. His name is Oswald Girard, Deputy for Oil and Gas Resources, in the Office of Energy Resources.

I have a prepared statement, Mr. Chairman, that I would like to read.

STATEMENT OF CHARLES D. MASTERS, CHIEF, OFFICE OF ENERGY RESOURCES AND ACTING CHIEF, OFFICE OF MARINE GEOLOGY, GEOLOGICAL SURVEY, DEPARTMENT OF THE INTERIOR, ACCOMPANIED BY OSWALD GIRARD, DEPUTY FOR OIL AND GAS RESOURCES, OFFICE OF ENERGY RESOURCES

Mr. MASTERS. Mr. Chairman, I appreciate your invitation to discuss concepts of oil and gas resources and reserves. My office, the Office of Energy Resources in the U.S. Geological Survey, is dedicated to developing reliable and credible resource assessments for long-range national planning as well as for short-term decisionmaking relative to land valuations associated with environmental impact statements, lease sales, and international boundary determinations.

Having generated these resource estimates, we are, of course, most anxious that the Government and the public at large understand their limitations and their significance. We are, at present, engaged in a major interagency effort, involving the Bureau of Mines, the FEA, ERDA, and others, to develop resource data in such a format that economic analyses can more easily follow from the resource estimates.

We think this program activity will markedly increase the usefulness of resource estimates. In the meantime, however, it may be useful

to describe for you ways of qualitatively understanding and analyzing the resource estimates we have developed.

Because 75 percent of our energy consumption is oil and gas and most of that is oil, I would like to focus my remarks on our oil resources. Two years ago we published U.S. Geological Survey Circular 725 on "Geological Estimates of Undiscovered Recoverable Oil and Gas Resources in the United States." Since that time, I think these estimates have gained general nationwide credibility, but I do not believe that adequate understanding of those numbers is yet widespread.

The diagram I have provided shows our classification of component parts of U.S. crude oil resources, and I should like to discuss with you factors that must be considered in analyzing the estimates. Though I will not specifically discuss the gas part of the diagram, the principles of my discussion apply to the numbers in that classification as well.

[The diagram referred to follows:]

CRUDE OIL RESOURCES OF THE UNITED STATES (Billions of Barrels)
Total U.S. Cumulative Oil Production 112 BB 12-31-76

	IDENTIFIED			UNDISCOVERED	PERCENT RECOVERY
	MEASURED	INDICATED	INFERRED		
Economic (Recoverable)	RESERVES				0%
	31	4	14	50-127	32%
Sub-economic (Potentially recoverable)	107-141			44-111	60%
Non-recoverable	178-201			62-159	100%

NATURAL GAS RESOURCES OF THE UNITED STATES (Trillion Cubic Feet)
Total U.S. Cumulative Gas Production 514 TCF 12-31-76

	IDENTIFIED		UNDISCOVERED	PERCENT RECOVERY
	MEASURED	INFERRED		
Economic (Recoverable)	RESERVES			0%
	216	135	332-655	80%
Sub-economic (Potentially recoverable)	50-108		42-82	90%
Non-recoverable	102-108		42-82	100%

Mr. MASTERS. Measured reserves—31 billion barrels of oil per year—as of December 31, 1976, are taken directly from API reports and considering frequent Government audits it is our judgment that they are generally reliable. Measured reserves represent the amount of oil in the ground that the petroleum industry believes is now available for production and can be recovered economically under existing prices and technology.

This amount of oil, however, is not available at whatever rate you may care to extract it. Physical constraints generally limit annual withdrawal to an amount equal to a production-to-reserve ratio of approximately 1:10. This is an aggregate ratio, individual fields will vary above and below that ratio.

The most we can expect to withdraw from the reservoirs containing this oil, then, is a little over 3 billion barrels of oil a year. This is about what we are producing and represents, in fact, a reasonable maximum that can be produced from current reserves.

One should consider, therefore, that this amount of oil indicates a producing capacity of approximately 3 billion barrels of oil per year for 10 years. It cannot supply a demand of 6 billion barrels of oil for 5 years.

Estimates of indicated reserves—4 billion barrels of oil as of December 31, 1976—represent the amount of oil that industry thinks is available by additional water floods, when and if they are installed. The reserves have been calculated, but the pipe has not yet been installed to effect the withdrawal. In other words, the oil is known to exist, but it will take dollars and time to extract it.

Estimates of inferred reserves—14 billion barrels of oil—represent oil not yet actually discovered but which is believed to be present in known fields given deeper drilling or additional drilling on their margins. The importance of this number is that it indicates a significant quantity of oil that can be discovered with minimal exploration effort and lag time.

The category of undiscovered resources—50 to 127 billion barrels of oil—represents the oil we believe is yet to be discovered. Because the probability that these estimates are accurate is less than the accuracy-probability associated with the reserve estimates described, we have shown them as a range of values to express that uncertainty. The smaller number—50 billion barrels of oil—we conceive to exist within a 95-percent probability—that is, the odds are 19 in 20 that at least that amount of recoverable oil in fact exists.

On the other hand, the larger number—127 billion barrels of oil—represents our assessment at a 5-percent probability of occurrence—that is, a 1 in 20 chance that at least that much recoverable oil exists in the United States offshore and onshore. At the time this assessment was made, we had no data for deepwater areas so the assessment extended only to the 200-meter water depth. In our next published assessment, we will include the deeper water areas.

In considering the significance of this range of numbers, it is important to keep in mind that just as you cannot produce the measured reserve immediately, so likewise you cannot discover this oil immediately; there will be a lag time, of up to 10 to 20 years or more in remote areas, in finding it and bringing it into production. Its discovery is,

of course, controlled by the industry's drilling rate, but more about that later.

As you well know, a lot of oil is left in the ground after routine primary and secondary recovery—on the average about 68 percent, in fact, of the oil originally in place. Processes designed to recover some part of that oil are called enhanced recovery processes.

The estimates we have reported as a possible target for enhanced recovery potential of the oil already identified are shown in the category of subeconomic resources (107 to 141 billion barrels of oil). The estimates represent 28 percent of the original oil in place and were based on the assumption that 60-percent recovery would be the ultimate average limit of reservoir depletion.

Since these estimates were made, the National Petroleum Council has examined many of the large fields in the United States and has concluded that only approximately 25 billion barrels of oil might be producible by enhanced recovery processes, at a current price of \$25 per barrel. In the judgment of industry, exotic methods of oil recovery will be expensive and limited.

The undiscovered subeconomic number (44 to 111 billion barrels of oil) was also estimated under the same assumption of 60 percent ultimate recovery and as such represents remote possibilities for future production.

I have shown the final 40 percent of the resource base at the bottom of the diagram in the interest of mathematical completeness. We do not anticipate that it will ever be recovered but greater visionaries than we are should nonetheless be aware of its existence.

In order to continue to produce petroleum, we must convert undiscovered resources into identified measured reserves through the discovery and exploration process. Inasmuch as we are now producing at a reservoir maximum, to maintain that level of production we must discover at least as much oil as we produce. For the last several years, however, we have been adding to our reserves at a rate of only about 2 billion barrels of oil per year and have been producing over 3 billion barrels of oil per year. Just to stay even, then, we must increase our reserve addition rate by 50 percent. That in itself would be a prodigious task for industry, and to increase production over and above present rates would take Herculean efforts that in the end might not be successful.

We must remember that for every barrel of increased production there must be an average of 10 barrels of reserves added to the system. If, for example, we were to propose increasing production by 1 billion barrels of oil by 1985, that is to a level of 4 billion barrels of oil per year, we would have to find approximately 21 billion barrels of oil just to match production in that 7-year period, and we would have to find an additional 10 billion barrels of oil to accommodate the added increment of production rate, assuming a production to reserve ratio of 1:10. To sum up, the discovery of 31 billion barrels of oil in 7 years represents an average of $4\frac{1}{2}$ billion barrels of oil per year, which is over twice our present discovery rate and probably impossible to achieve.

My analysis then of our oil resource picture is that with a significantly increased effort we may be able to maintain our present pro-

duction rate, but we must continue to make up the gap between production and consumption through imports, or alter the gap by a change in our energy resource mix or by conservation.

For the next few decades, the resource base is not limiting but the rate of discovery is, and if a significant amount of oil come from remote frontier areas and/or unconventional sources, we can be certain that the lag time for production will be frustratingly long. Looking beyond those next few decades, however, we must make plans and develop the technology to alter the energy mix or reduce consumption.

The wherewithal to do this certainly is available to us, but the next 10 years are critical because it takes at least that long to make any major changes in an energy system as large as ours.

The manner in which these changes are to be accomplished is, of course, the great question of the day, and I hope my remarks have contributed to your thinking on that subject. I will be pleased to answer any questions you may have.

The CHAIRMAN. Let me touch on just one part of it. When the President of the United States visited Louisiana, he went aboard a drilling rig that, in my opinion, was the most modern I have ever seen. There may be better ones, but that is the best I have ever seen. I have never seen anything quite that good. The operators are losing \$6,000 a day on that rig.

As I understand it, the equipment of that sort is a drag on the market. Are you familiar with that situation?

Mr. MASTERS. No, sir, I am not overly familiar with the activity of rigs.

The CHAIRMAN. The point of it is, apparently there are not enough offshore leases to drill. That rig was built in the hope that the operators were going to use it in the Atlantic, but with all the interest expense and the depreciation they have to contend with, they are losing \$6,000 a day on a sealed bid lease to keep from losing more than \$6,000 a day by just letting the equipment sit idle.

It would seem to me that your statement would imply that every good piece of equipment that we have ought to be drilling or be put to work, and we ought to make it attractive enough at least to make a profit.

I do not know why anybody wants to buy anymore equipment if he cannot drill what he has leased at a profit. He has to lose money just to get any work at all. Does that not seem odd, when the Nation's energy picture keeps getting worse and worse and we need to be doing more and more?

Mr. MASTERS. Yes, sir, I am sure that certainly Secretary Andrus of the Department of the Interior concurs with the idea of moving the lease sales forward. The Baltimore Canyon sale is now going to proceed on schedule, on the new schedule.

The CHAIRMAN. Let us hope that at least they have one exploratory well drilled by the time President Carter runs for reelection. That would be a really encouraging thing, to think at least that there is a lease actually spudded in, and someone has a drill bit working in the Atlantic somewhere to show for 8 years of conversation.

Does it look hopeful that they might start drilling in the Atlantic at some point?

Mr. MASTERS. I think it is quite hopeful.

The CHAIRMAN. If things go well, assuming somebody does not dream up a new ground on which to challenge it, when do you suppose that the drilling will actually start and we will have the first day of drilling in the Atlantic?

Mr. MASTERS. Ozzie, do you know the new schedule for the Baltimore Canyon sale?

Mr. GIRARD. That sale has already been held and is in litigation right now.

Mr. MASTERS. I think now that the courts have ruled, that we can proceed into the Baltimore Canyon; I imagine next spring rigs will move in there. Whether or not the industry decides to move in there this winter depends on their judgment of how big the rig is, how stable it is. I do not think that the final go-ahead has actually been given. I think it still must go through another appeal in court.

The CHAIRMAN. We have to spend at least another few months in court, maybe another few years, talking about environmental challenges, and things of that sort?

Mr. MASTERS. Certainly we assume the sale is going to go forward relatively soon.

The CHAIRMAN. I think we might as well laugh about these things as cry about them. If you laugh about them, at least you maintain your sanity a little while longer than if you cry about them—you are going to have to go lock yourself up in the crazy house someplace.

Let us just hope—how much land area is there in the Outer Continental Shelf in the Atlantic as compared to the gulf?

Mr. MASTERS. I do not have that number right at the tip of my tongue. Certainly it is a number that is approximately equivalent to the amount of land in the gulf. It is a little less, because the shelf is not quite that wide.

Of course, we really do not know yet. There have only been a couple of wells drilled out there. We do not have any way of knowing whether it is going to be as good a province as the Gulf of Mexico or not.

Our present resources estimates do not suggest that it will be as good a province as the Gulf of Mexico. But, by comparison, the Gulf of Mexico is an extraordinarily good one.

The CHAIRMAN. We drilled in the North Sea—that was an area that was not very promising. They drilled about 300 or 400 wells before they found the first good well.

Mr. MASTERS. The first oil required quite a number of wells. They found a lot of gas, then they finally found the oil. Certainly we have to look at it from an exploration point of view.

The CHAIRMAN. One dry hole would not condemn the entire area. One dry hole—or, for that matter, 100, it seems to me—would still not fully explore the area out there to be drilled.

Mr. MASTERS. Yes, sir; there is a tremendous amount of area to be drilled. There are very good structures to be explored, very good traps for petroleum. There is no question that a lot of it will be tested and a few tests, even though they are dry, does not condemn an area. It just causes you to step back and think again.

The CHAIRMAN. You have not said much about coal, and I understand you did not come to testify about coal, but do we have the potential to make up the short fall with coal?

Mr. MASTERS. Once again, Mr. Chairman, it is not a resource question. It is an industry capability question. We have very large quantities of coal in this country, representing a very broad spectrum of coal types. In other words, we can mine, or go to places to get coal, that is best suited for gasification, for liquefaction, for steam generation, for whatever particular use we want and it is present in some 38 States. But the rate at which we will be able to develop the mines to get that coal is an industry price/profit question, labor question, that has to be addressed by somebody other than myself.

The CHAIRMAN. I read yesterday that the President had a very unsatisfactory meeting with black leaders who are very much concerned about the fact that 40 percent of young black people are out of work, cannot get a job. We have over 7 percent of our workforce unemployed.

I am told that a coal mining job is a good job. Some coal miners make \$25,000 a year. Is that correct? That is what I am told.

Mr. MASTERS. Yes, sir. I think that is correct.

The CHAIRMAN. I think the poor fellows standing in line, trying to find a job somewhere, would be willing to take a job mining coal at \$25,000 a year, especially a strip mining job where one does not have to go down into a mine.

Mr. MASTERS. Sir, I think this is a part of that 10-year lag time we talked about. It takes 10 years to do anything. It does take time to train people.

The CHAIRMAN. It is going to take forever if we are going to pass more bills to provide more bases on which anybody with a good imagination can take us to court forever. But assuming that we do some things to expedite it, as we used to do in wartime, and get on with the business, how long would it take us to have enough equipment to mine all that coal?

Mr. MASTERS. To make a significant increase in our mining capability—now, mind you this is really not my field, so I am just talking about what I hear the Bureau of Mines people talk about—to make any significant difference in the amount of coal we are presently mining is a several year proposition.

Just to order a new dragline would maybe be a 3- or 4-year wait, just on steel and fabrication.

So it takes in the vicinity of 5 to 10 years to get a major new mine and get all the equipment in place and moving. It is a big operation.

Of course, the amount of coal we move is a huge operation. We move 600 million tons of coal a year. So to significantly increase that, the hope is we can get to 1 billion tons a year by, I forgot the date, perhaps 1985; many industry people are saying now that that is a prodigious effort. They are not really sure they can do that.

The CHAIRMAN. Thank you very much.

Senator Packwood?

Senator PACKWOOD. Thank you, Mr. Chairman.

I appreciate your inviting Mr. Masters and Mr. Girard to testify. I asked them to come to my office a few weeks ago. I believe they are here today because of that earlier meeting with me.

I want to compliment both of you. Our meeting was one of the most informative 1½ hours I have ever spent since I have been in the Congress. I take my hat off to you. You are a tribute to the civil service. I asked them to come because the argument we seem to be into is how

much oil is there, and I was intrigued initially by Barry Commoner's statement that I referred to when I talked with you, and of course Mr. Commoner wants to go to solar energy eventually, other kinds of energy, and he wants to simply bypass the nuclear and coal age and stick with oil when we get there.

I quoted you his statement. I would be curious about your comment. This is a statement he made before this committee on June 20 of this year.

The National Petroleum Council analysis show that domestic oil and natural gas are feasible fuels for at least the initial phase of the transition period up to 1985. To my knowledge, now similar analysis has been made for longer periods of time. However, it is known from the most recent survey of the United States Geological Survey that the remaining domestic oil that could be produced, albeit at the increased cost required for tertiary recovery for deeper wells, is between 276 and 440 billion barrels.

This is enough to meet the entire present demand for oil of 6.5 billion barrels per year between 42 and 58 years.

Would you comment on his statement?

Mr. MASTERS. I do not know where he got the very large numbers, the 276 and 440 billion. We have not generated any numbers like that.

If one wants to add in the possibility of oil shale, and certainly that is a very large resource, but the technology to get at it is not well established. The availability of water to get it is not established.

Senator PACKWOOD. He took them from your figures. He added up the low and high range on the subeconomic and field figures. Those are the figures he saw you use in the USGS as the source in essence, to say we can get from there to solar without having to worry about coal or nuclear. We do not have to go to another energy source. We can make it on petroleum in this country if we will get cracking now on solar.

Mr. MASTERS. What he has done, he has gone through our circular 725 and added up all the numbers.

Senator PACKWOOD. That is right.

Then say, at a minimum, under your figures, we have enough oil to go for 42 years.

Mr. MASTERS. That brings up the point in my testimony of rates of discovery and rates of addition to our reserve base. As I said in the testimony, I agree that the resource base is not the limiting factor. The thing I want to point out and make clear is the rate of discovery is very much of a limiting factor because we deal with a very huge industry and many individual decisions are made in many individual places to get that whole industry geared up to discovering oil twice as fast as they have been discovering it in the past—the past several years now. It is just a prodigious task. I do not really believe that it can be done in the short term.

So this is why the next 10 years is so critically important if we want to go in the direction of really pushing industry into finding it at a much faster rate. Nobody knows whether they can do it or not.

And whatever Government policies would affect that, that is the direction in which we should go.

Senator PACKWOOD. Let me ask you this question, and the answer will be very crucial on how I vote on this whole subject.

If we put enough money into it, we make a Manhattan project out of oil, and at the same time we start moving on solar or other esoteric

energies, can we bypass the coal and nuclear age? Can we make it through the next 30 or 40 years, absent price on oil? Forget price.

Mr. MASTERS. May I find out whether you will add another caveat to this? Are we supposed to take care of all the import problems too, no more imports?

Senator PACKWOOD. No more imports; 6.5 billion barrels a year.

Mr. MASTERS. My judgment would be no, that price is not the only factor that controls something like that. It is a price/cost ratio that is an exceedingly important thing, that one must deal with. Right now, we think costs are going up almost as fast as prices are in the offshore as well as onshore drilling. I do not know exactly why that is, but I suppose it is related, at least, to a very sharp upturn in the amount of drilling that is going on in the United States today.

At least in part there is a lot of pressure on equipment availability, although, as Senator Long pointed out, that is not true on the offshore, because we have held up on lease sales. Once that gets going again, there will be a lot of pressure on the offshore equipment available. Cost/price ratios are one problem that industry has.

Second, for this great industry of ours that is so widespread, for them to really start spending the risk dollars that are going to be necessary to find the really big oil, they have to have the long-term confidence in a governmental policy.

Senator PACKWOOD. I will stop you there. That is what we may be determining in this bill, at the time that we start to mark it up, what the long-term Government policy is.

Mr. MASTERS. Yes, sir.

Senator PACKWOOD. If we give them the assuredness of certainty and the return on the dollar—I understand your caveat about the next 10 years and how long it takes to buy a dragline—there is nothing we can do in the next 10 years if we gave 1,000-percent return that would dramatically increase the amount of energy produced in this country.

But, can we do it on oil and electric for 30 or 40 years if, at the same time, we are switching over to some energy resource? Do we have to go coal, do we have to go nuclear, or can we make it on oil until that major shift comes to another energy source?—

Mr. MASTERS. Personally, I do not think we can make it on oil alone. We will need other energy inputs.

The CHAIRMAN. Could I ask a question on that?

We have had witnesses before our committee and before others, who testified on something you have not said much about, the methane gas that we know we have in Louisiana and Texas, in solution in brine, enormous amounts of it.

The estimate, as I indicated, if you do not produce but 5 percent of it, that that is enough to provide the energy needs of the country for 100 years. Are you familiar with that estimate?

Mr. MASTERS. Yes, sir.

The CHAIRMAN. Can you tell us a little bit more about that? What is the potential?

Mr. MASTERS. The potential as measured by the numbers of cubic feet of gas that people have estimated is there, is huge. It comes out in thousands of trillions of cubic feet.

Now, the question is, Is it available? Can you get it anywhere close to a price that is reasonably acceptable to the system, and that has not been determined yet.

There are a number of research efforts going on; it is essentially an engineering problem. There are a number of research projects going on by industry and government. ERDA is putting a substantial effort into this to try to make some decision as to how much it is going to cost to get that gas out.

The CHAIRMAN. I just talked to a man—he may not be the best expert, but he spent a lot of time studying it—who indicates to me that it could be produced at about \$2 per thousand cubic feet of gas. Does that sound as if that might be right to you?

Mr. MASTERS. I can only give you hearsay too. I have had one industry person—only one—and they are not doing it yet themselves, but he quoted the same number. He said \$2 seemed reasonable to him, but he certainly would not recommend to his company that they get into the full scale unless they were pretty sure of a \$3 price down the line. This was just a casual remark made by an individual. I do not have any professional opinion.

The CHAIRMAN. \$2 gas equates to a price below what we are paying the Arabs for oil right now.

Mr. MASTERS. Yes, sir, about 5,000 cubic feet to a barrel of oil. I do not know what the price—

The CHAIRMAN. You are paying about \$13?

Mr. MASTERS. \$2.50 per thousand cubic feet then would be an appropriate equivalent price to oil.

The CHAIRMAN. If you compare it to what you are paying the Arabs on oil right now, it is \$2.50. We have a bill that would hold the price down to \$1.75. Well, thank the merciful Lord, when they wrote the bill they had not heard about the methane gas, because they would have fixed that price on some impossible basis.

According to what we have proposed here, it would not be regulated. You could sell it now.

The Secretary of Energy testified—at least, he told me—that he thought that perhaps \$100 million a year ought to be put into this. I think \$1 billion a year ought to be put into it, because if there is that kind of resource, and you can produce the gas at \$2, and the Arab price is \$2.50 right now for a similar amount of energy. Before the technology can be fully developed, the price will go up to \$3 anyway.

Looking ahead to developing that resource and adding that to existing reserves, it seems to me that there is enough to take care of our needs for 100 years or more. Again, it is going to cost money. That is not cheap gas. One must drill down to 25,000 feet to get it.

Mr. MASTERS. Not all of it. Some of it is deep but there is a lot of it at 10,000 feet, too.

I would like to interject a point here. While there are a lot of people saying that that is a huge resource down there, the Geological Survey per se has not looked in great detail at that resource. We think it is important. We have had a lot of other things to do and have just not gotten around to it.

I think there are still some serious problems in terms of how big is an individual reservoir down there. Right now people have just guessed, and the detailed geology has not been done to make a definitive

statement as to how much water you are actually going to be able to withdraw from a given well before that well gives out on you.

Of course, at a given point source, you are going to have to put a lot of money into it, drill a very expensive well and arrange for the handling of the brine water that is going to come out which must go somewhere.

The CHAIRMAN. But you see, if geopressurized methane production works, and everybody working in the area tells me that it will work, I see you nodding too, the pipelines are already built to transport the gas to the present consumers of gas. That gas is as pure as any gas produced anywhere.

If it works, the pipelines are already in place in the very area where the gas is. We do not have to worry about bringing that gas across California or getting it through the Panama Canal, or something. It is right where the pipelines are.

If we can develop that source of gas, we could save billions upon billions because the gas is where we want it to begin with. Is that not a fossil fuel? It is methane gas, just like the other gas that goes through the pipeline, is it not?

Mr. MASTERS. Yes, sir, I concur with your statement, if it works. I do not nod my head in the affirmative of saying that I know that it will work.

The CHAIRMAN. You were admitting that you knew what I was talking about when you nodded your head?

Mr. MASTERS. Yes, sir.

Up to this point, we have considered that it was basically an engineering problem. Now, a lot of the engineering has moved along to the point that I agree that there is a lot of geological things that need to be done and we are moving in that direction, along with the State of Louisiana and the State of Texas to help get a better geological understanding to go along with the engineering understanding.

The CHAIRMAN. What bothers me is that you are moving on it as though it were not a matter of urgency. We talk about building a platform out there in outer space—I saw the energy program with Walter Cronkite—and it could apparently be 50 square miles large in outer space.

They tell me when we sent men to the Moon, the cost of getting them there was in getting beyond the pull of the earth's gravity. They tell me if those Moon rocks they brought back had been pure blue-gold diamonds without a flaw in any of them, it would not have been commercially feasible to bring them back from the Moon.

Now people are talking about building a space platform many, many square miles in space and beaming energy back with some kind of beam. If they can get that done between now and the year 3000, they will have done something fantastic. But with geopressurized methane, we have something that can be done right now.

Mr. Schlesinger said, you know, there is a corrosion problem. Well, I talked to some people in the business. They said, did no one ever tell Mr. Schlesinger we have the metals to handle that right now? We have plastic pipe if you want to use that rather than metal. The technology is there.

Senator **PACKWOOD**. I do not think I disagree with much of what you have said, but when you are talking about just oil—pure crude oil—which is what the statement basically relates to, I think he is saying we are not going to make it on oil.

The **CHAIRMAN**. The same drilling rig that drills for oil can drill for methane. If you take into account methane deposits, we have enough.

Senator **PACKWOOD**. When you speak about the beam, I know what you mean, the laser beam. There is some limitation to it. You beam down to Earth and you collect it. But any kind of a little Earth tremor sets off the collection station a fraction of an inch and it diffuses.

The other thing—the beam is very intense, very hot and invisible, and it destroys anything it touches, and the CAB is not enthusiastic about these beams.

The **CHAIRMAN**. All I am saying is the methane is something we can develop right now. The solar platform is something that is, at a minimum, 50 years away. I am saying, why do we not get busy on something that will work, and on some technology that we have now, or at least which will not take much to make it work, rather than something that is 100 years away.

Mr. **MASTERS**. Mr. Chairman, may I qualify that editorial "we"? When I say we are not doing a lot, I mean ourselves and my office. The Government overall, however, is doing a lot relative to that particular resource in trying to bring the research along to try to get to a stage of determining whether or not it is a viable resource. Through an office in ERDA, funding is going to groups in the State of Texas, groups in the State of Louisiana, and a lot of work is going forward—I cannot judge at how fast a rate, but it is going forward at a significant rate—to try to determine the viability of that resource.

I only qualify my statements from the point of view that my particular office is not intimately involved with that activity right now.

The **CHAIRMAN**. They tell me, as I say, that there is enough methane gas there to last 100 years, just from what separates itself as it comes to the surface, but that is only 5 percent of what the methane is in that water.

The best way I know how to illustrate it is with a bottle of seltzer water; when you take the cap off the bottle, some gas separates itself from the water when it quits bubbling. If you shake the bottle up, that much more will come out.

So if you just improve your technology, you can get not to 5 percent, but 10 to 15 percent, and that multiplies the amount that is estimated to be available. Is that correct?

Mr. **MASTERS**. May I ask my deputy, Mr. Girard, to respond? He has done quite a bit of looking into this gas situation—geopressured gas—and he may have some remarks of value.

Mr. **GIRARD**. Let me raise some potential problems with geopressured reservoirs—the rate of delivery of this gas. It is not so much a resource question as it is a question of the rate of deliverability of the gas.

I use the analogy of trying to drain an Olympic swimming pool with a garden hose. The water is certainly there, but I do not know if you are going to get it fast enough to water your garden.

That is what I see as the real, potential problem of these geopressed reservoirs.

The CHAIRMAN. If you drill deep, you can use all of that heat—I see you nodding—you can use all of that heat for commercial use. It is pressurized at 3,000 pounds per square inch that deep, and you can use the heat to turn turbines with, to generate electricity. You have potential power in addition to the gas.

Mr. GIRARD. I certainly agree with the geothermal aspects, but the solubility rates of methane range from 20 cubic feet to 120 cubic feet per barrel, and that means you have to move just one hell of a bunch of water to extract enough methane to make it profitable and make it worthwhile.

The CHAIRMAN. You could pour it right out into the Gulf of Mexico and let it attract the fish rather than trying to put it back at 25,000 feet into the ground where it came from.

Thank you very much, gentlemen.

Senator Packwood?

Senator PACKWOOD. I have no questions.

The CHAIRMAN. Senator Gravel?

Senator GRAVEL. There was a recent study that was done for the Congress with respect to deregulation of natural gas that stated that if you deregulate it, we would only get 5 percent more gas and it would cost the American consumer upwards of \$10 billion. I wonder if you could comment on that study?

Mr. MASTERS. I really could not comment on questions of that nature. It is just too far beyond my area of professional expertise.

Senator GRAVEL. I think the point Senator Packwood was driving at, and Senator Long was driving at, and the point I would be driving at, when you tell us there are certain quantities of reserves, the question we ask is, What is the cost to get to those reserves, to get it to market? And you respond to your question and say there is, you do not think we can cut it on oil, and then you turn around and say, but it depends upon the policy as to whether or not the people will even intelligently look for oil.

So if we make a governmental policy to write off oil and gas and, by fiat, go to coal or other forms which may be more expensive than what we have written off, then your response does become quite crucial.

What if we deregulate gas? If you are talking about—you say we have so much reserves of gas. We know from experience, if you pay one price you get x amount of gas; if you pay another price, a higher price, you get $2x$ gas; if you pay three times that, you get $3x$ gas.

There has to be a point where we can equate and say, if the people are prepared to pay for something, they will either get gas or oil for what they pay for, or that will create an economic umbrella that would bring on other forms of energy.

And so for those of us who believe in deregulation rather than fiat Government in the marketplace, we are pretty chagrined by seeing the mixup. Of course, we do not see where we are adding any solutions to a problem by doing it by fiat.

Mr. MASTERS. This area of economics is really not my thing, but I am an explorationist, having worked with oil companies for a number of years. I am not actively involved with problems of resource assess-

ment—in trying to analyze our capabilities. But the points I tried to make in my address here applied to gas as well as oil.

Price is not the only thing that determines. There are a whole bunch of other factors that are involved in bring the level of industry activity up to the capability of finding gas or oil at a rate that you want it. In the past several years, the rate of drilling has gone up quite substantially. The industry is looking—there is enough money in the system for them to increase their drilling rate substantially, which of course we must do. It is also true that the rate of addition to reserves is declining every year.

The industry is not trying not to find oil; they are doing the best job they can to find oil and gas. But, the rate of addition to reserves is at a much decreased level over what it was 20 and 30 years ago. It has declined.

Senator GRAVEL. Is it possible that that rate is tied to the fact that we are not letting sufficient price come into play so that, in other words, if you need more wells to discover a given quantity of oil and that rate is up from the past, maybe that rate is not high enough to bring in oil. Maybe we ought to have a rate three times what we are presently experiencing.

But if that rate, the net cost of doing that is cheaper than would be an alternative fuel determined by fiat, we would still be better off if we let it work that way, rather than what we are presently doing in policy. Am I correct?

Mr. MASTERS. There is no question that more wells drilled will find more oil and gas.

Senator GRAVEL. That is the argument we are getting from Mr. Schlesinger and others. They have never been working hard, or maybe that is not enough. And why we cannot get them to work harder is because of price.

Mr. MASTERS. There is the other factor, too, that Mr. Long has addressed himself to, and that is the availability of ground to explore, and there has been a hold-up on the leases, particularly in the Atlantic, but the lease sales have gone forward, in the Gulf of Alaska, for example.

Senator GRAVEL. They have been held up also. They are now moving, but they have been held up. I would say we lost 18 months, and I still see some problems ahead, but we have not had any better luck in the Gulf of Alaska than we have had on the east coast. That is a point of fact. I do not think you can jump from one part of the country and say the other part is doing it. I can give you our horror stories too.

Mr. MASTERS. What I am trying to point out is that it is not just prices. The availability of ground is also important, and those sales have been held up in various places, but they have gone forward in a few places.

Senator GRAVEL. Availability of ground, availability of product in the ground, technology, and dollars. When the Government by fiat alters the economic situation and underlays the ground, then we are not making what you would call a very aggressive, assiduous effort as a nation to become at least independent or to offset the importation of oil.

Is that a fair statement, or am I exaggerating?

Mr. MASTERS. I think that is a fair statement; yes, sir.

Senator GRAVEL. In the last 3 years, where the Nation has been more increasingly becoming dependent on foreign sources of oil, we have not done the task at home to alleviate that problem.

Mr. MASTERS. The problem has not been alleviated.

Senator GRAVEL. Has not been alleviated, for two reasons. We are at fault and not at fault. It has not been Mother Nature that has been doing damage to us. We have been doing damage to our own selves.

Mr. MASTERS. It is also fair to say that the exploration problem is a much more difficult problem in this country than it was 20 or 30 years ago. Industry will have a more difficult time. Most oil, of course, is located in the very large traps. I do not recall the ratios exactly. Let's say 80 percent of the oil is found in 20 percent of the traps, something like that. What we must do to really markedly change that situation is find the big oil and right now most of the drilling is not oriented toward the big oil. Most of the drilling is directed toward marginal oil.

Senator GRAVEL. Why is that?

Mr. MASTERS. Availability of land is certainly one of the problems but I think it is true of all mineral resources. As soon as you have price instability followed by an increase in prices, then all of the companies at that point know where a lot of their marginal prospects are. It does not matter whether you are talking copper, iron or oil. Before they are sure of a stable situation, because they have a lot of lag time involved in their exploration, they will always go around and do the things close-in that are marginal because they know they can make a short-term profit at the new price. It takes a period of years to sop up that additional oil before they really start moving forward sharply with a big exploration program. The way-out off-shore exploration, of course, as we said, has been held up for other reasons, not because the companies are not willing to move out there.

Senator GRAVEL. Mr. Chairman, if you would indulge me, I would like to ask one question about Prudhoe Bay.

What was USGS' estimates of oil in Prudhoe Bay prior to its discovery in 1968?

Mr. MASTERS. We had no estimates.

Senator GRAVEL. You had no estimates?

Mr. MASTERS. That was on State land, not Federal land.

Senator GRAVEL. It was Federal land before it was State land. It only became State land in the 1960's. So it was within the inventory of USGS until it was selected, about the mid-60's.

Did you have any estimate at that time, the mid-60's?

Mr. MASTERS. My particular office did not have any estimate. My particular office did not exist back then.

Senator GRAVEL. You are tied with USGS and you certainly have a compendium of information which your present estimates rest on, so I go back to my original question: In 1963, 1964, did USGS have any estimate of oil in Prudhoe Bay?

Mr. MASTERS. I do not know.

Senator GRAVEL. Could you answer that question for the record, because it is important. It is meaningful part of my reserve.

[The following is the answer to Senator Gravel's question:]

The Geological Survey did not make any estimates of the petroleum potential of the Prudhoe Bay area on the North Slope of Alaska prior to the Prudhoe Bay Discovery.

Senator GRAVEL. If I may say for the record, Mr. Chairman, right now the oil that is coming out of the Alaska pipeline is going to be shipped through the Panama Canal at an uneconomic price of some \$2.40 per barrel, based upon a ceiling, so the oil companies who started working up there before the Arab embargo thought they were looking at one price.

Now, if they are able to sell in the marketplace, they compete very adequately, with the increased construction and transportation costs and with the ceiling on the price of oil, it means that the companies will be denied expected profits on oil that they presently have for return and I would submit for the record, the oil line that can be expanded from \$1.2 to \$2 million at very low cost will be delayed, meaning 800,000 barrels a day would be sort of held back from the marketplace because of internal decisions over the inadequacy of price.

I can only underscore that problem by the other problem that there was a document that was considered by the executive branch, where they were suggesting we price natural gas at Prudhoe Bay at zero. No price at all for it, and if it were computed the way some of the figures were, the oil companies would have to pay the Federal Government to get out the gas.

I just use this as a vehicle to explain some of the idiocies that exist within our system and why we have not solved our problem.

Thank you, Mr. Masters.

Mr. MASTERS. You are welcome.

The CHAIRMAN. Senator Dole?

Senator DOLE. Thank you, Mr. Chairman.

I do not know what ground has been covered. We have been busy at another meeting.

In your statement you used the term "economically recoverable" or recovered economically. Can you give me a definition of how that applies to gas and how the term applies to oil? What do you mean by that phrase?

Mr. MASTERS. Right now, those estimates are arrived at, one by the API and the other by the AGA, and they base that on current judgments, each company bases it on their own particular development situation. They may say, for example, at the present price, my reserves in this field are such and such. If somebody wanted to tell them that the price is now higher than that, then they may elect to drill a bunch of wells that were not possible before, in their judgment, and they may elect to carry out some other enhanced recovery project that was not possible at the earlier price. It is a judgment of the industry as audited by Government, that that amount is recoverable at current price.

Senator DOLE. You just indicated the price is a factor. Have you analyzed how much gas or oil is available as a function of the price?

Mr. MASTERS. No, sir, we have not. I referenced a study we have going now to enable people to do more econometrics with the numbers we generate, and in that particular study we are trying to get at how much it is going to cost to find this new oil and gas that is out there. Not only to find it, but find out how much it is going to cost to develop

it and then, given the rate of producibility and the profit ratios necessary for the companies, what is the price going to have to be to get at that oil?

This study is moving along. I am sure it will be a year away, or more.

Senator DOLE. Are you aware of ERDA's market oriented study?

Mr. MASTERS. Yes, sir.

Senator DOLE. As I understand, they claim to have used your data as a part of their basis of projecting the amount of gas that might be available as a function of price.

Mr. MASTERS. Yes, sir.

Senator DOLE. They claim that anywhere from 500 trillion cubic feet to 1,000 trillion cubic feet is available if we are willing to pay as much as \$2.50 per million Btu. That's about a 25- to 50-year supply.

Mr. MASTERS. We use 20 trillion feet of gas—that is 20 quadrillion But/year—

Senator DOLE. Do you think there might be that much gas available?

Mr. MASTERS. This goes back to the discussion that we had with Senator Long, bringing up the geopressed reservoirs in the Gulf of Mexico. We did try to cover our view on that, being that yes, people have suggested various numbers, but it as yet has not been demonstrated that it is really available at any price. But this gets completely outside of my area of professional involvement.

Senator DOLE. Would there be a sufficient amount of methane from geopressurized regions with a sufficient amount available at \$3.50?

Mr. MASTERS. The point Mr. Girard made in response to one of the earlier questions applies here, the problem being one of deliverability down there. The gas is in the fluid in an amount of 50 to 100 cubic feet/barrel of water. I think Mr. Girard said 20 to 120 cubic feet of gas per barrel of water. So you have to find reservoirs that have great permeability, great deliverability to get enough gas out of a given hole to make any difference to you.

To our knowledge, this deliverability problem has not really been addressed to make a definitive decision. We know enough to know that there is better permeability in the Louisiana reservoirs than the Texas reservoirs. That is a broad statement. There are many good Texas reservoirs and I am sure there are some bad Louisiana reservoirs. But it is this deliverability problem, this permeability problem: How much water can you get out?

And, then, I think it is also a serious problem: What do you do with the water? Because some of it is of extremely high salinity, you cannot just dispose of it easily. It much either go back into the ground or do something else with it. The engineering and the cost of that just has not been worked out.

Senator DOLE. The point is, the administration is refusing even to attempt to get that gas by adopting the pricings adopted in the bill. We are going to have a price ceiling of \$1.75. We will then be foreclosed from making an effort to discover that gas.

Mr. MASTERS. I really cannot answer that. I do not know whether that forecloses the situation. I do not know enough about the technology and the cost of the technology to get it out.

I know that ERDA—well, somebody at the ERDA office—working on geopressured reservoirs, will be able to give you some kind of a cost/price judgment on that.

Senator DOLE. As I understand it, we are planning to import gas from Indonesia at \$3.59 per million btu. We may be subsidizing ourselves into an area of energy dependence on gas. If we are going to write in ceilings and restrictions and not deregulate gas, we are going to force Americans to pay a high price for foreign gas while we would be unwilling to extract any of our own gas because some may say it is uneconomical.

I just do not understand that attitude. Do you have any comment on that?

Mr. MASTERS. I have no comment, Mr. Dole.

Senator DOLE. Do you agree with that, disagree, or do not know?

Mr. MASTERS. I do not know about the Indonesian gas, for example. Obviously, it does not seem reasonable to buy gas at \$3.59 from Indonesia and not pay over \$1.75 here. I do not know what the rationale is for that.

Senator DOLE. It does not seem to be very sensible to me, but you probably cannot comment on that?

Mr. MASTERS. No, sir.

Senator DOLE. I was not here when Secretary Schlesinger testified. It was my understanding that he indicated that as far as oil is concerned, we would be exhausting our oil supplies in as little as 12 years.

Do you agree with that statement, or do you have any reason to disagree with that statement?

Mr. MASTERS. I would disagree, because I do not think we will discover it that fast. Our judgment is that there is 50 to 127 billion barrels of oil within the 95 to 5 percent probability range. We have not included in that number the oil beyond 200 meters of water depth. I am confident there is oil out beyond 200 meters. At the time we made that assessment, however, we did not have data in the deeper water areas. We are more or less ready to produce another resource assessment which will increase that number considering the offshore or considering it beyond 200 meters.

My problem with the statement that we would have exhausted all oil in 12 years, is, I think, that we will continue to find more oil and we will continue to find it at a rate of a few billion barrels of oil per year. Right now, we are adding to our reserves at a rate of 2 billion barrels per year. I think that we have 50 to 127 plus billion barrels to look for. Therefore, at that reserve addition rate, we are still going to be looking for and using oil over a longer period of time, and not, therefore, exhaust our resource base in a short time frame.

Mr. Schlesinger possibly was considering that we have 30-plus billion barrels of reserve, and if we produce it at 3 billion barrels of oil per year, then over a 10-year period we will exhaust that reserve. It will be gone, but we always add to reserves, as you well know.

Senator DOLE. That is all I have, Mr. Chairman.

The CHAIRMAN. Thank you very much, gentlemen, for a very useful and helpful statement.

Now, we will call Mr. Lee White, chairman of the energy policy task force of the Consumer Federation of America, accompanied by Ms. Ellen Berman, director, energy policy task force of the Consumer Federation of America.

STATEMENT OF LEE WHITE, CHAIRMAN, ENERGY POLICY TASK FORCE OF THE CONSUMER FEDERATION OF AMERICA, ACCOMPANIED BY ELLEN BERMAN, DIRECTOR, ENERGY POLICY TASK FORCE, CONSUMER FEDERATION OF AMERICA

Mr. WHITE. Thank you, Mr. Chairman.

Ellen Berman is executive director of the energy policy task force of the Consumer Federation of America, and I am here today in my capacity as chairman of the task force.

If I may, I would like to speak informally, but I ask that my formal statement be incorporated into the record.

At the outset, let me identify our organization. It is a coalition that has been in existence for about 4 years. It operates under the aegis of the Consumer Federation of America. It includes a lot of labor organizations, a lot of consumer organizations.

It includes municipal electric systems, municipal gas systems, rural electric co-ops. The U.S. Conference of Mayors support us; Consumers Union; National Farmers Union. Quite obviously, with that broad a membership, I must at the outset indicate that not everybody in our group always agrees with all of our positions.

I have a hunch, however, on the main point that we would like to make that—

Senator DOLE. If I could interrupt, I think the record should indicate that you also receive grants from the Government. Is that correct?

Mr. WHITE. Yes, we have received some Federal funds which enabled us to engage in some research projects for the Federal Energy Administration. Modest funds have been made available.

Senator DOLE. Have not funds been made available for appearances before the Federal Trade Commission and other regulatory agencies?

Ms. BERMAN. The Consumer Federation itself, not the energy policy task force, has appeared in hearings before Federal Trade Commission on the funeral home industry and has been paid. The energy policy task force, in fact, was just recently paid to appear before the Federal Energy Administration on home heating oil hearings.

Senator DOLE. I am not quarreling, I am just suggesting—

Mr. BERMAN. This is a precedent that FEA has set. We were very pleased to receive funds in order to participate on behalf of consumers. Without such funds we could not have participated. And consumers would have been totally unrepresented.

We have received some Federal contracts that have gone to the Paul Douglas Consumer Research Center—CFA's nonprofit research arm.

Mr. WHITE. Our basic annual operating budget, since the issue has been opened, is something on the order of \$50,000 to \$60,000 contributed primarily by these organizations. And on these special occasions where the various agencies have thought it appropriate to have consumer representation, we have been able to work out arrangements with them where they provide some funding so we can get economic analysis and other assistance.

As I suggested—I cannot pledge you that every one of our groups have taken a resolution and support everything I say, but when we

get, for example, to issues such as the crude oil equalization tax, we have a pretty good sense of what our membership believes, and I think that there are members of the task force who have testified before the Ways and Means Committee who are scheduled to come here and who will take almost identical views to those that I am going up to express today.

First, I would like to mention a couple of relatively important issues, although ones I would prefer not to spend a great amount of time on unless there are questions. On the matter of home insulation, we agree, Mr. Chairman, that much needs to be done.

Our strong preference, as expressed by Mr. Brandon, is that there be a low-interest rate program with Government assistance. And for those people where even low interest rates would not do the trick, we think there ought to be direct grants to them.

Everybody has known for 4 years that an investment in home insulation can do wonders in saving fuel bills in addition to saving fuel. It is also a national scandal that we have been so slow to get moving on it.

We have a hard time being as enthusiastic about the tax credit approach. Normally that goes to the people in the higher income groups. Our focus has been primarily at the lower income levels.

The CHAIRMAN. If you make it what we call a refundable tax credit, you can do it for low-income people, too. Do you know what I am talking about?

Mr. WHITE. Sure, there are various ways of doing it. Our preference is for the more direct mechanism on the basis that it gets the job done better. I cannot say that we have any strong or adamant position against the tax credit. We just do not prefer that approach.

The CHAIRMAN. I would suppose that you would be for whatever is the most effective way to do it. For example, if a person insulates his home, puts in storm windows and things of that sort, all he has to do is go down there and take a simple form to fill out—not as a part of his tax return which claims the Government owes him 20 percent of his expenditures. If somebody is right there to give him a check, it might be simpler than to require an application form sent to some Government agency and the delay and uncertainty involved in that process.

I assume if we could work out some way by using the tax system, which is more efficient, you might prefer that.

Mr. WHITE. I would say that my experience in Government and my experience outside of Government makes me a little apprehensive about whether the administration of that would go smoothly. Yes, in principle, all we are talking about is various techniques of getting the job done. The job has to be done, that is obvious.

The CHAIRMAN. If we use a tax credit approach for the taxpayer, when he is ready to settle up with Uncle Sam, he just reduces his taxes by that amount, and if the Government does not think it is right, they can audit that tax return.

If you use the refundable tax approach, he does not even have to include it in his return. If you want to make it something he can get immediately, he can just go and claim the Government owes him the money. We could draft the law so the Government pays him the

check immediately. If there are doubts about it subsequently, they can go check on it. There is more than one way to kill a cat.

Mr. WHITE. There is more than one way to kill a cat, and all we hope is that this particular cat gets killed. We will not have any difficulty, I am sure, on that.

Our preference runs in the direction we suggested.

Senator DOLE. If I could ask a broader question, are you trying to monitor in any area, the stories coming out about some of the rip-offs in the insulation industry. Not to single out any of them, but it is a big issue now, and a lot of people are going to be deceived by some practices in that business.

Do you have any projects underway to keep an eye on that?

Ms. BERMAN. We do not. We have testified before the Product Safety Commission about the problems in the insulation industry. We will keep tabs on it to the extent that we can. But it is a very overwhelming problem for a group with a staff of one. It is something we are aware of and are concerned about. I hope there will be watchdog groups, groups larger than ourselves, monitoring the entire industry.

I know the FTC will monitor the industry.

Mr. WHITE. They have. As Ellen suggests, the Federal Trade Commission has taken a very active interest. There is another constraint. If we are going to build an enormous demand for insulation, it would be nice to know that we have the insulation.

Already, the price has begun to sweep up. As Senator Dole suggests, people who have been in the home improvement business are not the pillars of our community; the blue suede shoe boys are there, and the potential for rip-offs are enormous.

I think that explains one of the reasons that we have been so slow to move into this, because of the apprehensions of how the system will work. There will be problems which problems we not yet envision.

Senator DOLE. Have you thought of any way we can protect the consumer?

Ms. BERMAN. I think there should be a system of licensing standards for the insulation dealers and there should be audits and monitoring of them. We would happily work with the Congress on the development of standards for the industry.

Mr. WHITE. There are some provisions along that line that are in a different part of the energy bill that have to do with electric utility regulation. There are some obligations on the part of utilities to perform audits.

There has been kind of a hanging back on the part of the congressional committees that have looked into utility regulation by giving the whole thing to the utilities to do, on the grounds they are competitively way out of proportion to the people who are in the home improvement business, or would like to get into it.

But happily, there is an awful lot of attention being given to this in the process in which the Congress is now engaged.

To move on to the gas guzzler tax, we believe that here, too, the tax approach is inappropriate. We would much rather see mandatory auto efficiency standards adopted.

It is almost as though we are saying, if you happen to be wealthy enough, it is OK to have a Cadillac, it is OK for the industry to con-

tinue to manufacture Cadillacs. I do not mean to single them out, because I gather that they are in the down-sizing process. For all I know, they may be more efficient.

We much prefer an approach that says that the automobile industry is mandated—and they are demonstrating an ability to live with those mandates—to produce automobiles that are most gasoline efficient rather than saying you can manufacture as many automobiles as you can sell as long as the individual is willing to pay \$500 or \$1,000 or a \$2,000 tax.

Now, I would like to turn to what we deem to be the most important part of the tax issue that is now before the Senate—the crude oil equalization tax. We believe that the COET is an unwise approach, in large part because it rests on the assumption that the increased cost of energy will result in a depressing of demand. We much prefer the more equitable approach of handling the demand side by the conservation technique.

We believe that the studies that have been undertaken by the Congressional Budget Office, the General Accounting Office, the Library of Congress, all demonstrate that the administration's figures are grossly optimistic in terms of what the impact of price on conservation really is.

You can squeeze a little bit. There is no question about it. There are too many of us involved in owning equipment, and you can turn your thermostat down a little bit, but you cannot turn it down more and more.

There are constraints. To use the concept of price as the mechanism for allocating essential resources in our society does not seem to us to be appropriate. If the administration is intent on stabilizing prices, we believe it is much more sensible to continue—indeed, to restore—some of the price controls. If, as we are, one is concerned about excess profits being made by people who are in the energy business, particularly in the petroleum business, then price controls are essential.

If I can oversimplify the administration's position, it is distinguished from the prior administration's attitude in the following way. Let us take the price of oil, put it up at OPEC's level; instead of letting the producers have the excess between the domestic price and the oil price, we will tax it.

Now, with our biases and prejudices, we would certainly prefer taxing the difference rather than giving it to the oil companies, but we do not think you have to make either of those choices. According to the administration they will take the tax with one hand out of the right pocket and with the left hand put the rebate back into the left pocket, and presumably we will be about the same as we were before.

The higher price resulting from the tax is not going to have much of a dampening impact on consumption. It has one great deal of administrative confusion in it. Even worse, again from our perspective, is the implementation of that rebate mechanism that concerns us and that we feel will never come to pass.

When this proposal was first offered, being the Nebraskan I am, I remember when I was a kid in Omaha and we traded a yo-yo for a knife, you always got your hand on the other guy's knife before you let loose of the yo-yo. Here we are going to have a tax, a big tax, an enormous tax, and you tell us that we are going to get it back, but we are not so damn sure we are going to get it back.

The House has already said, yes, you can have a rebate for 1 year. We have heard rumblings in the Senate that it is a lot of money, so why do we not use it for something worthwhile, like public transportation, things dear to our heart. But I do not think, frankly, that that kind of a concept makes a great deal of sense. We would much prefer to see no tax, no artificial acceptance of the OPEC level as a standard to which this country ought to aspire.

We have no problem with the price of fuel reflecting what it costs, and if it costs a great deal more—and I must say, Senator Long, as it come to that methane, I believe we ought to put some of our R. & D. dollars there. We made a national commitment; we are spending \$7 billion a year of taxpayers' money for R. & D. Some of it ought to go into determining whether or not that methane is deliverable. It would be a beautiful thing if it could happen because it would solve many, many of our problems, including imports.

It is hard, as a card-carrying liberal Democrat, to be critical of the Democratic administration, but I must say we are. We have found some of their proposals to be excellent, but here on the crude oil equalization tax, we believe that it is a foolhearty concept.

We would hope, when your committee is through with it, that we would find that the crude oil equalization tax fell through a crack someplace.

Senator DOLE. Pretty big crack.

Mr. WHITE. As I say, I do have a longer formal statement. I would much prefer to summarize the principal points, and those are the ones that I think are the most important.

The CHAIRMAN. Thank you very much for your presentation here. You might want to expand upon your views after we have heard from the other witnesses. If so, I would be pleased to have a further statement from you.

Thank you very much.

[The prepared statement of Mr. White follows:]

TESTIMONY OF LEE C. WHITE, CHAIRMAN OF THE ENERGY POLICY TASK FORCE OF CONSUMER FEDERATION OF AMERICA

My name is Lee C. White, and I am here today in my capacity as Chairman of the Energy Policy Task Force of the Consumer Federation of America. Our Task Force has 43 member organizations (Attachment A), and our expressed purpose is to ensure that the consumers' views are included and considered in the energy policy debates currently taking place, and, in particular, within the Congress. We recognize that there is no necessary single "consumer interest" in any of the numerous issues that comprise the energy policy debates; nevertheless, we have undertaken to do the best job possible in assessing and stating the views of the consuming public and, as the broad base of our membership suggests, we do indirectly represent millions of Americans.

We appreciate the opportunity to comment on the tax proposals that are a part of the Carter Administration National Energy Act and deem those provisions to be exceedingly important to consumers across the country. In a very real sense, the tax provisions—or at least many of them—reflect the Administration's heavy reliance upon pricing, which means higher pricing, as a means of dampening demand and helping to reduce our dependence upon importing oil. We believe that such a policy of deliberately increasing domestic energy prices to the artificial and non-competitive level set by the Organization of Petroleum Exporting Countries (OPEC) is unsound and politically unwise. The higher prices generated by the Carter Energy Plan will cause price increases greater than the price increases following the Arab oil embargo of 1973-74. While apparently directed at stimulating conservation, evaluations by the General Accounting Office, by the Congressional Budget Office, and by the Library of Congress indicate that the

Administration's projections of energy savings are over-optimistic. Moreover, the price increases that would result from the Energy Plan will give rise to more inflation and unemployment. The President's Plan would, if adopted, force consumers to shoulder the greatest economic burden. Especially hard hit will be families who are poor or have fixed incomes. Many middle-income families will suffer increased hardship as well.

While this Committee is interested in comments on all the tax provisions of the President's Plan, my testimony today will focus primarily on the proposed crude oil equalization tax. Aside from the gasoline tax, to which we are opposed, no other tax provision of the legislation has created as much controversy. Before discussing the crude oil equalization tax and our position on it, I would briefly like to state our position on a number of the other major tax provisions of the President's Energy Plan. The "cornerstone" of President Carter's Energy Plan, as we all know, is conservation. To achieve this objective, the Plan proclaims that the American people must begin paying the "replacement cost" of energy, which is asserted to be the price charged by the OPEC cartel. This is not a true economic cost; on the contrary, it is an artificial, administered cartel price. Moreover, it is absurd to talk about "replacement cost," a term which implies certain market parameters, such as competition, resource base, etc., when the market is noncompetitive. Still, the President argues for a combination of price and tax increases to stimulate conservation and to provide additional incentives for production. Despite a total lack of verified data on exploration and production costs and despite information indicating that new oil costs are no greater than \$6 per barrel and natural gas no higher than 60 cents per thousand cubic feet, there is a large number of additional production incentives contained in the Plan—higher natural gas prices starting at \$1.94 per thousand cubic feet in 1978; OPEC prices for newly discovered crude oil (\$13.50 per barrel). With these higher prices and with no controls on products, it is not likely that the tax increases will provide consumers with any more incentive to conserve.

While there may be some justification for the tax on utility and industrial users of oil and gas to induce a switch to coal, there is little justification for a tax on gas-guzzling automobiles or another tax on gasoline. Efficiency in gasoline consumption can be obtained by simply mandating a stricter fuel-efficiency standard for all automobiles and making production of inefficient models illegal. A 5 cents a gallon tax on gasoline would have little impact on the driving habits of most Americans. Too many families use their automobile because there is no public transportation alternative. Many American families, despite the increased cost, would still be compelled to use their car to get to work or to accomplish various necessary tasks. And many of these families cannot afford the added burden of this tax.

As to the provisions allowing income tax credits for investments in insulation and solar equipment, it is certain that those families who would make these investments would have made them without the tax credit. These families are those with incomes sufficient to afford the investment in the first place. Moreover, the savings from the tax credit, especially for insulation, will probably be wiped out by the sudden and drastic increase in the price for insulation. What is required is a massive low-interest loan program for those families who cannot afford the substantial initial investment, but who are also not defined as poor. Such a program would be far less wasteful of tax dollars and would provide millions of more homes with access to insulation and other conservation equipment.

While the President proposes various methods for increasing energy prices, he gives scant attention to the structure of the marketplace. For example, entirely missing from the President's plan is a recognition of the inherent non-competitiveness of the petroleum marketplace—a marketplace which is dominated by a handful of multinational corporations, which have helped OPEC to maintain its cartel price. In fact, the President's Plan legitimates these non-competitive arrangements and the excessively high prices resulting from these arrangements. As a result, it is almost as if the U.S. Government has itself become a member of the OPEC cartel. Thus, by making no effort to increase competition in the petroleum industry and by relying on higher prices and taxes as the mechanism to enforce consumer compliance with national energy policy, the President's proposal would place consumers in an extraordinarily difficult position.

The President has followed the lead of former President Ford in opposing controls on petroleum products and has proposed decontrolling gasoline prices, one of the last products under controls. At the same time, the President implicitly recognizes that without controls, the oil companies would have the opportunity to reap windfall profits by charging the "world market price" for their products,

even though crude oil in the United States would still remain under price controls. Thus, in order to prevent these profits, the President proposes the crude oil equalization tax to, in effect, tax away the difference between the crude oil price and the price the companies would charge for their refined products. Consumers will be burdened in either situation, but the President's crude oil equalization tax becomes more palatable only because the major oil companies will not be able to reap billions of dollars in additional profits. And it is precisely because this tax prevents them from receiving this money that this Committee has heard and will continue to hear opposition to this tax from the major companies.

The major oil companies apparently are not satisfied with the sudden, dramatic and highly profitable increases in energy prices resulting in part from OPEC decisions to quadruple world oil prices, and in part from oil company pressure on the U.S. Government to follow suit. They want to eliminate the crude oil equalization tax so that they can charge the world price for their oil products, or if there is to be a tax, they want a big chunk of it for themselves. Thus, the real issue before this Committee centers on the transfer of wealth. Should consumers be protected from excessive prices through controls on refined products? Or should prices be allowed to climb to the OPEC level by means of various decontrol proposals, in which case the major oil companies will earn billions of dollars taken from consumers? Or should the Government tax the difference between the controlled domestic price of oil and the artificial, non-competitive OPEC price and then return this tax to the public? Certainly, from our point of view, controls on product prices are the best alternative.

The National Energy Plan states "Total deregulation would result in a massive transfer of income from the American public to the oil and gas producers, amounting to \$14 to \$15 billion, nearly 1 percent of the U.S. gross national product." This fear was also expressed by the House Committee on Ways and Means in its report on the Energy Tax Act of 1977, wherein it stated, "the committee believes that it would be unfair for producers to obtain a windfall profit by being able to charge the full world price for crude oil produced from known reserves." In short, both the White House and the Ways and Means Committee recognized that deregulation of crude oil prices would result in oil company windfalls. But neither recognized that the same result would occur even without deregulation of crude oil prices. It is essential to recognize this important distinction which has curiously eluded too many people. Even if crude oil prices remained under control, by decontrolling product prices the major oil companies could raise prices to the OPEC level. Thus, by favoring product price decontrol, the Carter Administration has placed consumers in the position of choosing between the lesser of two evils. Instead, consumers should insist that the Administration reimpose product price and allocation controls. As it stands, the Administration has proposed an inequitable and unnecessary tax to prevent the major oil companies from reaping a whopping unearned financial reward.

In theory, we oppose the crude oil equalization tax because we oppose the premise upon which it is based—namely that domestic petroleum prices must be raised to the OPEC-determined "world market price." The Energy Policy Task Force of the Consumer Federation of America urges the Committee to abandon the crude oil equalization tax. As a preferred alternative, we strongly favor a new look at EPCA with the intent of continuing crude oil prices controls and reimposing controls on petroleum products.

An additional aspect of the matter that we deem most important to the groups comprising the Energy Policy Task Force is the question of rebates. From the outset we have been leery of the Carter Administration's basic scheme which rests upon the concept of taxing to make prices higher but coupling the tax with rebates to consumers across the country. We have feared that Congress will find it too tempting to use the large revenues that would be realized by a crude oil equalization tax for such worthwhile programs as it would like to fund. We can hardly be reassured by the House's action where the rebate mechanism—even assuming it is administrable—is only for the year 1978. Ruminations in the Senate suggest that even the on-year rebate may be eroded if not scrapped completely. Congress rejected the Carter gasoline tax that would have added a nickel a year to the Federal excise tax on gasoline—it should do the same with the equalization tax. It is hard to think of a more regressive tax than one on basic energy which obviously hits harder the lower ends of our economic ladder.

While mentioning the impact on consumers—and especially those who are our poorest and our elderly who must live on fixed incomes—it is worth noting that the Carter energy plan issued last April purported to recognize this aspect of

the energy price spiral that has already had such a devastating impact on family budgets by promising a redesigned program for Emergency Assistance for Low-Income Persons. The following appears at page xxiii of the National Energy Plan:

"Existing emergency assistance programs are deficient in assisting low-income persons to meet sharp, temporary increases in energy costs due to shortages or severe winters. A redesigned program will be completed promptly and submitted to the Congress."

It is now well into September and if the Administration has "completed promptly and submitted to Congress" such a plan, we have not seen it.

In conclusion, we believe the crude oil equalization tax is wrong in concept, in that it will have little depressing effect on demand, is a regressive tax, and that the part of the scheme that calls for rebates is too illusory and vulnerable to be relied upon by consumers. We urge its rejection.

[ATTACHMENT A]

ENERGY POLICY TASK FORCE MEMBER ORGANIZATIONS

Adams Electric Cooperative, Inc.
 AFL-CIO.
 Allegheny Electric Cooperative, Inc.
 Amalgamated Clothing & Textile Workers Union, AFL-CIO.
 American Federation of State, County & Municipal Employees, AFL-CIO.
 American Federation of Teachers, AFL-CIO.
 American Public Gas Association.
 American Public Power Association.
 Basin Electric Power Cooperative.
 Central Power Electric Cooperative, Inc.
 Consumers Union.
 Cooperative League of the USA.
 East River Electric Power Cooperative, Inc.
 Florida Electric Cooperatives Association.
 Hoosier Energy Division, Indiana Statewide Rural Electric Cooperative.
 Industrial Union Department, AFL-CIO.
 International Association of Machinists and Aerospace Workers, AFL-CIO.
 Kansas Electric Cooperatives, Inc.
 Kansas Municipal Utilities.
 Lincoln (Nebraska) Electric System.
 Maritime Trades Department, AFL-CIO.
 Minnesota Farmers Union.
 National Farmers Organization.
 National Farmers Union.
 National Rural Electric Cooperative Association.
 North Dakota Farmers Union.
 Northeast Missouri Electric Power Cooperative.
 Northeast Public Power Association.
 Northwest Iowa Power Cooperative.
 Northwest Public Power Association.
 Oil, Chemical and Atomic Workers International Union, AFL-CIO.
 Pennsylvania Rural Electric Association.
 Rocky Mountain Farmers Union.
 Service Employees International Union, AFL-CIO.
 Tennessee Valley Public Power Association.
 Texas AFL-CIO.
 Tillamook Peoples Utility District.
 United Auto Workers.
 United States Conference of Mayors.
 United Steelworkers of America, AFL-CIO.
 Valley Electric Cooperative.
 Washington Public Utility Districts' Association.
 Wisconsin State AFL-CIO.

[Thereupon, at 10 noon, the committee recessed, to reconvene at 10 a.m. on Friday, September 9, 1977.]

ENERGY TAX ACT OF 1977

FRIDAY, SEPTEMBER 9, 1977

U.S. SENATE,
COMMITTEE ON FINANCE,
Washington, D.C.

The committee met, pursuant to notice, at 10:05 a.m. in room 2221, Dirksen Senate Office Building, Hon. Russell B. Long (chairman) presiding.

Present: Senators Long, Talmadge, Byrd, Jr., of Virginia, Bentsen, Matsunaga, Curtis, Hansen, and Dole.

The CHAIRMAN. This meeting will come to order.

Is the Honorable John Tower here?

Then we will call Mr. A. V. Jones, Jr., president, Independent Petroleum Association of America.

Mr. Jones, we are very pleased to have you here.

Mr. JONES. If you do not mind, I see that Senator Tower has just arrived.

The CHAIRMAN. I want you to know, Senator Tower, you displaced a mighty good man.

STATEMENT OF HON. JOHN TOWER, A U.S. SENATOR FROM THE STATE OF TEXAS

Senator TOWER. Considering the fact that I am up for reelection, I should let A. V. go first.

Mr. Chairman, I would first like to express my appreciation for the opportunity to appear, and noting who is present this morning—the distinguished Senators from Louisiana, Georgia, and Texas—I would say that the committee is in good shape. If you could go ahead and proceed with action today with current company, I think everything would be all right.

I would like to submit my entire statement for the record, Mr. Chairman, and begin about halfway through it, with the facts and figures relating to drilling and production and turn to the middle part of my testimony, on page 6.

I would like to address myself to the proposal for a crude oil equalization tax. Under the President's crude oil tax proposal, oil prices would be held down by controls while being artificially raised through a complicated system of Federal taxes. If there is a better illustration of the "Alice in Wonderland" quality of many of the Carter energy proposals, I cannot think what it would be.

I find it difficult to conceive of a more illogical, upside down, counter-productive, and in fact destructive way to approach the oil pricing issue.

In my opinion, the President's crude oil tax proposal is little more than a scheme for back door financing of questionable Federal programs that could not otherwise stand the test. It is a massive tax program masquerading as an energy proposal.

The President has already decided to dip into the revenues to help fund his welfare reform proposals. The likelihood that the President and the Congress will in the future be able to resist similar temptations for other projects seems to me to be slight indeed.

The House of Representatives has already demonstrated as much. The rebate plan adopted by the House is for 1 year only, and the crude oil equalization tax trust fund, established for the return of the crude oil tax receipts, is set to terminate at the end of 1979.

If, indeed, the crude oil tax receipts are to be rebated, it would appear unlikely that the crude oil tax will achieve its purported goals. The President has said that the crude oil tax is designed "to insure that market decisions by consumers are based on the real value of oil."

Considering that the real price of oil will continue to be controlled at an artificially low level, and considering the manner in which the crude oil taxes will be rebated to the consumers—in the form of lower income tax withholding rates—I find it extremely difficult to understand just how consumers will be able to figure out what is "the real value of oil."

I think it is clear that the crude oil tax proposal of the President, as embodied in this legislation, will have little, if any, overall impact on the consumption of petroleum products.

In what way will consumers benefit if the crude oil tax is successful in achieving its goal? The goal of the tax, presumably, is to make petroleum products more costly so that consumers will use less. Higher prices do discourage consumption, and that is a necessary thing under certain circumstances.

It is, however, only half the picture.

Will these higher prices resulting from the tax have the effect of increasing the supply of oil? Will they improve our balance of payments? Will the crude oil tax create jobs?

Certainly not. To the extent that the crude oil tax achieves its goals, the effect will be simply to take money out of the pockets of consumers. The only question is, Where will the money go?

Higher energy prices, in and of themselves, are not necessarily desirable. Higher prices for any commodity are desirable only to the extent that they serve a necessary function, in the context of a market-regulated economy.

If the marketplace is permitted to work, prices will be only so high as is necessary to insure an adequate supply of the particular commodity. The energy market will operate in this manner, if we will permit energy commodities to be priced at their replacement value—and if the replacement price is permitted to be used to replace the energy consumed.

Price controls stimulate demand for energy while decreasing the supply of energy. A free, competitive marketplace permits higher prices to serve their function of increasing supply and discouraging

consumption. The President's crude oil tax is, in my judgment, the worst of both worlds: energy consumers pay more, but they get little, if anything, in return.

I will mention briefly two other reasons for my opposition to the crude oil tax proposal. In the first place, I am confident that this proposal, if enacted, will soon prove to be a bureaucratic nightmare, incapable of being administered in an effective and equitable manner.

Only time can prove me right or wrong, but the prospect of the Federal Government attempting to administer this complicated tax system, imposed as it is on top of an equally complicated system of oil price controls, is not encouraging.

Last, but perhaps most important, the President's proposal assumes the indefinite continuation of the current system of Federal oil price controls. The President takes this position despite the fact that it is increasingly apparent, even to many of those who support the concept of oil price controls, that the current program is unworkable.

Because of my conviction that these oil price controls are not only costly but also counterproductive to our national energy needs, I recently introduced legislation designed to reform the current law governing regulation of domestic crude oil production and to provide for a gradual phase-out of existing Federal price ceilings on domestic oil.

This bill, S. 1709, the crude oil pricing reform act, would abolish the complicated composite price mechanism contained in the current law. It would provide for gradual, predictable escalation of price ceilings for old and new oil, aiming at the June 1, 1979 target date for total decontrol contained in the current law; and it would expand the categories of oil now exempt from price controls to include certain new oil and certain oil which can be produced only at higher than usual production costs.

I recognize, of course, that the Committee on Energy and Natural Resources, rather than this committee, has primary jurisdiction over the issue of crude oil pricing policy. I mention my bill, and the concept of phased decontrol of oil prices generally, only in an attempt to contrast the decontrol approach to that of continued controls and the crude oil equalization tax.

The President's approach attacks only half of the problem, at best. Oil price decontrol, such as that which I have proposed, addresses both sides of the problem—supply and demand.

My preference would be that the committee abandon entirely the concept of the crude oil equalization tax. If we are going to make major changes in the manner in which oil prices are determined, then we should do it directly, by amending the oil price control law.

If the committee concludes that it is necessary to retain the crude oil tax, then I urge you to include measures which will provide substantial additional exploration and production incentives.

I will leave to the discretion of the committee the manner in which this can best be accomplished.

Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

Senator Talmadge?

Senator TALMADGE. I have no questions. I compliment the distinguished Senator for his remarks.

Senator TOWER. I thank the distinguished Senator.

The CHAIRMAN. Senator Bentsen?

Senator BENTSEN. I join in that and say to my colleague from Texas that I strongly agree with him that this bill does not have the incentives that we need. It is like a two-legged stool. It is important for us to see that we have deregulation and put the incentives in and encourage production.

I know that the members of this committee will try to have deregulation, and build incentives into the system.

Senator TALMADGE. I thank my distinguished colleague from Texas. I would be remiss if I did not note the statesmanship that has been exhibited for years by the distinguished senior Senator from Louisiana and my distinguished colleague from Texas.

I think you two gentlemen in particular have the sophisticated understanding of the economics of the oil and gas industry. I commend you for your past efforts and look forward to your leadership in the oncoming battle, and there is going to be one.

The CHAIRMAN. Senator Dole?

Senator DOLE. I have no questions. I commend my distinguished colleague for his leadership, not only this morning but on the Republican Policy Committee in trying to draft responsible alternatives in energy legislation. That leadership is taken, of course, by the distinguished Senator from Texas. We are very grateful for his outstanding performance.

Senator TOWER. I thank my colleague.

The CHAIRMAN. Senator Tower, I would be willing to vote for deregulation and decontrol, and I have supported that kind of proposal. I have supported the Bentsen-Pierson amendment.

Senator TOWER. Which was a good proposal, and I hope we will have the chance to consider it again.

The CHAIRMAN. I am for free enterprise, and I would like to preserve it if we can, as I know you would. If we cannot do anything to free the industry from these needless controls, it occurs to me that it would serve a purpose to levy this tax, put the proceeds into a trust fund, and use that trust fund to indemnify any losses in trying new energy technologies. The Reconstruction Finance Corporation approach could be used, as we had in World War II when Jesse Jones headed up that effort, and a real job was done of obtaining wartime production.

We had synthetic rubber plants, to help meet the shortages. We had shortages; the Government met them. Money was available to do the job where it was needed. If we cannot do it any other way, it seems to me that we might proceed on the basis of a trust fund, making funds available to people who would make the kinds of investments we want to achieve more protection from insecure foreign sources of energy supply and also to get on with conservation.

This committee has jurisdiction only insofar as proposals in the tax area. We can form a trust fund to put the tax money into, but if we are going to do anything of this sort, we have to do it in the taxation area with something relevant to the tax like a trust fund.

I wonder how you would feel about it, if you could expand a little bit about your attitude, if we were to refund some of the tax revenues to the poor. Beyond that, we could dedicate the rest of it to a trust

fund to help guarantee loans and make loans and help provide capital both to produce more energy and to make better use of what we have.

How does that appeal to you?

Senator TOWER. I think that the proposal that the chairman has advanced here certainly merits some very careful consideration. Off-hand, I would neither agree or disagree with the proposal of the trust fund.

Conceptually, however, I think I would agree with the chairman. Whatever money is paid for energy should go back into producing more energy.

The President was absolutely right in saying that we have to pay the replacement costs of the energy, but from that point, the President and I differ.

I think when you pay the replacement costs for energy then the money should actually go into the replacement of that energy.

The trust fund idea, I think, certainly has merit. I would have some concern about seeing the Government get into the oil business. I still think that the private sector can do a better job of exploring for and developing oil and gas production than the Government can.

The CHAIRMAN. The kind of thing I am talking about would not have the Government do any producing at all.

Senator TOWER. It is a loan guarantee program, to provide some capital. Obviously, capital shortfall is one of the critical possibilities that the industry has to face up to.

As the distinguished Senator from Louisiana well knows, capital invested in finding and developing oil and gas is high-risk capital, and it is not easy to come by. Hence, we have to have incentives. Hence, too, we have to have profits.

There has to be the prospect of a good profit in high-risk ventures, or people simply will not invest in capital.

I would certainly be willing, from my own point of view, and from the standpoint of what I could support, to give serious consideration to the idea advanced by the Senator from Louisiana.

The CHAIRMAN. In considering these proposals, we should not be thinking of partisanship, we should not be thinking in terms of who is right. We should be thinking in terms of what is right.

Senator TOWER. I certainly agree.

The CHAIRMAN. Vice President Rockefeller was advocating this type of financing mechanism a year or 2 ago.

Senator TOWER. I do not necessarily buy it, by the way.

The CHAIRMAN. He was advocating that kind of approach, as it was done back in World War II. It was done under the Roosevelt administration. That approach has complete precedent in terms of what has been done in national emergencies to meet the emergency.

And it seems to me that that is consistent with what you have been saying here.

I would like to let the industry be paid what it costs to produce the energy so they can reinvest the proceeds in producing more energy. It looks as if we cannot get the votes for that.

If that is not feasible and cannot be done, I think this other approach would at least make available the price that is being paid on an energy replacement basis to be put back into replacing the energy that we are using.

I would think that is something you could support.

I appreciate your answer—you would like to reserve judgment until you see what it is in more detail. But I am sure you can understand generally what I am talking about.

Senator TOWER. Conceptually, I agree that the money exacted from the production of oil and gas should go back into more production, ultimately.

The CHAIRMAN. I think Jesse Jones did a great job heading that up. My only criticism is that too much of that money went to Houston, Tex., compared to Baton Rouge and New Orleans, La.

Senator TOWER. May I say a lot of that money is still there.

The CHAIRMAN. At least it has not been burned; it has not been destroyed.

Senator BENTSEN. Mr. Chairman, on that, we passed through this committee in 1975 an amendment that I proposed that provided for Government guarantees so long as private enterprise was putting in the equity money. We are talking about things like oil shale and coal conversion, gasification plants, that kind of thing.

Some of these things could cost as much as a billion dollars.

I do not agree with the approach used in World War II where the Government went in and built the plants and then asked private enterprise to run them. Under my approach, private enterprise would put up the risk capital, the first 15 or 20 percent, and then Government would make a guarantee where they would eliminate the liability for the corporation on the bottom 80 percent.

That way, you get business judgment on whether it is a practical or feasible project, and they get it built at as low a cost as they can, and they have the problem of operating it.

The problem you have in getting some of these coal gasification plants built now is you may have a pilot plant that works all right. They are not sure that the commercial plant itself, the big one, will work.

You get a company that has \$500 million of capital in surplus and they build a billion dollar plant and it does not work, they are wiped out. So a board of directors will not approve that.

If you can get it where they put in the first dollar, we will get some of those built for the country.

Senator TOWER. I find myself in fundamental agreement with the Senator.

Reflecting on World War II, having once built the plants, they did turn it over to private enterprise to operate, or we would not have won World War II.

The CHAIRMAN. It seems to me that if we invest in something such as developing our oil shale reserves, or if we are going into something like the commercial use of the methane gas, which is in the ground beneath Texas and Louisiana, where there is a fantastic potential, if the project succeeds, at some point it might actually break the OPEC cartel.

If it does and they drop their price, then the investment will all be lost unless this Government wants to protect it with trade policies. To undertake these projects, I think we have to think somewhat the way the Government did when they built those rubber plants back in World War II.

We could have private enterprise undertake the project, if you want, but when it is going to be a very high cost fuel, and involves a huge investment of money, I do not think anybody will want to put a great deal of his own money into it, because of the very speculative nature of it. They would take a fantastic risk, would they not?

Senator TOWER. Yes, it is high risk, and the front end capital requirement is going to be enormous. Perhaps it cannot be borne by private enterprise.

But I would still agree with my colleague from Texas that there certainly should be some equity capital invested to the extent possible or feasible.

The CHAIRMAN. We might make funds available and tell private enterprise to come make the Government a proposition. The Government could say that we are willing to guarantee a loan to develop shale, or that we are going to give you a big lease to have some shale to develop.

Let us see who would be willing to make the best proposition and do business on that basis.

The one thing I do not want to do is to set a program up in which nothing ever happens. We have seen too much of that around here—a lot of big talk and then in the end, nothing happens. Nothing ever comes of it.

If we are going to do something, it ought to be on the basis that we have some reasonable assurance that we will get results.

Senator TOWER. As I say, I am simply receptive to these ideas, but going back to what my colleague from Texas said about equity capital being invested from the private sector, what I want to make sure we not do is tax away that potential for equity capital formation.

I still think the private sector is going to make better judgments than the Government is.

The CHAIRMAN. Senator Byrd?

Senator BYRD. No questions.

The CHAIRMAN. Thank you very much.

Senator TOWER. Thank you.

The CHAIRMAN. Senator Dole?

Senator DOLE. I do not have a question, but do you have a draft of this proposed plan available?

The CHAIRMAN. I do not have it right now. Maybe Mr. Rockefeller might have a draft of his suggestion. I am thinking along the same lines as his proposal. Just look at the old Reconstruction Finance statute to see the kind of proposal I have in mind.

Senator BYRD. Nelson Rockefeller, or David Rockefeller?

The CHAIRMAN. The Nelson Rockefeller plan, at the moment.

Senator TOWER. I think you will find support for it in the administration.

The CHAIRMAN. Thank you very much, sir.

Senator TOWER. Thank you very much, Mr. Chairman, and members of the committee.

[The prepared statement of Senator Tower follows:]

STATEMENT OF U.S. SENATOR JOHN G. TOWER

Mr. Chairman, members of the committee. I am grateful for this opportunity to appear before you on the Energy Tax Act of 1977. I am the senior United States Senator from what is the largest oil- and natural gas-producing State in

the Union. Of the 254 counties in Texas, there is oil or gas production in 212. The State of Texas alone produces almost 40 percent of all the oil and gas produced in the United States. The State of Louisiana, I might note, is close behind, in second place, in both oil and gas production.

Let me say at the outset that this legislation, as originally proposed by the President and in the form in which it passed the House of Representatives, disturbs me greatly. I wholeheartedly commend President Carter for his vigorous efforts to help convince the American people that the Nation's energy problem is genuine and serious. I am happy to say that I can also enthusiastically support many of the energy conservation goals and proposals contained in this legislation. Having said that, however, I am also constrained to say that, for the most part, the bill is based on the completely erroneous assumption that this country has run out of oil and gas.

There are numerous provisions in this legislation that concern me. Unreasonable regulatory and tax burdens on natural gas-dependent industries and electric utilities is one major area of concern which I will mention only in passing. However, because crude petroleum is the most valuable of Texas' mineral products and because, in my judgment, the proposed crude oil equalization tax is one of the most ill-advised parts of the Carter energy plan, I will direct most of my specific comments toward the crude oil tax.

Now, I know that it is well known that Texas is extremely well endowed with oil and natural gas, but if you will bear with me for a few moments, I would like to recite a few facts which will suggest to you just how important this energy legislation is to the State of Texas. Texas has produced 41.9 billion barrels of oil over the years. That is about 36 percent of the U.S. total. In 1976, Texas produced 1.2 billion barrels of crude oil, or 40 percent of the U.S. total. In terms of world oil production, Texas alone produced almost 6 percent of all the oil produced in the world in 1976. That is down from about 7 percent in 1970.

That is the present. The potential of Texas oil production is also great. It has been estimated that Texas has about 12 billion barrels of oil reserves, made up of over 9 billion barrels of crude oil and almost 3 billion barrels of natural gas liquids. That amounts to about 32 percent of all U.S. oil reserves. What is more, it is estimated that at least an additional 1.5 billion barrels could be recovered through water flooding and other special recovery methods.

That kind of production does not come about unless you drill a lot of holes in the ground. Texas oil men drilled almost 13,000 wells in 1976, including 330 test and service wells. That comes to about 30 percent of all U.S. drilling. Nearly 26 percent of Texas wells drilled in 1976 were "wildcat" wells, which seek new fields. I should mention that only 33 percent of these wildcats found oil or gas. In the process, Texas operators spent \$2.2 billion drilling in 1976, and lost \$745 million in drilling dry holes.

It is obvious that the State of Texas has made a major contribution to the Nation's energy needs. The extent to which Texas and other major energy producing States can continue to contribute to increased U.S. self-sufficiency is dependent to a great extent on the legislation before this committee.

Before I put those Texas statistics aside, please bear with me just a bit more while I cite some which will illustrate just how important a healthy energy economy is to my State. The Texas petroleum industry employs some 257,000 persons (about one out of every 19 Texas workers) with wages of \$3.7 billion annually. Texas owners of oil and gas royalty interests received \$1.9 billion from oil and gas production in 1976. As some of you may know, many of our State government programs are funded to a significant degree by oil and gas taxes and revenues from oil and gas production on State-owned lands. Texas petroleum industry taxes account for 21.9 percent of all State taxes. The industry's 1976 tax payments to State government were \$857 million. Texas oil and gas dollars pay for almost 60 percent of the State cost of aid to dependent children, medical assistance, and teachers' retirement matching funds.

Texas is one of the few States which still retains a substantial quantity of State public lands. Fortunately, much of it has significant oil and gas production. The Texas Permanent School Fund and the University of Texas Permanent Fund are major beneficiaries of oil and gas production from these State-owned lands. The Permanent School Fund in 1976 received \$130.4 million from the petroleum industry for lease rentals, bonuses, and royalty payments. The University Permanent Fund received \$85.7 million from these sources in 1976.

Now, obviously, Texans, both as energy producers and as energy consumers, have a great stake in the energy policy decisions being made in this Congress. I

submit, however, that the Texas figures I have just cited also suggest that it is the American people who have been and will continue to be the principal beneficiaries of aggressive oil and gas production efforts in producing States such as Texas, Louisiana, Oklahoma, California, Wyoming, New Mexico, Kansas, and Alaska.

In view of that, I am, quite frankly, disappointed and saddened by the Carter energy legislation, both as originally proposed and as passed by the House. President Carter's national energy plan, as embodied in the bill before you, is, in my judgment, critically deficient in many respects. It appears to be based on the totally erroneous assumption that we can conserve our way out of this Nation's current energy supply predicament. To concentrate entirely on efforts at conservation ignores the fact that there are very real limits to what can be achieved in reduced energy demand without seriously crippling the Nation's economy and drastically impairing our standard of living.

Measures to increase energy efficiency and reduce consumption are important and necessary elements of national energy policy. But without realistic measures to increase supplies, any national energy policy is doomed to failure. Frankly, I find in the Carter energy plan and in the bill before you no significant incentives which could lead to needed substantial additional exploration for and production of oil and gas and other energy sources.

In other words, President Carter's National Energy Plan and the bill before you constitute only part of a comprehensive national energy plan—they are designed to reduce energy demand, but they contain almost nothing which will lead to increased energy supplies. The various congressional studies of the plan reached the same conclusion. The Congressional Research Service concluded that "the plan contains little in the way of new incentives for private development of new oil and gas resources." The Office of Technology Assessment concludes that "the plan does not clearly establish that the proposed oil and gas pricing policy will provide the necessary funds to achieve its projected oil and gas production rates." And finally, the General Accounting Office found that "by not increasing the financial incentives for additional production, the plan fails to come to grips with the problem of increasing domestic crude oil production."

I have numerous objections to the various provisions of the House-passed Energy bill. The primary objection is the one to which I just alluded: The bill tries to solve our energy problem by attacking only half the problem—consumption. This energy plan will fail unless we write into this bill major new oil and gas production incentives.

The second major objection to the bill is that it is based on more, not less, Federal Government intrusion into private enterprise energy development activities. Lastly, the Carter Energy Plan and the legislation before you reveal an unmistakable attempt to benefit some regions of the United States at the expense of other regions. There are some who say that this legislation, if enacted in its present form, will succeed in making "energy colonies" of the major energy producing States of the Union. I do not believe that is an unreasonable assessment. In this context, I might say that Texans are more than willing to carry their fair share of the burden and to pay their fair share of the cost of solving this Nation's energy problem. I believe Texas' willingness to share and to help was well demonstrated during this past winter's natural gas supply crisis. In my judgment, however, Texas energy producers and consumers have already paid more and done more than anyone else to supply themselves and the Nation with adequate supplies of energy. This bill does not reward or encourage energy producers and it clearly imposes on producing State consumers a very unfair and punitive burden.

Putting aside for the time being some of the particular concerns of my Texas constituents, I would like to turn to President Carter's proposal for a crude oil equalization tax. Under the President's crude oil tax proposal, oil prices would be held down by controls while being artificially raised through a complicated system of Federal taxes. If there is a better illustration of the "Alice in Wonderland" quality of many of the Carter energy proposals, I cannot think what it would be. I find it difficult to conceive of a more illogical, upside down, counter-productive, and, in fact, destructive way to approach the oil pricing issue.

In my opinion, the President's crude oil tax proposal is little more than a scheme for back-door financing of questionable Federal programs that could not otherwise stand the test. It is a massive tax program masquerading as an energy proposal. The President has already decided to dip into the revenues to help fund his welfare reform proposal. The likelihood that the President and the

Congress will in the future be able to resist similar temptations for other projects seems slight indeed. The House of Representatives has already demonstrated as much. The rebate plan adopted by the House is for one year only, and the Crude Oil Equalization Tax Trust Fund, established for the return of the crude oil tax receipts, is set to terminate at the end of 1979.

If indeed the crude oil tax receipts are to be rebated, it would appear unlikely that the crude oil tax will achieve its purported goals. The President has said that the crude oil tax is designed "to insure that market decisions by consumers are based on the real value of oil." Considering that the real price of oil will continue to be controlled at an artificially low level, and considering the manner in which the crude oil taxes will be rebated to consumers—in the form of lowered income tax withholding rates—I find it extremely difficult to understand just how consumers are going to be able to figure out what is "the real value of oil." I think it is clear that the crude oil tax proposal of the President, as embodied in this legislation, will have little, if any, overall impact on the consumption of petroleum products.

In what way will consumers benefit if the crude oil tax is successful in achieving its goal? The goal of the tax, presumably, is to make petroleum products more costly so that consumers will use less. Higher prices do discourage consumption, and that is a necessary thing under certain circumstances. It is, however, only half the picture. Will these higher prices resulting from the tax have the effect of increasing the supply of oil? Will they improve our balance of payments? Will the crude oil tax create jobs? Certainly not. To the extent that the crude oil tax achieves its goals, the effect will be simply to take money out of the pockets of consumers. The only question is where the money will go.

Higher energy prices, in and of themselves, are not necessarily desirable. Higher prices for any commodity are desirable only to the extent that they serve a necessary function, in the context of a market-oriented economy. If the marketplace is permitted to work, prices will be only so high as is necessary to insure an adequate supply of the particular commodity. The energy market will operate in this manner if we will permit energy commodities to be priced at their replacement value—and if the replacement price is permitted to be used to replace the energy consumed.

Price controls stimulate demand for energy while decreasing the supply of energy. A free, competitive marketplace permits higher prices to serve their function of increasing supply and discouraging consumption. The President's crude oil tax is, in my judgment, the worst of both worlds: Energy consumers pay more, but they get little, if anything, in return.

I will mention briefly two other reasons for my opposition to the crude oil tax proposal. In the first place, I am confident that this proposal, if enacted, will soon prove to be a bureaucratic nightmare, incapable of being administered in an effective and equitable manner. Only time can prove me right or wrong, but the prospect of the Federal Government attempting to administer this complicated tax system, imposed as it is on top of an equally complicated system of oil price controls, is not encouraging.

Last, but perhaps most important, the President's proposal assumes the indefinite continuation of the current system of Federal oil price controls. The President takes this position despite the fact that it is increasingly apparent, even to many of those who support the concept of oil price controls, that the current program is unworkable.

Because of my conviction that these oil price controls are not only costly but also counterproductive to our national energy needs, I recently introduced legislation designed to reform the current law governing regulation of domestic crude oil production and to provide for a gradual phaseout of existing Federal price ceilings on domestic oil. This bill, S. 1700, the Crude Oil Pricing Reform Act, would abolish the complicated composite price mechanism contained in the current law; it would provide for gradual, predictable escalation of price ceilings for old and new oil, aiming at the June 1, 1979, target date for total decontrol contained in the current law; and it would expand the categories of oil now exempt from price controls to include certain new oil and certain oil which can be produced only at higher than usual production costs.

I recognize, of course, that the Committee on Energy and Natural Resources, rather than this committee, has primary jurisdiction over the issue of crude oil pricing policy. I mention my bill, and the concept of phased decontrol of oil prices generally, only in an attempt to contrast the decontrol approach with that of continued controls and the crude oil equalization tax. The President's approach

attacks only half of the problem, at best. Oil price decontrol, such as that which I have proposed, addresses both sides of the problem—supply and demand.

My preference would be that the committee abandon entirely the concept of the crude oil equalization tax. If we are going to make major changes in the manner in which oil prices are determined, then we should do it directly, by amending the oil price control law.

If the committee concludes that it is necessary to retain the crude oil tax, then I urge you to include measures which will provide substantial additional exploration and production incentives. I will leave to the discretion of the committee the manner in which this can best be accomplished.

The CHAIRMAN. Now we will hear from A. V. Jones, Jr., president of the Independent Petroleum Association of America.

Senator TOWER. Mr. Chairman, I would just like to say that not only is Mr. Jones a distinguished Texan, but he is a distinguished leader in the oil and gas industry. I am sure that I will endorse everything that he says.

The CHAIRMAN. You had better be careful, now. You cannot tell about some of these fellows. He might favor certain people over certain other people. You had better be sure which side you are on before you do that.

Senator BENTSEN. Mr. Chairman, I am not running for reelection this coming year, and I still want to speak in very laudatory terms of my friend. I am not going to give him a total endorsement.

The CHAIRMAN. I think we had better wait until he makes his statement before we endorse it.

STATEMENT OF A. V. JONES, JR., PRESIDENT, INDEPENDENT PETROLEUM ASSOCIATION OF AMERICA

Mr. JONES. Thank you very much, gentlemen.

Mr. Chairman, I did submit to the committee on August 12 a detailed written statement relative to H.R. 8444, and I hope that this statement has been distributed to the committee members.

That statement stands as the position of the Independent Petroleum Association of America and the 20 State and regional associations which are listed on the cover page of the testimony that I have presented this morning.

In our view, this bill, unless modified in significant respects, would assure chronic domestic shortages of energy and increased dependency on unreliable imports of foreign oil and natural gas.

The glaring weakness in H.R. 8444 is the failure to provide for expansion of domestic oil and natural gas production.

What has been overlooked by the proponents of H.R. 8444 is the need to bridge the gap from now until the day when alternatives to oil and natural gas can be relied upon extensively. Crude oil and natural gas presently supply 75 percent of our Nation's energy.

For the next decade or longer, no alternative can be counted on to replace significantly this reliance on oil and gas. The United States will become increasingly more dependent on imports unless it has a vigorous, healthy, and expanding domestic petroleum industry.

I would like to call your attention to the chart I have attached to the prepared testimony. It is called "The Carter Energy Plan Versus the Required Expansion," and what we have attempted to do here is show statistically what we have actually accomplished in the period

1970 through 1976 as far as oil and gas production is concerned in this country.

You will notice we actually are in a downtrend position in oil and gas production in this country, even though we have had a greatly expanded effort.

This comes about because of many, many years of suppressed prices as far as oil is concerned, actually a phasing out of the oil and gas industry. It is going to be some years before we can create an upturn in these production rates.

However, the Carter plan simply does not provide enough money to do the exploration, development, and production work necessary to even achieve what he would like to have us achieve as stated in his energy message.

On the second side of this, the required expansion indicates that in order to have 10 million barrels of domestic production of oil by 1985, we are going to have to be drilling somewhere along 80,000 to 90,000 wells per year at that time.

It is going to require an effort double what we are doing right now. It is going to require about \$250 billion in the interim period between now and 1985 to get this job done, and Mr. Carter's energy proposal simply does not have that kind of money in it for the industry. It is about \$100 billion short.

Without significant changes in the House-passed legislation, the reduction of imports by 1985 to 26 percent, or to 6 million barrels a day, will be impossible.

I would like to quote from some of the studies made by independent sources of the administration's plan, and I will quote from some of the statements that these groups have made.

The Office of Technology Assessment—this is analysis of the proposed energy plan, and I quote: "The actions proposed by the plan may not be strong enough to prevent oil imports from reaching levels that could threaten the national security and economic stability."

This is a quote from the Comptroller General of the United States in a letter to the Honorable Jack Brooks: "We believe it is somewhat incongruous to ask the Congress to establish a set of national energy goals, and then to propose a national energy plan that is not expected to achieve them."

The GAO, in its evaluation of the national energy plan, says:

Portions of the plan dealing with domestic supply are not likely to achieve the results that have been projected. Unless energy demand is reduced, the level of imported oil is likely to be about 4.3 million barrels per day more than the administration's goal of 6 million barrels per day.

The plan will reduce revenues to producers for most oil already discovered and may adversely affect oil companies' financial ability to support additional exploration. By not increasing the financial incentives for additional exploration and by reducing companies' financial strength, the plan fails to come to grips with the problem of increasing domestic crude oil production.

Finally, the Brookings Institution, in a paper entitled "Setting National Priorities," says: "In short, the proposals will not eliminate the gas shortage; they will partially disguise it and extend it to markets that are now uncontrolled."

The Administration has defended the lack of production incentives in H.R. 8444 with several false and unsupported arguments regarding resource potential and rig and equipment availability.

These arguments are in regard to what the resource potential is in the country. They try to hide behind the facade that there are not enough rigs and equipment available to sustain the type of drilling program I am addressing myself to and I think you gentlemen know that the ingenuity of American business simply will not allow shortages of iron to be one of the restraints in this situation.

Also, I think they have taken an about-face. Dr. Schlesinger is now admitting that maybe there is enough gas in this country to sustain our current rates of production, that there is probably as much oil to be found as has been found.

We think the administration has half an energy program. We do not think they can actually defend the position they have gotten themselves into.

The administration has also justified its strategy of deliberately limiting production incentives by alluding to huge reserves of "excess cash" in the petroleum industry. The aggressive explorer-producer of crude oil and natural gas is being shortchanged by such statements.

Active producers are limited in their drilling efforts each year for lack of capital. Exploration drilling is a high-risk business. Generally, it is not possible to borrow funds to drill exploratory wells. These funds must come from aftertax revenues from sale of production and from outside entrepreneurial investors.

The tax provisions in H.R. 8444 are obviously of greatest concern to member of this committee. Unfortunately, most of these tax provisions take the wrong approach. Of particular concern to domestic explorer-producers is the crude oil equalization tax which would increase the cost of petroleum to consumers by 5 to 7 cents per gallon without stimulating any increase in supply.

In fact, according to the administration's own estimates, the tax will actually reduce the income of the petroleum industry. This reduction in income would be in addition to the losses incurred by producers as a result of past price freezes and rollbacks and FEA's refusal to allow prices to escalate to the full extent allowed by law. This is especially unfair because producers have made many investments in the past, relying on the Government's assurance of oil price levels.

We recommend that this tax be rejected in its entirety. Instead, we urge you to concentrate on eliminating price controls on crude oil and natural gas. Until this is done, the United States will not have a rational or workable energy policy.

It makes no sense to import foreign oil and natural gas at high prices and at the same time deny the domestic industry maximum incentives to find and produce oil and natural gas from domestic sources. For example, natural gas from Canada now costs \$2.16/per thousand cubic feet and the price promises to continue to rise.

LNG is being and will be imported from a number of countries at prices ranging from \$2 to \$4 per thousand cubic feet.

Simply, there is not any justification for holding our prices as low as they are.

The only positive tax provision we can see in the whole bill is the one affecting the independent producers in which the minimum tax would be removed as far as intangible drilling costs are concerned. This is the amendment that Senator Bentsen sponsored in the Senate before.

We would urge you to again put this in the full bill.

The IPAA would like to urge the adoption of the following petroleum taxation policy. We would like to see you drop the crude oil equalization tax that is included in H.R. 8444.

We would like to see elimination of the noncorporate intangible drilling expenses as a minimum tax preference item. Hopefully, the 65 percent of taxable income limitation on percentage depletion for independent producers could be removed.

We would like to see an amendment to the existing law to prevent further reduction in the percentage depletion rate and the allowable volume. We would also recommend providing for expensing of geological and geophysical cost rather than their being required to be capitalized.

We would like to see an enactment of an energy development investment tax credit which would allow a credit against Federal income tax for exploration and development expenditures.

We would hope that we could decontrol the price of upper tier oil and all economically marginal crude oil and phase out the price controls at some time in the future on lower tier crude oil prices.

We would like to see the deregulation of the price of new natural gas. We hope that you will reject the House-passed provisions on natural gas, which extend Federal jurisdiction to the intrastate market.

Thank you very much, sir. I am sorry I went over the time a little bit.

The CHAIRMAN. Senator Talmadge?

Senator TALMADGE. I have no questions, Mr. Chairman.

The CHAIRMAN. Senator Bentsen?

Senator BENTSEN. Mr. Chairman, I want to congratulate the witness on his paper and say that I am pleased to see that the House has finally accepted the Bentsen amendment on intangible drilling costs. I know it will be under attack again in the Senate, but it is absolutely imperative that we keep it on a permanent basis.

I am going to work very strongly to do so.

Again, I agree with him very much on working for deregulation and we will continue to fight to do that.

The CHAIRMAN. Senator Dole?

Senator DOLE. I certainly share the statement that you have made, Mr. Jones. KIOGA (the Kansas Independent Oil and Gas Association) is part of your group. I wonder if you would elaborate on the effects of the Tax Reform Act of 1976 on its affect on the raising of capital and the treatment of intangible drilling expenses.

We made some changes. They have had an adverse impact, did they not?

Mr. JONES. They certainly did. A lot of the money that is attracted to particularly the independent producers, the ones drilling the large numbers of very risky wells, now he does have to rely on the outside investor.

I think wisely the law has provided for the immediate writeoff of the cost of exploration and development wells and certainly this penalty on this expenditure did make raising this type of capital more difficult for the independent. It also—we see no justification for this type of tax on an expenditure rather than a positive cash flow as depletion. You have the cash, but a lot of people were put in the very

difficult position that they had to come up with more money to pay their tax than they actually had and had to go borrow and it cut down their exploration efforts for this year by the amount of money they have got to make up for the tax.

That was in 1975.

Senator CURTIS. If you would yield, was that applied retroactively?

Mr. JONES. Yes, sir. It was actually passed in November or December. People had done their work for the whole year, then they came up and passed it. This made it a doubly hard blow. They had to make provision for this tax and go borrow the money and everybody reduced their efforts this year.

Senator DOLE. There was an effort made by Senator Bentsen to rectify the problem. We fell a little short.

Senator BENTSEN. We did rectify it for 1977. The deal we made in conference was that the administration and the House would consider putting it on a permanent basis if we settled for 1 year, 1977. I am pleased to see that they have kept their commitment.

Mr. JONES. We want to encourage it.

Senator DOLE. That is the reason I asked. There may be someone who does not have that in mind.

You made a forceful statement. There were some of us who were not here for the early hearings in August when Mr. Schlesinger and others gave the administration's view. As far as the crude oil equalization tax is concerned, the big question is whether or not this is going to decrease our dependence on foreign oil.

I have read all of the editorials and all the other comments—it does not seem to be an energy measure at all. It is a tax measure. But does it have any impact on our dependence on foreign oil?

Mr. JONES. I submit it will not have any impact at all. It will raise the price of gasoline very slightly to the consumer, but I do not think that it will actually cause any conservation at all.

Certainly you are asking the consumer to pay near to the replacement cost for energy, but this money, none of it accrues to the producer who would go out and find more energy for the consumer.

I submit that it will, in fact, put us more dependent on foreign oil. This is what we are trying to show, that under this plan, instead of reaching the goals that he prescribed, we are going to be further dependent on oil in the mid-1980's at a time when it may be costing \$25 to \$40 per barrel and simply our economy cannot stand to pay that type of price for oil in the quantities we would need to sustain our economy.

At that time, the balance-of-payments deficit would simply overwhelm us.

You think because it is going to add to the cost of gasoline, again it is 5 to 7 cents, I guess—I cannot understand how that is going to have any world impact on demand. It seems to me it is not going to decrease demand, if that does not happen. It is not going to decrease dependence.

I am certain you have studied that.

Mr. JONES. That is my position, too. I do not think 5 to 7 cents will have any influence on demand whatsoever.

Senator DOLE. You have properly addressed the problem. Of course, there is always the charge made that those of us who come from producing States have a bias.

We want to help the country overcome dependence on foreign oil. If you took the shackles off the industry, we believe we have the potential in some of producing States to increase productive.

That opens up everybody to charges. Maybe the oil industry does not have the best image, but it is improving. People are beginning to recognize that those who use the industry as a political whipping boy may have made a mistake. It may have had some short-term gains, but we still have the problem.

I do not think we have addressed it, in all fairness to the administration, in the Carter proposal.

What is the industry's view on plowback? Would it be preferable that instead of a big tax that would let the price rise to protect the consumer, that the industry be encouraged to put their profits into more exploration.

Mr. JONES. In the House, we supported the so-called Schroeder-Jones amendment that would have given the industry an opportunity to plow back a small portion of the tax. It did not pass the House, but it came very close.

We think that there is all the justification in the world to allow the industry to put the money into exploration. In fact, we are submitting that unless some provision for this cash flow does come from either accelerated prices or this type of tax with a plow back, that we simply will not be able to do what the President himself sets out, that is, having 10 million barrels per day domestic production by 1985.

It simply will not occur.

I do not understand why the administration is reluctant to let the industry have part of these revenues to plow back.

Senator DOLE. We fail to understand that, too. If we cannot just reject the equalization tax, at least we can make some provision. That will lead us from dependence to independence.

Maybe it is not possible. If we adopt the administration's—zero—policy and accept the doom and gloom statistics that have been paraded about during the last several months, we are in big trouble.

Mr. JONES. I do not believe the people in America would go for this program, sir, if they had the confidence that we have that the resource base is out there and, given the opportunity to go find the oil and gas, we can bridge the gap between now and 1990 when hopefully we have some alternative source of energy for consumers.

Senator DOLE. The problem is not going to be based on what some consider to be greed. It is going to be based on a system that has worked over the years. A system which we are about ready to strangle.

Mr. JONES. Hopefully we will give our system a chance to continue to work.

Senator DOLE. Thank you, Mr. Chairman.

The CHAIRMAN. Senator Byrd?

Senator BYRD. Thank you, Mr. Chairman.

I gather from your chart that you feel that the increase in the use of—U.S. use of—oil, will be about 15 percent by 1985?

Mr. JONES. We are using that. We hope the growth of use will be reduced. We are assuming that the President's 2 percent per year increase in demand would be a reasonable growth in demand; yes. That is what that number is. It would increase about 15 percent between now and then.

We think that is a reasonable goal for the country, that type of increase in demand, but we will not meet that demand under the program. The cash flow will not meet the demand under his program.

Senator BYRD. This chart that you have, one is labeled "Carter Plan" and the other, "Required Expansion." Under the Carter plan, you envision that by 1985 we will be relying on imports for about 45 percent of all of our oil?

Mr. JONES. All of our oil; yes, sir.

Senator BYRD. Does the administration agree with that?

Mr. JONES. We submitted these numbers to the administration. We have given copies to Dr. Schlesinger. We have gone over these numbers with the Treasury Department. Those are the points I tried to make in my testimony here, that the General Accounting Office, I think, agrees with us pretty well, that we are not likely to achieve the President's goal under the plan unless something changes.

There is simply not enough money available as far as the industry is concerned to get where he wants to be. I think we pretty well have that documented.

Senator BYRD. The GAO actually puts it a little higher than you do, at 47 percent of our oil being imported.

Mr. JONES. Yes, sir. Our numbers are consensus. We drew some from the Chase Manhattan Bank, several various sources. But I think they fall within the range of most forecasts.

Senator BYRD. You feel if the program that you espoused is approved instead of relying on imports for 45 percent of our needs, our imports would be down to 26 percent?

Mr. JONES. Yes, sir.

Senator BYRD. In regard to the crude oil equalization tax, how much does that amount to in dollars?

Mr. JONES. In dollars per year, how much money is it?

Senator BYRD. Yes.

Mr. JONES. I have heard various figures. I do not know exactly what it would be the first year, but it gets up as high as \$80 billion by 1985.

Senator BYRD. Is that a cumulative figure?

Mr. JONES. Cumulative.

Senator BYRD. In other words, it would be \$80 billion of additional revenue?

Mr. JONES. Yes. Taken out of industry.

Senator BYRD. And going into the Government?

Mr. JONES. Yes. The numbers have varied, depending on whose numbers you use. A lot depends on how much oil you are talking about, but I have heard that number used.

Senator BYRD. Is that a number that you have some confidence in?

Mr. JONES. When fully implemented, in \$15 to \$18 billion per year, I think somewhere between \$80 and \$100 billion would be a number that we would have confidence in.

Senator BYRD. When fully implemented, what annual revenue range would it be?

Mr. JONES. \$15 and \$18 billion per year.

Senator BYRD. Thank you, sir.

Thank you, Mr. Chairman.

The CHAIRMAN. Senator Curtis?

Senator CURTIS. Mr. Jones, I want to commend you for a very fine statement. I remember your previous appearances here.

I would like to ask you, in your opinion would the enactment of the administration proposal be in the interests of the consumer, both in the short range and in the long range?

Mr. JONES. Senator Curtis, I think it would be the biggest disaster that ever came upon this country, to adopt this proposal, because simply by 1981, 1982, somewhere in that range, when oil is costing around \$30 per barrel, foreign oil to import, and we will be importing 40 to 50 percent of our oil, this country will be an economic basket case.

Factories would be shut down, our people would not have jobs. Unemployment would be high.

I do not consider if the people in this country knew the precarious position they were in right now that they would allow this type of bill even to be talked about. They are not fully cognizant of the facts.

I saw some recent statistics that 50 percent of the people in the United States do not know we import foreign oil. They assume it all comes from Texas, Louisiana, New Mexico, and Oklahoma, and they are not cognizant even that we import foreign oil.

Senator CURTIS. Maybe they did not realize those States you enumerated were part of the Union.

Mr. JONES. That is right.

Senator CURTIS. I am not making that allegation; however, I am glad that they are here.

Let me ask this. You have been around here before. There has been a concentrated attack on the oil industry. We have to go back more than a decade, of course.

The incentives that existed in the law some years back for the production of petroleum and natural gas, in your opinion, were those incentives to the benefit of the American consumer?

Mr. JONES. I have to answer that two ways, sir. No. 1, they brought energy to the consumer in this country at the cheapest price that has ever been known in the industrialized world. We literally had oil and natural gas, for all practical purposes, natural gas was free. Oil was very reasonable and did not increase through the years.

It made oil and natural gas very cheap to the consumer. He did not understand—he did not get a price signal to conserve at all. This might have been to his detriment.

He got used to running his business, his household, his leisure, on cheap energy and he grew to expect cheap energy. That may be why our industry is coming under some attack now, when energy is no longer going to be cheap.

As far as helping him, it made it cheap. It may have hurt him some in the long run because it did not give him market price signals to conserve energy, like other parts of the world do conserve.

Senator CURTIS. In other words, as far as supplying him with sufficient energy at a low price, it was very much in favor of the consumer?

Mr. JONES. An excellent, beautiful job.

Senator CURTIS. It might have overdone that in that it failed to cause the price to be high enough to make people conscious of the economic facts involved.

Mr. JONES. That is my answer, yes, sir.

Senator CURTIS. It has been my opinion that the depletion allowance, the traditional treatment comes in the form of intangible drilling costs and the like, were in reality consumer subsidies. They worked out that way, did they not?

Mr. JONES. They did, yes, sir.

Senator CURTIS. Do you believe that, based upon your contact with knowledgeable people, knowledgeable and dependable concerns, that there are sufficient resources—

Mr. JONES. I believe, sir—

Senator CURTIS [continuing]. To provide our needs?

Mr. JONES. I am a petroleum geologist and have been involved in this for over 25 years. We can, without any question, supply natural gas at around 20 trillion cubic feet per year for the next 30 years, that oil production can be sustained somewhere along the goals of the President, but it is going to take a sustained effort that I am talking about.

We have got to double the rates at which we are drilling right now to bring on the supply. The supply is there, but it is deeper, it is more expensive, it is in secondary and tertiary recovery of some of our already discovered resources. It is going to be very, very important that the industry get the signals now to go in and make some of the expenditures that are going to be necessary, at this point, for us to have the oil by 1985 that we need.

Senator CURTIS. Those signals must be dependable and of sustained duration, is that right?

Mr. JONES. That is correct.

Senator CURTIS. It calls not only for expenditure for drilling, but in refinery facilities and transportation facilities?

Mr. JONES. Tremendous capital outlays, some \$250 billion in oil and gas in the next 10 years.

Senator CURTIS. Those of us on this committee have been aware of an economic fight going on in the country, an antibusiness feeling, that instead of facing up to the needs of cutting Government expenditures they want to tax somebody else, or the arguments of the demagog, so and so in this segment of the industry are unjustly being treated too favorably.

It seems to me that individuals who do not believe in the system and who have their own theory of taxation are placing those objectives first. I think their answer is wrong, but they are placing those objectives first, rather than how do we secure an adequate supply of energy for a growing America.

Do you think there is something to that?

Mr. JONES. I believe that, sir. I think it is a shame that they would choose this very vital industry to promulgate their feelings. Certainly I think there are people that would like to nationalize the entire petroleum industry, no question.

Senator CURTIS. My reaction to the Carter proposal when it was announced was that it was appropriate for regimentation of the oil industry and laid the foundation for eventual Government takeover.

Mr. JONES. I would concur.

Senator CURTIS. Because, if the industry would be so crippled that they could not do the job, then it makes it very easy to take the next step, that Government had better do it.

My time is up, but I would like to add one more question, if I could have unanimous consent. That is this. We have heard a great deal about conservation. Now, we know that we should prevent waste, whether it is petroleum or money or any other thing.

There is a certain virtue, as well as efficiency, in preventing waste.

But the answer to our petroleum problems cannot be geared only to conservation, is that not right?

Mr. JONES. That is true, sir. That would be a very bad mistake.

Senator CURTIS. Are jobs produced in America by the use of energy or the nonuse of energy, which?

Mr. JONES. Of course, we can show you statistically where jobs and energy have been synonymous, almost. You plot the gross national product of this country, the number of people employed and the use of energy in this country, and they will lay over each other.

If we do not have energy in this country in the future, the only thing that can happen is our gross national product will start to decline and we are going to have chronic unemployment.

Senator CURTIS. In other words, there is a mentality in the country that can force the country to go back and live like hermits and pioneers—pioneer, actually; nonuse of energy, nonuse of all these facilities. But when they do, then a country with availability of jobs for people of all ages and the economy is out the window. Is that right?

Mr. JONES. Yes, sir.

Senator CURTIS. Thank you.

Senator TALMADGE. Thank you very much for an excellent presentation.

[The prepared statement of Mr. Jones follows:]

STATEMENT OF A. V. JONES, JR., PRESIDENT FOR INDEPENDENT PETROLEUM
ASSOCIATION OF AMERICA

On behalf of California Independent Producers Association; Kansas Independent Oil and Gas Association; Kentucky Oil and Gas Association; Liaison Committee of Cooperating Oil and Gas Associations; Louisiana Association of Independent Producers and Royalty Owners; Michigan Oil and Gas Association; Oklahoma Independent Petroleum Association; Pennsylvania Grade Crude Oil Association; Pennsylvania Oil, Gas, and Minerals Association; North Texas Oil and Gas Association; Permian Basin Petroleum Association; Rocky Mountain Oil and Gas Association; National Stripper Well Association; Illinois Oil and Gas Association; Texas Independent Producers and Royalty Owners Association; West Central Texas Oil and Gas Association; Independent Petroleum Association of America; Ohio Oil and Gas Association; Independent Petroleum Association of Mountain States; Panhandle Producers and Royalty Owners Association; and The Land and Royalty Owner of Louisiana.

Mr. Chairman, I submitted to the Committee on August 12, 1977, a written statement on H.R. 8444, the National Energy Act. I understand the statement has been distributed to Committee members. It stands as the position of the Independent Petroleum Association of America (IPAA) and the twenty state and regional associations listed on the cover page on the Administration's energy proposal, as passed by the House of Representatives.

In our view, this bill, unless modified in significant respects, would assure chronic domestic shortages of energy and increase dependency on unreliable imports of foreign oil and natural gas.

In short, Mr. Chairman, H.R. 8444 is deficient. It fails to provide any additional stimulus to increase domestic oil and natural gas supplies. Instead, it would impose massive new taxes on energy supply and use which would raise energy costs to consumers without buying them any additional domestic supplies in return. Because we cannot conserve ourselves to energy sufficiency, such an approach falls far short of the aggressive, far-sighted kind of energy policy required for this Nation.

The glaring weakness in H.R. 8444 is the failure to provide for expansion of domestic oil and natural gas production.

What has been overlooked by the proponents of H.R. 8444 is the need to bridge the gap from now until the day when alternatives to oil and natural gas can be relied upon extensively. Crude oil and natural gas presently supply 75 percent of our Nation's energy. For the next decade or longer, no alternative can be counted on to replace significantly this reliance on oil and gas. The United States will become increasingly more dependent on imports unless it has a vigorous, healthy, and expanding domestic petroleum industry.

IPAA has made a detailed analysis of the potential to increase oil and natural gas production under the Administration's plan versus an approach that would provide both the capital and incentives to greatly increase our exploration and development drilling effort.

The expanding program of exploration and development drilling outlined on the two attached charts is a realistic goal that can be achieved. Under it, foreign imports could be reduced to about 28 percent by 1985, a level consistent with the goal of 6 million barrels per day of imports set for 1985 by the Carter Administration.

The attached chart, "U.S. Oil Supply, 1970-1985" projects the supply conditions under the Carter energy plan through 1985 and compares these conditions with those that could and should be attained under an expanding program of exploration and drilling. The total supply in both cases is estimated to satisfy an increase of two percent per year in U.S. oil consumption, based on the Carter Administration's goal of curtailing the rate of growth in energy consumption. The "Required Expansion" is based on continuing the increase in drilling that was actually attained in the period 1973-1976 (2,500 additional oil wells per year.)

The second attached chart, "Capital Expenditures, Well Drilling Activity, and Oil and Gas Production—Lower 48 States, 1970-1985" compares the results under the Carter plan versus the results under the expanding program of exploration and development drilling. This comparison is summarized in the attached table which shows the cumulative deficits of the Carter plan during the period 1976-1985 and the annual deficit for the year 1985.

Without significant changes in the House passed legislation, reduction of imports by 1985 to 26 percent or about 6 million barrels per day is impossible. This conclusion is supported by a number of recent independent studies of the Administration's energy plan. The analyses are generally applicable to the provisions of H.R. 8444 because it essentially embodies the Administration's program.

Quotes from a few of these studies would be instructive:

Office of Technology Assessment—"Analysis of the Proposed National Energy Plan":

"The actions proposed in the Plan may not be strong enough to prevent oil imports from reaching levels that could threaten national security and economic stability."

Comptroller General of the United States—"Letter to Honorable Jack Brooks":

"We believe it is somewhat incongruous to ask the Congress to establish a set of National Energy Goals, and then to propose a National Energy Plan that is not expected to achieve them."

General Accounting Office—"An Evaluation of the National Energy Plan":

"Portions of the plan dealing with domestic supply are not likely to achieve the results that have been projected. Unless energy demand is reduced, the level of imported oil is likely to be about 4.3 million barrels per day more than the Administration's goal of 6.0 million barrels per day."

"The plan will reduce revenues to producers for most oil already discovered and may adversely affect oil companies' financial ability to support additional exploration. By not increasing the financial incentives for additional exploration and by reducing companies' financial strength, the plan fails to come to grips with the problem of increasing domestic crude oil production."

The Brookings Institution—"Setting National Priorities":

"In short, the proposals will not eliminate the gas shortage; they will partially disguise it and extend it to markets that are now uncontrolled."

The Administration has defended the lack of production incentives in H.R. 8444 with several false and unsupported arguments regarding resource potential and rig and equipment availability. Gloom and doom conclusions about our petroleum resource base are not justified by anything in the great body of private and public data that reflect expert evaluations of the remaining oil and gas resource potential which is substantial. All past experience provides a basis for full confidence that rigs, materials, and services for an expanding exploration,

drilling, production effort will be forthcoming under policies designed to encourage—rather than discourage—an all-out effort to maximize domestic production. More detailed discussions of these topics are presented in the body of our written statement.

The Administration has also justified its strategy of deliberately limiting production incentives by alluding to huge reserves of "excess cash" in the petroleum industry. The aggressive explorer-producer of crude oil and natural gas is being shortchanged by such statements. Active producers are limited typically in their drilling efforts each year for lack of capital. Exploration drilling is a high risk business. Generally, it is not possible to borrow funds to drill exploratory wells. These funds must come from after tax revenues from sale of production and from outside entrepreneurial investors. Locking producers into a static or in many cases a declining cash flow position, as the Administration proposes, purposely would limit our ability to expand significantly. It would commit our country needlessly to a dead-end and progressively inadequate dependence on others for critical energy supplies.

The tax provisions in H.R. 8444 are obviously of greatest concern to members of this Committee. Unfortunately, most of these tax provisions take the wrong approach. Of particular concern to domestic explorer-producers is the Crude Oil Equalization Tax which would increase the cost of petroleum to consumers by 5-7 cents per gallon without stimulating any increase in supply. In fact, according to the Administration's own estimates, the tax will actually reduce the income of the petroleum industry. This reduction in income would be in addition to the losses incurred by producers as a result of past price freezes and rollbacks and FEA's refusal to allow prices to escalate to the full extent allowed by law. This is especially unfair because producers have made many investments in the past, relying on the government's assurance of oil price levels.

We recommend that this tax be rejected in its entirety. Instead, we urge you to concentrate on eliminating price controls on crude oil and natural gas. Until this is done, the United States will not have a rational or workable energy policy.

It makes no sense to import foreign oil and natural gas at high prices and at the same time deny the domestic industry maximum incentives to find and produce oil and natural gas from domestic sources. For example, natural gas from Canada now costs \$2.16/MCF and the price promises to continue to rise. LNG is being and will be imported from a number of countries at prices ranging from \$2-4/MCF. The FPC is about to approve the importation of natural gas from Mexico at an initial price of \$2.58/MCF. Yet, H.R. 8444 would rollback the price of much of the intrastate gas and hold interstate prices to levels no higher than \$1.75/MCF, but averaging much lower. Foreign oil is being imported into the United States at an average price of \$14.50 per barrel, yet the average price of domestic crude is about \$8.50 per barrel. In fact, some lower tier oil production is being shut-in or curtailed because of the price control regulations.

These increasing plans and trends toward greater dependence on remote and insecure energy supplies at ever-rising costs are not just happenstance occurrences. They are a result of cumulative business decisions which reflect "no confidence" that our government will construct and implement the policies required to encourage development of our own vast energy resources.

The one positive tax provision in H.R. 8444 affecting independent producers which, at the minimum, we urge the Committee to retain is the one which limits the minimum tax on intangible drilling costs. It partially rectifies a very harmful provision in the Tax Reform Act of 1976 which actually placed a tax on capital expenditures.

SUMMARY

The solution to our intolerable dependence on foreign crude oil is to let the marketplace work. Market forces will allocate efficiently existing supplies, stimulate innovations to conserve energy and maximize efforts to increase petroleum resources. The support industries have the capability to respond to increased demand for drilling rigs, pipe and equipment.

Conservation alone cannot solve our energy problems. To rely on conservation is to risk a highly regimented economy with staggering unemployment and unprecedented invasion of individual freedom of a choice—a cornerstone of the American system.

In the long term alternative sources of energy will be able to assume a greater share of our energy burden. However, in the shorter term of the next decade or so, crude oil and natural gas must continue to provide the bulk of our energy requirements. The critical question facing Congress is whether crude oil and natural gas will be developed from our domestic resource base or whether we

will allow ourselves to become increasingly more dependent on foreign nations for our energy lifeblood. The answer should be clear and compelling! The attendant economic problems and the precarious national security situation make it clear that U.S. consumers would be served better by relying on domestic resources, not foreign countries, for their energy supplies.

Adoption of H.R. 8444 as narrowly approved by the House would so limit our industry in applying its tested ingenuity and resourcefulness to the energy supply problem as to condemn our country to a future of chronic recession, unemployment and inflation. None of these pressing problems can be solved without adequate, accessible and dependable energy supplies.

RECOMMENDATIONS

IPP urges the adoption of the following :

A. Petroleum Taxation Policy

1. Reject the Crude Oil Equalization Tax as included in H.R. 8444.
2. Eliminate noncorporate intangible drilling expenses as a minimum tax preference item.
3. Repeal the 65 percent of taxable income limitation on percentage depletion for independent producers.
4. Amend existing law to prevent further reduction in the percentage depletion rate and allowable volume.
5. Provide for expensing of geological and geophysical costs rather than requiring their capitalization.
6. Enact an energy development investment tax credit which would allow a credit against federal income tax for exploration and development expenditures.

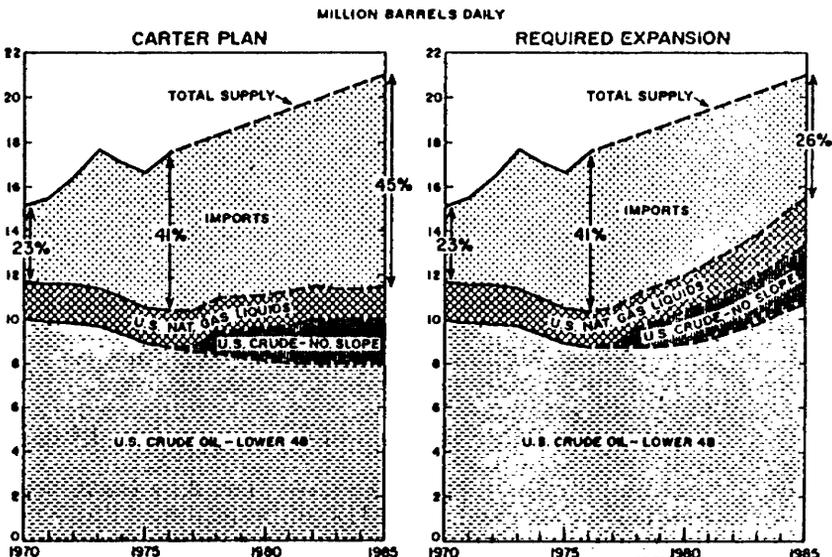
B. Crude Oil Pricing Policy

1. Decontrol the price of upper tier crude oil and all economically marginal crude oil.
2. Phase out price controls on lower tier crude oil.

C. Natural Gas Pricing Policy

1. Deregulate the price of a new natural gas.
2. Reject House-passed provisions on natural gas which extend federal jurisdiction to the intrastate market.

U.S. OIL SUPPLY, 1970-1985 CARTER ENERGY PLAN VS. REQUIRED EXPANSION

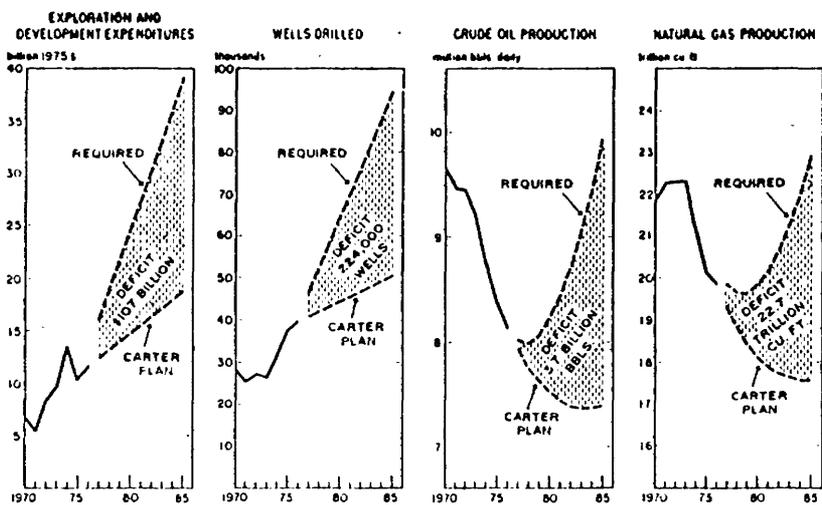


Note: Crude oil, lower 48 includes processing gain.

IPAA Chart
July 1977

**CAPITAL EXPENDITURES, WELL DRILLING ACTIVITY, AND
OIL & GAS PRODUCTION - LOWER 48 STATES, 1970-1985**

REQUIRED EXPANSION VS. CARTER ENERGY PLAN



IPAA Chart
July 1977

COMPARISON OF CARTER ADMINISTRATION ENERGY PROGRAM WITH AN EXPANDING PROGRAM OF EXPLORATION AND DEVELOPMENT DRILLING

	Required expansion	Carter plan	Deficit	
			Units	Percent
TOTAL, 10 YR, 1976-85				
Exploration and development expenditures (constant 1975 dollars) (billions).....	\$256	\$149	\$107	41.8
Total wells drilled (number).....	670,000	446,000	224,000	33.4
Crude oil production (billion barrels).....	31.4	27.7	3.7	11.8
Natural gas production (trillion cubic feet).....	205.7	183.0	22.7	11.0
YEAR 1985				
Exploration and development expenditures (constant 1975 dollars) (billions).....	\$39.2	\$18.8	\$20.4	52.0
Total wells drilled (number).....	94,000	50,200	43,800	46.6
Crude oil production:				
Billion barrels yearly.....	3.63	2.70	0.93	25.6
Thousand barrels daily.....	9,930	7,390	2,540	25.6
Natural gas production (trillion cubic feet).....	22.9	17.6	5.3	23.1

Senator TALMADGE. Next, we have a panel group of witnesses: Mr. Harold D. Hoopman, president and chief executive officer, Marathon Oil Co.; Mr. John R. Grey, president, Standard Oil Co.; Mr. E. L. Williamson, president, Louisiana Land and Exploration Co.; Mr. Raymond Golden, general partner, Salomon Bros., accompanied by Mr. Tony Copp, vice president, Salomon Bros. and Mr. Ron Freeman, vice president, Solomon Bros.; Mr. Roger Billings, president, Billings Energy Corp.

Gentlemen, you may be seated at the table. You may insert your full statements in the record and proceed as you see fit.

Do you have one spokesman?

Mr. HOOPMAN. Mr. Chairman, or Senator Talmadge, I am Harold Hoopman, Marathon Oil Co.

Senator TALMADGE. Are you speaking for the entire group?

Mr. HOOPMAN. No, sir. With me is Mr. E. L. Williamson president of Louisiana Land and Mr. John R. Grey, and I think we are prepared to present as a panel our comments, and I think you will find that Mr. Golden and his group would like to testify after the completion.

Senator TALMADGE. You may insert your full statement in the record and summarize it.

STATEMENT OF HAROLD D. HOOPMAN, PRESIDENT AND CHIEF EXECUTIVE OFFICER, MARATHON OIL

Mr. HOOPMAN. We appear for the American Petroleum Institute, the Mid-Continent Oil and Gas Association, the Rocky Mountain Gas Association, and the Western Oil and Gas Association.

Mr. Williamson will first address the committee on the question of supply and demand. I will present our portion on the crude oil tax policy, the oil-pricing policy, and our industry's necessity for appropriate funds to do the job for the future.

Mr. Grey will then speak to the problem in the industrial users' tax.

We would like to apportion our time in that manner, and would suggest that the question session be handled at the end of the three-part presentation.

Senator TALMADGE. That will be fine. You may proceed.

STATEMENT OF E. L. WILLIAMSON, PRESIDENT, LOUISIANA LAND & EXPLORATION CO.

Mr. WILLIAMSON. In addition to appearing on behalf of these associations, my name is E. L. Williamson, I am president of the Louisiana Land & Exploration Co., with headquarters in New Orleans, La. In addition to appearing on behalf of these associations, I am here because I am personally concerned that the administration has chosen to solve, or suggest solutions, to our energy problem through conservation.

I am concerned with their apparent abandonment of the prospects of increasing domestic oil and gas production. Moreover, in order to justify these conservation goals, the administration has greatly understated the potential for increasing domestic oil and gas production. Therein lies both the problem and the conflict.

I, of course, have no argument with the need to conserve energy. We recognize that. That need is real; we must use our energy wisely. But we cannot and will not be able to solve this energy problem by conservation alone—unless we are willing to risk far greater unemployment and the possibility of a major recession in the years ahead.

Nor can we wait until the other energy sources come onstream. Increased coal and nuclear power, synthetics—the whole spectrum of energy sources; sure, these are going to be important energy sources in the future, but now and for the next two or three decades, it is going to be petroleum that fuels this economy.

The question we are facing now is in what proportion do we want that petroleum to come from domestic or imported sources?

Now, our success in realizing the potential for increasing domestic production rests on three basic elements.

First, the prices received for domestic oil and gas must reflect the full cost of replacing that unit of energy.

Second, Federal lands—onshore and offshore—must be made available for exploration and production.

Third, this and succeeding Congresses must act positively to assure on a continuing basis that there is a good climate for investment in petroleum exploration and development.

Let us first look at our proved oil and gas reserves.

The American Petroleum Institute and American Gas Association calculates our domestic crude resource base to be 37 billion barrels of crude oil and natural gas liquids and 216 trillion cubic feet of natural gas. A word of caution though.

It is thought by many because these are developed and proved that they are in effect in an underground storage tank, the dimensions of which are well-known and the contents thereof easily extracted. You turn a valve, and we get them. It is not that simple.

These oil and gas fields have to be constantly worked on; you have to spend money on them.

The point is that we do have a fairly well-known and identifiable petroleum reserve base.

Now, beyond our proven reserves, the geologists, the geophysicists, the engineers whose disciplines and experience makes them experts in this area, are generally convinced that we have more oil and gas yet to be found and produced in this country than has been produced since 1859. Where is it?

Very briefly, in a number of categories. First, under most of our older fields are shallow and distinct reservoirs. We simply have to drill deeper.

Second, there are smaller reserves which have been uneconomic in the years past, but under a different set of conditions can be recovered.

Third, the total ultimate recovery from our known reserves can be increased through more sophisticated secondary recovery projects and, beyond that, tertiary projects.

It is estimated that the average recovery from primary and secondary methods in all U.S. reservoirs will only be about one-third of the original oil in place. This means we are going to leave in the ground some 300 billion barrels of oil.

We can get some of that; there is no question about it, but it is going to be expensive.

Fourth, there is still oil and gas to be found in the mature oil provinces of this country, west Texas, Kansas, Oklahoma. There are seismic techniques which are improving. We are going to have to go deeper, be looking for more subtle traps. It is going to be more expensive. There is still a lot of oil to be found.

Fifth, there are presently uneconomic reserves in this country that are known, but because of high costs are noncommercial. An example of this is natural gas that is locked in the tight sands and shales in the Rocky Mountain States. This is going to come to market someday. There have been estimates there may be as much as 600 trillion cubic feet of such gas.

Sixth, and very important, there are vast areas on the Outer Continental Shelf which are largely unexplored. Only 4 percent of the total shelf area has ever been leased. There are basins on the east and west coasts, particularly the shelf areas around Alaska, that are very prospective.

We know enough about them to think that the ingredients of oil provinces are present, hydrocarbon source material, reservoir rocks and structures or traps. The very size of these unexplored areas suggests they probably hold the greatest potential for the big reserves in the future.

Seventh, and lastly, there are still areas onshore that have not been thoroughly explored, particularly in Alaska where the areas are remote, expensive, and the lands have not been available; interior basins.

An example of the kind of thing I am talking about is the Overthrust Belt in the Rocky Mountains. The first discovery was made in this geologic province some 2-3 years ago, now the scene of intense exploration activity.

What does this mean? I subscribe to that group of studies that concludes that there are over 150 billion barrels of crude oil, and 800 trillion cubic feet of natural gas that can be found and recovered in this country.

I am convinced that we have the petroleum reserve base adequate to carry us well into the next century at current levels of production or higher.

I am not arguing because of this potential that we can continue to do business as usual. What I am saying is there is a lot of oil and gas that remain to be discovered and produced if we design and adopt a balanced energy program. We are going to need this kind of domestic resource base to protect the security and the well-being of our country.

We are going to need it to permit an orderly conversion to fuels of the future. We are going to need it as insurance against any failure to meet either the timetables or the targets of conservation and conversion.

What can keep us from realizing this potential?

First, the assumption that we cannot increase domestic oil and gas production will become a self-fulfilling prophecy if we do not create the environment to permit the search.

The second element is one of accessibility. We have to make the prospective lands available on a timely basis for exploration and production.

Finally, I would suggest a third element that rests squarely on your shoulders: The development of a sound, national policy, a policy that will attract, on a continuing basis, huge amounts of investment capital needed to do the job.

There is no guarantee that all the gas that we think is present in this country and offshore will be recovered. One thing we can be certain of. Unless we try, we will never know.

If we are going to maintain our present level of production, it is going to take a very vigorous and continuing exploration effort. If we are to go beyond that and attempt to increase our domestic production, it is going to take a herculean effort, one greater than this industry has ever expended before.

Whether or not that effort can be made rests squarely in the hands of Government. That, members of this committee, is in your province and that of your colleagues. It is my firm belief that the marketplace pricing, together with conservation, is the only way that we can intelligently approach the solution to this problem.

Thank you.

Senator TALMAGE. Thank you very much.

Will the next witness identify himself?

STATEMENT OF HAROLD D. HOOPMAN—Resumed

Mr. HOOPMAN. I am Harold Hoopman.

Mr. Chairman, the House bill before you, H.R. 8444, will generate huge tax revenues and force companies to pay increased prices for what is represented as replacement costs for the oil we are using. Increased prices may discourage consumption and encourage conversion away from oil and gas to other fuels, but taxation will never produce a single barrel of replacement oil or a cubic foot of natural gas.

When I testified before the Ways and Means Committee, I stated that the National Energy Plan brought to all Americans the hard choices we face because of the seriousness of our energy problems. The administration recognizes replacement cost pricing for oil but rejects the market approach to increase our domestic oil supplies in favor of an indefinite extension of oil price controls and taxes levied on top of that. We believe that all of us should recognize that we must pay the replacement cost of the energy we used. But we also have a right to expect that energy will be replenished.

You have heard many times that oil and natural gas provide over three-quarters of our energy supply, and that our dependence on foreign supplies has been steadily increasing since the 1973 embargo. Nonetheless, over the next two decades oil and gas must continue to provide the bulk of our energy supplies pending a shift to coal and other abundant sources.

Over half of our total 1990 oil production must come from reserves which have not yet been discovered.

In the United States, we are fortunate to have substantial oil and gas reserves and areas to explore for new supplies. Given a proper economic climate and freedom from restrictive regulatory devices, we believe that we can conserve energy and replace our domestic supplies being used. These tasks will be difficult and the costs will be high, but there are no acceptable alternatives.

The basic problem in the administration's energy plan, as set out in the bill before you, is that it does not address both oil price and oil tax policy. I recognize that there is a committee jurisdictional issue involved. But the two policies must be considered jointly.

We are convinced that a plan based on a system of continued oil price controls and crude oil taxes is destructive to the Nation's interests. We cannot escape the fundamental economic fact that the marketplace is the most efficient allocator of resources. Continued control on oil prices, including newly discovered oil, simply will not create the investment climate and encourage the exploration activity that the Nation needs to provide energy for the future.

If the administration's plan for price controls on oil is continued indefinitely, it will create a situation parallel to that of the long deterioration of natural gas supplies which began with wellhead price controls in 1954.

With respect to crude oil and without going into the details, producers' crude oil prices are lower today than they were in February 1976 when EPCA took effect with congressional understanding that oil prices would be maintained in real dollars, and that domestic oil prices would reach market levels by mid-1979. Upper tier oil prices are approximately \$2 per barrel lower today than they were in January 1976. In addition, there has been a real dollar loss to the producer on lower tier oil since EPCA became law.

The heart of the proposed National Energy Act is the crude oil equalization tax. When fully implemented, the tax will increase the price of domestic crude to something like world levels and may fulfill the administration's goal of requiring the consumers to pay a price that represents the replacement cost of oil.

This tax will generate about \$15 billion per year in Federal revenue when fully implemented, which, incidentally, is almost twice the domestic oil industry profit on U.S. operations in 1976.

The administration and the House assumed that only two-thirds of the tax will flow through to the ultimate consumer. If that is the case, and assuming that tax generates \$15 billion in revenue in 1980, domestic refiners would have to absorb approximately \$5 billion of the tax.

A \$5 billion additional cost at the refinery level would exceed industry refining and marketing profits, and would amount to a loss of approximately \$2.5 billion in profits after income taxes. The total domestic profits for the industry are estimated at about \$7.5 billion.

A \$2.5 billion loss is a staggering one-third reduction in profits. It is my firm belief that refiners will not be able to bear this huge burden, and further rollbacks in producer prices will be forthcoming.

The industry's views of capital requirements are far different from what the administration has told you. You have been told that the industry generates all the money it needs.

In fact, some companies have been described as unable to use their annual cash flow. In the case of my own company, I can assure you that this is simply not correct. Our investments in petroleum operations exceeded our annual cash flow and, as a result, we increased our debt to obtain additional funds.

Even for those companies with heavy equity bases, their financial resources will be required if we are to meet the energy needs of our Nation. Simply stated, expenditures for exploration and production alone will have to be in the range of \$20 to \$30 billion per year in current dollars over the next 10 years.

This will be some three times the average annual amount of about \$8 billion invested by the industry in exploration and production during 1971 and 1975. To obtain this level of expenditures, these funds must be, for the most part, internally generated because oil and gas exploration is a high-risk activity.

The bill before you will severely restrict the industry's ability to accumulate funds. In a special evaluation report dated July 25, 1977,

prepared by Comptroller General on the administration's energy plan, it was stated that:

The plan will reduce revenues to producers for most oil already discovered and may adversely affect oil companies' financial ability to support additional exploration. By not increasing the financial incentives for additional exploration and by reducing companies' financial strength, the plan fails to come to grips with the problem of increasing domestic crude oil production.

This statement accurately reflects the financial requirement confronting our ability to supply the Nation with petroleum. The two essential points are: First, the availability of funds for investment; and second, a rate of return sufficient to induce the investment of those funds in oil and gas activities.

Equally important, a pricing and regulatory climate that minimizes the uncertainties and attracts investors to commit funds to oil and gas exploration and development is essential. Thus, any company in an industry whose forecasted rate of return is below average will have difficulty marketing equity securities or borrowing the required funds.

Even if funds could be made available for investment, they will not find their way into exploration and development of oil and gas unless the rate of return is adequate. Instead, these funds will go to businesses which promise more attractive rates of return. And despite the conviction of many that oil company profits are large, so also are the investments huge, and the fact is that the rate of return for the petroleum industry does not exceed the average rate of return for all manufacturing.

There have been assertions that additional price incentives for producers for exploration and development are not necessary. The point has been made that producers appear to be operating at a high level under existing price controls.

Accusations like these fail to recognize the differences between short-term and long-term investments. Today's activities are based on investments and decisions made at times when producers anticipated, and when Congress had indicated, that domestic oil would be priced at market levels.

No one should assume that long-term investments for the next 10 to 20 years can be made under legislation which severely restricts producers' price realizations.

Such restrictions may not be seen immediately in lowered activity, but they inevitably will take place in the long-term as they did in the case of natural gas over the past 24 years.

Neither the national energy plan as originally proposed nor the bill before you will achieve the objectives of increased domestic oil and gas production or reduced imports. However, there is a workable approach, which requires concurrent consideration of oil price and oil tax policy, that will be more likely to achieve those goals.

This approach involves the following key elements:

On the price side, the first thing that must be done is to eliminate the composite price formula contained in the Energy Policy and Conservation Act, so that the full impact of the implicit price deflator and other incentives can be directly applied to the different classifications of domestic crude oil.

At the same time, the prices for domestic crude oil should be allowed to reach market levels over the shortest period necessary to minimize adverse economic impact to the consumer.

If these price policies are enacted and the concerns about excess profits continue to exist, then they can be handled more effectively with far fewer distortions through enactment of a wellhead excise tax that contains the following essential characteristics.

One, the tax must be an excise tax imposed at the wellhead on a property-by-property basis and the producer or royalty owner will be the taxpayer.

Two, the tax would be withheld by the first purchaser from the settlement with the producer and paid over to the Treasury.

Three, the tax will be measured by the difference between the total price received by the producer and a reference price computed under an extension of price control rules.

Four, the tax will apply only to that volume of oil below a declining production base so that we can stem the reduction in domestic crude oil production and increase ultimate recovery from existing properties.

Five, the tax will not apply to oil which is exempt from price controls; which is produced from properties on the North Slope; which is produced and sold from a property from which no crude oil was produced or sold during a period of 90 days prior to April 20, 1977.

Neither would it apply to oil which is used in crude oil or natural gas exploration and production; or which is produced by enhanced recovery methods.

Six, the tax will make allowance for additional State and local taxes resulting from increased prices; and the impact of inflation on the tax base.

Seven, the tax will be limited in such a manner that it does not preclude operation or development of marginal or high cost projects.

In closing, Mr. Chairman, let me reiterate our extreme concern about the House-passed bill. The Nation's energy problems cannot be solved by forcing the consumer to pay the replacement cost for energy by collecting a high tax from him and then distributing the proceeds to the general public. The price paid by the consumer ought to be put to work to provide him with a new unit of energy for the one he consumed.

We have offered some sound workable alternatives to the bill before you. The alternatives answer objections of those who allege that excess producer profits will result from increased oil prices, and they will aid in achieving our Nation's energy requirements in the future.

Our alternatives will require modification in oil price as well as oil tax legislation. Unless substantial changes are made in both areas, we do not believe that the Nation's energy goals will be achieved.

I urge your favorable consideration of our recommendations.

Mr. Grey will now discuss the industrial users tax. Thank you.

Senator TALMADGE. Mr. Grey, you may proceed.

First, which Standard Oil Co. are you the president of?

Mr. GREY. Standard Oil Co. of California, with headquarters in San Francisco.

Senator TALMADGE. You may proceed.

STATEMENT OF JOHN R. GREY, PRESIDENT, STANDARD OIL CO. OF CALIFORNIA

Mr. GREY. I am here to discuss that part of the National Energy Act which, if enacted, would pose substantial new Federal excise taxes on the use of oil and natural gas for the purpose of inducing utilities and industries to convert to the use of coal. It is a tax the consumer will pay.

We believe that use of this Nation's abundant coal is essential for a workable comprehensive energy plan. This new user tax will not accelerate or aid conversion to coal. Even before the President's energy message, many fuel users had planned to construct coal-fired facilities because of increasing costs of oil and natural gas.

Where conversion is feasible, replacement cost pricing of oil and natural gas will provide enough incentive for such conversions—at least to the limits of coal supply. In plain language, the tax is legislative overkill:

First, the tax is not necessary to do the job. However, recognizing that conversion to coal must be achieved without major economic disruption, let me identify the three elements which we see as essential.

This can be accomplished by pricing all fuels at replacement value. Conversion has been delayed by Government actions which now regulate oil and gas prices below their replacement cost.

The national energy plan proposes to maintain the price controls on oil and natural gas—but to increase the consumer's cost to replacement value by taxation—some type of crude oil equalization tax. This will provide adequate incentive for conversion.

However, allowing oil and gas prices to rise to some reasonable replacement cost through phased deregulation would provide the same incentive for conversion but it would also stimulate greater domestic petroleum exploration and production—adding to the overall domestic energy supply.

Second, limitations on our Nation's ability to produce and use coal must be recognized. Any attempt to push conversion beyond the limits of coal and equipment supply will result in excessive prices and inflation. These limitations are not illusory, they are real—a message brought home to all who saw the "Energy Special" on television last week.

For example, the Congressional Research Service of the Library of Congress, the General Accounting Office, and the Office of Technology Assessment, have all concluded that adequate supplies of coal cannot be made available in time to fuel the conversions called for in the legislation. Their reasons include: (1) Lack of trained manpower; (2) lease and permit delays which put off development of the massive coal resource on Federal lands; (3) shortages of mining and burning equipment; (4) limitations of the coal transportation network; (5) the uncertainty created by the environmental regulations which restrict both the mining and burning of coal; and (6) lack of sufficient investment capital to expand coal production quickly enough.

In hard numbers, the Congressional Research Service estimated the achievable range of U.S. coal supply for domestic use in 1985 at 760 million to 940 million tons per year. This is far below the administration's estimated requirements of 1.2 billion tons.

In other words, it cannot be done. Conversion to coal will be limited by supply, not by the financial incentive to convert, and we will not be able to reach the goal of 1.2 billion tons by 1985.

Third, it requires consistent Government policies. Investors and managers are willing to take their chances with the risks and uncertainties of the marketplace. But frankly there is no way of dealing with the endless changes in regulations and interpretations inherent in today's Government policies and actions.

In response to Government mandates and pricing policies in the late 1960's and early 1970's, many plants converted from coal to cleaner burning oil and natural gas. Now they are being asked, and in many cases, required to convert back to coal. If American businesses are to make the investments necessary for coal conversion, there must be some concrete evidence that the Government will not destroy the investments by later changing the rules.

While proposed Government policy now calls for replacement cost pricing and increased coal usage, there remain the insurmountable problems associated with coal production, transportation, and use—which will not be resolved in the near future. First, U.S. coal production will fall short of the administration's goals for 1985.

Second, if more coal were somehow produced, there will be inadequate facilities to transport it to where it is needed.

Last, environmental constraints will prevent its use in many areas. In spite of these limitations, this legislation would impose substantial added taxes on industrial users of oil and natural gas—even though many users cannot convert because of these problems.

The consumer already bears the heavy burden of inflation. The tax is unnecessary. To impose it will only increase the public's burden. The tax will raise the cost of American products, and reduce our ability to compete in world markets. This will lead to higher unemployment. This tax will cause:

- Higher utility bills for all consumers;
- Higher costs for farmers and agricultural processors;
- Higher prices for food and other consumer products; and
- Higher unemployment.

It will not cause more rapid conversion to coal. It is legislative overkill.

For these reasons, we urge you to eliminate the industrial and utility user tax on oil and natural gas.

The advocates of this proposal contend that tax credits would offset a major part of the \$25 billion in user taxes to be imposed by this legislation in the next 7 years. But these credits would be available only to those industries and utilities which are able to convert to coal.

Due to the obstacles mentioned previously, many industries and utilities would be forced to pay the tax but would be unable to take advantage of the tax credits because of their inability to convert.

The House recognized that in many instances, forced conversion would be infeasible, impractical, and unproductive. As a result, they approved several important exemptions from the tax. These include:

- The use of oil and gas in petroleum exploration and development;
- The use of oil and gas by facilities where conversion to coal is precluded by environmental regulations;

Industrial process uses of oil and gas where use of a substitute fuel would adversely affect the manufacturing process and where a substitute fuel is not feasible for environmental and economic reasons; and

The use of oil and gas as a feedstock.

These exemptions, while vital, simply emphasize the inequities and economic harm that would result from this tax.

However, the legislation fails to provide sufficient exemptions to take into account time, site, and permit limitations. It imposes a tax on every single large and small use of the taxpayer. This is burdensome, costly to audit, and impractical. If the tax is applied at all, it is most logically applied only to those large steam-generating boilers capable of conversion.

As reported by the House Ways and Means Committee, the bill also would have exempted from the tax any user granted an exemption from the mandated use of coal as provided by other sections of the legislation. But the full House deleted this sensible provision. As a result, industries which clearly lack the capability to convert to coal, will still be subject to the tax.

For example: Consider the State of Hawaii. Because of its unique logistical problems, Hawaiian industries and utilities are not subject to the mandatory use of coal. But the bill before you, nevertheless, would apply an indirect tax on every consumer of electricity in Hawaii. It is estimated that in the first year alone, the tax will cause a \$30 million increase in the fuel bill of the Hawaiian Electric Co. This will lead to a substantial increase in consumer utility bills.

The need for all these exemptions simply underscores the futility of trying to achieve conversions through a user's tax. The real answer is not to attempt to repair this piece of legislation overkill by adding broad new exemptions. Instead, this committee should complete the job begun by the House Ways and Means Committee and eliminate the penalty tax entirely.

Again, let me emphasize that, given replacement pricing of oil and gas, there would already exist financial incentives for conversions to the limits of coal supply in 1985.

The factors I have mentioned—in particular, the short-fall in coal supply—will limit the rate of coal conversion, at least through 1985—whether the user tax is imposed or not.

In other words, the Congressional Research Service of the Library of Congress, the General Accounting Office, and the Office of Technology Assessment, tell us:

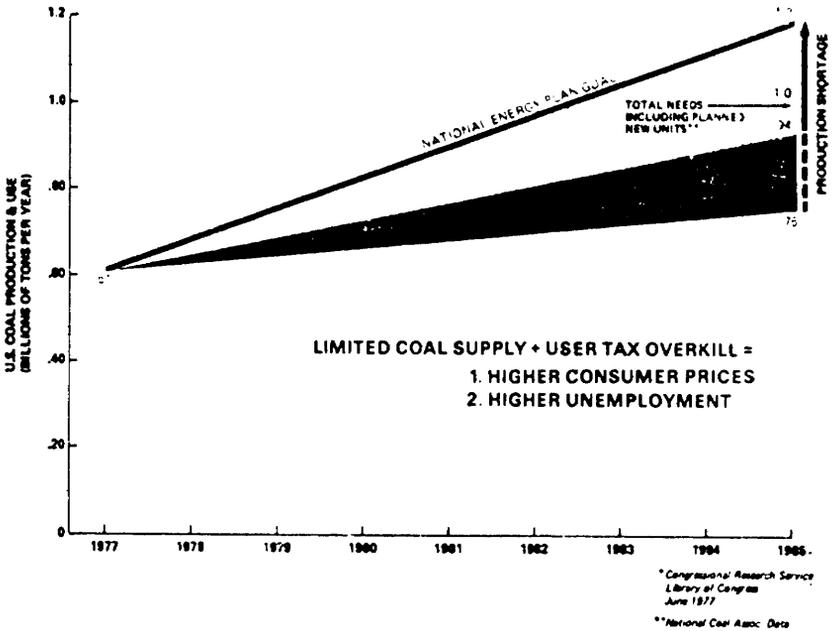
It is impossible to produce sufficient coal to fuel the conversions called for by this bill;

There is insufficient transportation to carry the coal to where it is needed—in the time frame covered by this legislation; and

Current regulations in many areas would prohibit the burning of coal even if it were available.

I have attached a graph to show the relationship of the President's plan and the forecast coal production levels and the forecast of conversions that are now planned. These demonstrate that there is no need, and no reasonable justification, for such a tax.

[The graph referred to follows:]



Mr. GREY. It would add to the utility bills of consumers, impose unnecessary costs. Replacement cost pricing of oil and gas provides adequate incentive to insure conversion of large boilers to coal.

Again, let me emphasize that to adopt this proposed tax penalty would constitute legislative overkill. Thank you.

To summarize briefly our panel presentation, Mr. E. L. Williamson testified that the potential for increased domestic oil and gas exploration and development can be realized if producers are permitted to receive prices reflecting replacement costs. If the investment in petroleum and other energy sources is promoted by stable, realistic economic climate.

The needed domestic reserves of oil and gas are available, but only at the higher costs inherent in exploration and development in hostile areas and deeper horizons, in applying enhanced recovery techniques, and in developing alternative sources.

The capital needed to reach these capital costs can only be found if we eliminate price controls, return to a free market, and allow oil and gas to sell at its true replacement value.

Mr. Hoopman has told you that the Nation's energy problems cannot be solved by forcing the consumer to pay for the replacement cost of energy by collecting a high tax from him and then distributing the proceeds to the general public. The price paid by the consumer ought to be put to work and provide him with a new unit of energy for the one he consumes.

Senator TALMADGE. Would you suspend at this point please, Mr. Grey?

There is a vote going on on the Senate floor right now on the Roth amendment. We will have to temporarily suspend.

Mr. GREY. I have completed my presentation. That was the end. I was just going to thank you for your kind attention.

Senator TALMADGE. Are there some other witnesses on this panel who desire to testify, or does that complete this panel?

Mr. GREY. This completes my presentation.

Senator TALMADGE. There are only one or two things I want to say before I go over to vote. I want to compliment you on your well prepared and well documented statement.

All of you, of course, realize that this committee deals only with taxation. We have no other jurisdiction, other than that field.

I take it from the thrust of all of this testimony that you feel that if the oil industry was unfettered, they could find adequate reserves of both gas and petroleum to supply the needs of this country. Is that your testimony? Are you all in accord on that?

Mr. HOOPMAN. I do not think that any of us propose that we will arrive at a situation that will fulfill the goals of the energy independence program that was forecast; the importation of crude oil will be with us for a long period of time. But we can certainly close the gap a good deal.

Senator TALMADGE. How long would it take to make this country self-sufficient, if price were no obstacle?

Mr. HOOPMAN. If you put the price high enough, we, of course, could close the gap, because it would eliminate the economic viability of imported crude.

Senator TALMADGE. If I recall the testimony of Mr. Williamson correctly, he thought that there were tremendous amounts of undiscovered petroleum and natural gas available at a price.

Is that what your testimony was?

Mr. WILLIAMSON. Yes, sir.

Senator TALMADGE. How long would it take to bring that into production?

Mr. WILLIAMSON. Under a very rigorous exploration effort, the most vigorous exploration effort, I think we can expect to improve our current level of domestic oil and gas production by 30 percent. Perhaps I am reaching through the air.

Senator TALMADGE. Thirty percent. In how long?

Mr. WILLIAMSON. In 10 years or so.

Senator TALMADGE. What would the price of a barrel of petroleum be at that time?

Mr. WILLIAMSON. I have not considered that.

Senator TALMADGE. What would a thousand feet of gas cost at that time?

Mr. WILLIAMSON. I do not know, because I do not know what the whole energy market situation would be. I guess the point is, let's be sure it is understood—my point is that we can find, we can maintain our domestic level of production. There is a possibility that that can be increased with an unfettered effort.

It is my personal judgment—I am not now speaking for any association; I am talking for one independent oil and gas man—I do not think

we can satisfy the total needs of this country. We cannot achieve total energy independence with hydrocarbons.

Senator TALMADGE. As I understand the situation here, there are three prices for oil. One is called old old oil; another is called old oil; the third is called new oil. Is that correct?

Mr. WILLIAMSON. Yes, sir.

Senator TALMADGE. What are you getting for your old old oil?

Mr. WILLIAMSON. About \$5.25.

Senator TALMADGE. What are you getting for your old oil?

Mr. WILLIAMSON. \$11.25.

Senator TALMADGE. For your new oil?

Mr. WILLIAMSON. Well, the new oil would be strip oil which is about \$14 to \$15.

Senator TALMADGE. That is the OPEC price, the same price as OPEC?

Mr. WILLIAMSON. Very close to it; yes, sir.

Senator TALMADGE. You would not increase production any if you decontrolled your old old oil and your old oil at the present time, would you?

Mr. WILLIAMSON. Yes, sir; you would, because one of the problems that many industry witnesses have been talking about is the problem of capital formation.

Senator TALMADGE. It would give you additional profits which you could plow into additional exploration. Is that your testimony?

Mr. WILLIAMSON. Yes, sir.

Senator TALMADGE. Thank you. I must leave at this point to go over and vote on the Senate floor, and I will ask Senator Byrd, if I cannot return, to preside until the chairman returns; he was called away. Senator Dole and I must meet with some representatives of the House Agriculture Committee.

Are they here now?

Senator DOLE. Yes.

Senator TALMADGE. We will stand in recess, then, for a brief period of time.

[A brief recess was taken.]

Senator BYRD. The committee will come to order.

Senator Bentsen, do you have questions for the panel?

Senator BENTSEN. Yes; thank you very much, Mr. Chairman.

First, I want to congratulate the witnesses on some well-reasoned statements. They have been careful not to use some of the overblown rhetoric I have heard on both sides that destroys credibility in these arguments.

Mr. Hoopman, the points you made in particular about paying the replacement cost of oil and having the consumer pay that replacement cost, I think that is right. I think that is what they ought to do, but they do not achieve the objective, obviously, the way they are trying to do it.

I was trying to think about the most simple analogy that I could think of would be a department store that had an inventory and you stated you were going to sell it to the consumer, to the purchaser, at replacement cost, but the differential between what your book cost was

and the replacement cost was paid to the Government and not to the owner of the inventory.

There is no way he can replace it, is there?

Mr. HOOPMAN. That is very true.

Senator BENTSEN. That is what we are talking about, is it not? We are talking about reserves that are inventory and we are trying to replace them for the country.

Mr. HOOPMAN. We do have a situation in our country where reserves are at barely a minimum working inventory, and we need not have an inventory sale at reduced prices in order to reduce that inventory. We are at a level of inventory that we cannot logically reduce. Therefore, we must, when we use a unit of energy, find some means of replacing that so we have a time stock in the warehouse great enough to service the public.

Senator BENTSEN. I have also listened to the argument, Mr. Williamson and Mr. Grey, that the industry has so much money that it is going out and buying department store chains or circuses or other forms of investment and then they turn around and argue at the same time that they are getting incredible profits off their and gas.

Investment money goes to the best market, and if they are going to get the best return out of department stores, they are not going to drill for oil and gas. That is what is happening.

There is no way that you are mandated how you have to use your investment money, and you are going to seek the best return. If it is not in oil and gas, you will be buying department stores and we will not be solving the energy problems in this country. It that not correct?

Mr. HOOPMAN. That is true. As far as discretionary expenditures are concerned, it will find, in most instances, the perception that the best rate of return will be served. So far as some investments in plants and facilities, you may legislate a set of circumstances that would cause those facilities to operate at less than reasonable profits for a period of time, because there is not much alternative except going along until such time that you are squeezed down to a point of starvation, or out of business.

Senator BENTSEN. Mr. Williamson emphasized the point that you want a stable economic market. I assume that you mean the industry and the rules apply to it when you state that.

Mr. WILLIAMSON. Yes, sir.

Senator BENTSEN. That is one of my deep concerns about the bill that came over from the House. On the gas portion, where they talk about \$1.75, when I know of all kinds of contracts that have been let at \$2 or more, and the economics have been based on that and the financing has been based on that, the borrowing has been based on those numbers. And when those contracts expire, as I understand the rollover, they would roll the price back.

I just want to know how you are going to pay those loans off on prices below those that you contracted for?

You have the rules changed, and you do that enough times, you get burned enough, then you decide you want another line of work and you quit drilling for oil and gas. Is that not right?

Mr. WILLIAMSON. Yes, sir.

Mr. GREY. We have seen this already in our diminishing reserves in the United States, in that the prices that have been placed on petroleum

products in the United States are inadequate to attract the capital to maintain even a balanced reserve position. Year by year, in the past, we have seen our reserves diminish, which is the end result of this type of thing.

Senator BENTSEN. I have just seen a recent situation down in Texas on Seadock that would save the consumer in this country over \$1 billion in transportation of oil. I saw the rules change on the kind of return. Private enterprise said they will not build it. You cannot mandate them to do it.

Thank you very much, Mr. Chairman.

Senator BYRD. Senator Hansen?

Senator HANSEN. Thank you, Mr. Chairman.

I was trying quickly to scan Mr. Grey's testimony here and I thought it was his testimony—did you suggest that—I think I misspoke myself; I believe I meant to speak to Mr. Hoopman.

Did you suggest some alternative tax proposals in your testimony?

Mr. HOOPMAN. Yes, sir; I did.

Senator HANSEN. Was it your thought that if your suggestions were implemented, it would ameliorate the adverse impact on the industry? You were not recommending these on your own volition, were you?

Mr. HOOPMAN. Our recommendation is that price controls should be removed and the marketplace should be allowed to allocate the resources of the country. As a means of attempting to be responsive to the expressed desires of Congress for a politically acceptable means of getting from where we are to where we should be, we did propose that a tax could be used as a means of phasing out of controls and during that period of time, using the tax that would absorb a portion of the cash generated between the present controlled prices and the replacement cost as a means of gradually phasing that tax out.

At the House Ways and Means testimony, we proposed that that be done on a percentage basis of the tax.

You pick the percentage, but we recommend that it be done in a 3- to 4-year period. This proposal that is worked out in far more detail in the filed record, does propose that it can also be handled by reduction in the volumes of controlled oil, both upper and lower tier oil, to the point that that would be phased out, and there again we recommend that the phaseout period be as short as possible.

Previous deliberations before Congress have used the 1.5-percent phaseout of old oil. This is in the ball park of being a reasonable phaseout period.

Senator HANSEN. It would be fair for me to infer that implicit in your testimony was the idea that if we are going to have that kind of tax, this is a more acceptable way to impose it and to structure it than was contained in the bill coming from the House, but it is not your ideal?

Mr. HOOPMAN. The bill coming from the House is strictly a revenue-raising device, and it does absolutely nothing to help on energy policy for the country. If a tax is used to reduce the impact, either phased in as the administration has proposed, or the difference between the present controlled prices and the full replacement cost, which is phased out over a period of time, the philosophy is very different.

The philosophy proposed by the Institute, and by this panel, is that controls should be ended, the marketplace should be allowed to act, and

we are attempting to be constructive in our offer to work with the committee, or with the Congress, to work out a realistic means of removing those controls.

We certainly do not support the wellhead tax, or the user tax, as it is presently constituted in 8444.

Senator HANSEN. Thank you for that clarification.

Recalling the questions that Senator Talmadge asked of Mr. Williamson just as we recessed, I am not certain that you were able to spell out as clearly as perhaps you may have intended. I have had the opinion that it has been the position of knowledgeable people in the industry that, given the opportunities and the encouragement, that a completely unfettered marketplace could greatly minimize our dependence on foreign sources of supply, since undiscovered resources no doubt do exist.

You did not mean to imply, I think—and I just want to underscore this point—that if we were to take off all controls so that the price of petroleum products, both oil and natural gas, were able to rise so as to clear the market, we would be able within any foreseeable period of time, to produce all of the oil and natural gas that reasonably might be required by the people of this country and by the industry of this country; but, rather, that we could get those required imports down to manageable proportions so as to not unduly strain our balance-of-payments situation, or to jeopardize our national security, or to leave us in a threatened position if an embargo were to be placed on the imports that come into this country bringing greater disastrous consequences to the United States.

Is that a fair assessment?

Mr. WILLIAMSON. That is precisely and far better stated than I could have, had I the time to expand on it.

Senator HANSEN. You did not have much time.

Mr. WILLIAMSON. That is precisely the point; we must buy time to permit this orderly conversion to the other fuels. My argument is, unless we exert a maximum effort, our imports, level of imports, are going to continue to rise with all of the dire consequences of that.

So if we are trying to stay even, and not continue to lose ground; yes, sir.

Senator HANSEN. I would like to ask you, Mr. Grey, and you, Mr. Hoopman, if you share in a general way, those thoughts?

Mr. GREY. Very much, sir.

The point that was missed was as we look to the future, we need oil and gas to bridge into the future. Every inclination is that the marketplace will bring in coal and alternate energy supplies, to supplement domestic oil supplies, so that our domestic energy base is one that does support our national foreign policy to the point that we are not to rely on these foreign sources, very much so.

Mr. HOOPMAN. I think that we all recognize that we must have a very diligent and aggressive effort to bring coal and nuclear and other sources on, in addition to the very aggressive exploration for oil and gas.

The deficiencies that we point out today in coal and perhaps nuclear, although we do not think those will come on as fast as is programmed, we do not think that the industry of the United States will be able to survive this without oil, which is the bridging oil and gas, which are

the most available, and bridging commodities coming in and taking that gas during the period of time that we geared up to do what we really ought to be doing with coal and nuclear too.

Senator HANSEN. I am sorry I overran my time, Mr. Chairman.

Senator BYRD. Thank you.

Senator Matsunaga?

Senator MATSUNAGA. Thank you, Mr. Chairman.

Mr. Grey, I was especially impressed by your observations that the user tax is redundant, where an industry is required to convert to coal, because of economics or regulation; and I agree with you that where an exemption is granted from converting, as Hawaiian utilities are, under the bill passed yesterday by the Senate, S. 977, it would be punitive to impose the oil user tax on those exempt utilities. These utilities are exempt, because they cannot convert to coal economically. It just does not make sense.

For the record, do you happen to recall why the House of Representatives reversed the recommendations of the Ways and Means Committee?

As I understand it, the Ways and Means Committee initially did not impose the user tax on exempt utilities.

Mr. GREY. I do not have a precise answer on that.

Senator MATSUNAGA. It just does not make sense to me.

Mr. GREY. In my testimony, sir, I think I was going to make the point that we see today's prices, without this punitive tax, as sufficient to warrant conversion to coal under today's conditions.

We, as an oil company, find ourselves appropriating some of our funds for steam generation facilities in oilfields where steam is required for assisted recovery purposes. The economic choice today is coal. When one considers the overlay of another burden on fuel costs for utilities, in addition to the prices that replacement costs would represent, it does not make sense. I cannot answer as to why they made that change.

Senator MATSUNAGA. You believe that there are sufficient incentives now in the bill and elsewhere which would lead to conversion?

Mr. GREY. Yes; I do. The Coal Institute has identified over 200 coal-burning facilities that are scheduled for construction and utilization between now and 1985. That would account for more than the tonnage the Government research agencies calculate could be provided by the coal industry. So that is moving ahead as it is.

But even today, without further changes in oil prices, the economic incentive is there in the differential price per million Btu's for oil and gas and for coal.

We, as an oil company, realize that we live by the laws of economics, too. We cannot afford to burn our own products in our steam generation facilities if we have an adequate supply of reasonably accessible coal to assist in the supplemental recovery of crude oil from some of our heavy crude fields in California.

Senator MATSUNAGA. I, too, hope that, as you have stated in your presentation, within the next 10 years the Federal Government will not reverse its position on coal. I hope that we will not have to tell industry you are causing too much pollution to the air, you are going to have to convert back to oil, low sulfur oil.

Mr. GREY. The costs that we looked at for this conversion includes meeting the air pollution restrictions in the San Joaquin Valley and living with our neighbors in a good neighbor fashion. There, too, we recognize that this has to be done in an environmentally acceptable manner. We are doing it that way.

Senator MATSUNAGA. You have sufficient technology?

Mr. GREY. Yes, to do this kind of thing in these installations.

Senator MATSUNAGA. I am glad to hear that.

This leads me to another question, one which was raised at an earlier hearing. That is, we have enough shale oil to last us 200 years, and enough gas stored away to last us maybe 500 or 600 years, if we develop the proper technology to get it out of the ground.

What is keeping us from developing the technology? What is preventing us from getting shale oil out?

Mr. GREY. The progress in technology is with us. We have had demonstrations in operations in Colorado of semicommercial retorts. The use of shale in other countries of the world as an oil source has been demonstrated.

The problem right now is a matter of economics, because a barrel of oil recovered from shale represents a cost of somewhere in the \$16 to \$20 a barrel range. You can get numbers all around.

There is some experimental work going on which is purported to bring shale oil in at something in the range of \$10 to \$12. That is still to be demonstrated.

If it is demonstrated, it will find its way into the market rather quickly. But presently, the techniques that have been demonstrated and with which people feel secure from a technological standpoint, have investment costs and operating costs that bring a product in a price range considerably higher than the incremental barrel available to us from a foreign source. So it is an economic problem right now.

The same thing is true in some of the liquid supplemental fuels derived from coal. We, as a company, have done a considerable amount of research in the extraction and conversion of oil from shale and in the conversion of coal into liquid products. We find once you make the extraction step in shale, once you have made the hydrogenation and liquification step in coal, you may move into petroleum technology.

I have a couple of small demonstration units here that show what type of product can be made from coal and what type of products are made from shale. I propose that these might be made available to your staff. I think you will find them interesting, as representing a bit of the story as to where the interplay is between the source of coal, the source of shale, and the petroleum technology that we are now experiencing in this country.

Senator MATSUNAGA. Mr. Chairman, I might ask that what Mr. Grey has there in his hand be made part of the committee file.

Senator BYRD. Without objection, so ordered.

Senator MATSUNAGA. Unless Mr. Grey has objections to surrendering it.

Mr. GREY. I would be happy to have you have them. I have other samples available for each of you. I do not have them with me. We will make sure that they are delivered to your staff. These present an up-to-date version of the technology that is used in moving from coal and shale into liquid fuel, or clean fuel, as we see it today.

Mr. MATSUNAGA. I see my time is up, Mr. Chairman. Thank you, gentlemen.

Senator DOLE. I assume most of the ground has been covered, and I will not take but a minute.

It will be said by some that the industry witnesses came and told us that they were against the equalization tax and the industrial users tax, and told us what they were for—is more profits. That may be stated by some—not by members who have been present here this morning.

The basic question is, will the equalization tax reduce our dependence on foreign oil?

You have alluded to that. I do not think that it will reduce our dependence on foreign oil.

Mr. HOOPMAN. As presently constituted, it will raise the price of energy in the United States and will cause some amount of additional care and conservation. In that manner, it may take a small increment of a very large problem, but the funds generated certainly will not go toward the adequate solution of the overall problem as is presently constituted in the bill which is before you, the 8444, the House bill.

Mr. GREY. In every study, it would appear that our dependence on foreign oil would increase if the tax is left as constituted.

Mr. HOOPMAN. This comes about primarily because the funds for replacement supplies will not be expended on replacement supplies. Therefore, the deficiency will increase rather than decrease.

I think we belabored that point heavily, but it is a point that is very important.

Senator DOLE. That is the centerpiece of the administration's program. Many of us are looking for alternatives. If that is rejected, what do you suggest as an industry?

Mr. HOOPMAN. As an industry, we feel very strongly that we are willing to take the risk of wrestling in the marketplace here as a competitive industry, an extremely competitive industry for that customer.

We are willing to take our chances in the marketplace. I think as management, that we do have the ability to allocate the discretionary funds, whatever they might be, and fall heir to the oil industry. We think that is the proper arena in order to take on this particular problem. And we believe that that has been successful in the past, and we would like the opportunity to go at it as a free market, market allocated resource problem.

We think it can be best solved that way.

Senator DOLE. Of course, there are going to be great pressures on the Congress to do something.

Mr. HOOPMAN. There certainly are great pressures on the Congress.

Senator DOLE. To accomplish it by October 8, 22, or some time before we adjourn this year.

Mr. HOOPMAN. There is an old saying that you never have time to do it right, but you always have time to do it over.

Senator DOLE. I have been around long enough that if we ever start an equalization tax or an industrial users tax to discourage conversion, it is going to be a long time before, if ever, the tax is going to be removed. It may be called a temporary program, but I do not know many temporary programs that ever terminate.

I do think they did terminate the breeding of cavalry horses a few years ago, which started off as a temporary program.

Senator BENTSEN. The nearest thing to immortality is a temporary Government program.

Mr. HOOPMAN. Unless you have extremely clear phaseout provisions, I have to agree; it will perpetuate.

Senator DOLE. That is why it is important. We are talking about a time frame of 30 days to decide the future direction we take in energy in this country, and worldwide. What we do will have an impact everywhere.

If we are to take any action, what should that action be?

Mr. GREY. On the user tax, you ask what are the alternatives? I think my presentation is aimed at saying that the user tax is something added to a situation that already has sufficient incentives. Differential energy costs between the replacement costs of oil and gas and the contemplated cost of coal, present adequate financial incentives to cause this conversion to take place.

It is then limited by supply rather than financial incentive.

Senator DOLE. You pointed out what happened on the House side. There were certain exemptions made. How do you make the users tax fair? In any circumstance, those who pay the tax would be at an economic disadvantage.

Mr. GREY. It is fair if you do not have it.

Senator DOLE. That would make it equal.

Mr. GREY. It also provides—what it really was intended to do was to provide added incentive for conversion. Our contention is, I think the analysis of the economics of the energy costs through coal and conversion costs—

Senator DOLE. The best illustration is concerning Hawaii.

Mr. GREY. It is punitive there, in a way an overburden that is unnecessary. But even those areas where coal is accessible and coal conversions can be accommodated, there is adequate financial incentive to accommodate those conversions, to finance them, and to give a rate of return on investment that will cause capital to flow in those directions, as witnessed by the 250 coal-burning steamplants that are contemplated by the coal industry.

Senator DOLE. What about if you deregulate prices and assure consumers and everybody else who is skeptical about the industry, that profits would be plowed back for further exploration?

Does that have any appeal at all?

Mr. HOOPMAN. Historically—

Senator DOLE. Would you do it?

Mr. HOOPMAN. Historically, you will find that when the industry has some periods of better profitability, it increased their exploration and development costs almost proportionate to the funds available.

Of course, this comes about primarily because they receive a better return on the investments that have come about.

I believe that you would find that you would not need mandatory reinvestment cycle. I think that, there again, unless it becomes economically the proper choice, that to set up an artificial set of circumstances forcing an investment really would only be a band-aid on a big sore, and it really would not cure the problem.

Senator DOLE. If I may just ask one final question. You mentioned

in your statement that your company does not have this surplus kicking around. Are there any companies who have?

Mr. HOOPMAN. I think in the information that went in the papers submitted for the record, it is indicated that among the Triple-A rated companies, there are some that have very large cash positions reported in their annual report, but their expenditure programs are also huge, and the ratio of the funds available to Exxon as compared to the expenditures that they are making, that expenditure is very large compared to the summation of the other industries, outside of the oil industry.

For example, I am talking about another company, something in the area of \$5 billion, \$5.074 billion was their cash and securities' portfolio as reported in their annual report. That is at the end of 1976, and Exxon's capital expenditures that year was \$4.098. That is a ratio of 1.24 to 1.

General Motors, for instance, had \$4.6 billion in cash and securities, and their capital expenditure program is \$999 million, for a ratio of 4.63 to 1.

I am not putting this out as an attack on General Motors. What I am saying, if you are big and you have a big problem, if you have a big stake to drive, you had better have a big hammer to hit it with, or you are not going to do any good.

The oil industry is a huge, huge industry and it requires huge, huge funds to get the job done.

Mr. GREY. I could mention, with respect to Standard of California, that looking at cash and securities on our balance sheet at the end of 1976, we reported \$975 million. Identifying the amount of cash that is required to conduct our business, we found that on a cyclical basis, as our monthly bills were paid, there were several times during 1976 where we had to go to the bank to borrow cash in addition to that which was on hand.

This does not reflect a poor financial position. It reflects the cyclical nature of things. This is a snapshot in time.

You and I need a certain level of cash to run our homes through our checking accounts. This is the working cash that one needs to make those payments that are required at given dates during any given cyclical part of the billing period.

Senator DOLE. You could have an overdraft.

Mr. GREY. We live in the wrong city.

Senator DOLE. Thank you.

Senator BYRD. I have just several brief questions. Is my recollection approximately correct that the total world oil reserves is put at roughly 300 billion barrels?

Mr. HOOPMAN. I do not have a number.

Senator BYRD. That is all right.

How about U.S. oil reserves?

Mr. WILLIAMSON. About 37 billion barrels of liquids, crude oil and natural gas liquids.

Senator BYRD. To get back to the bill in question, the House bill. As you may know, I represent a consumer State. Could you point out what benefit this bill will be to the consumers?

Mr. GREY. The bill as it is constituted?

Senator BYRD. Yes.

Mr. GREY. The bill, as it is constituted in its pricing elements, does not bring much in the way of help to the consumer. We believe it does not adequately strengthen the domestic production of energy in the United States. The imposition of the equalization tax places the replacement costs on the consumer, but it does not replace the barrel for the consumer to satisfy his future energy needs. The consumer will be shortchanged in the long run.

Senator BYRD. But it increases the cost to the consumer?

Mr. GREY. It does. It reflects again, back to the example of the department store. It fails to assure the consumer that we will have a viable energy supply system, that there will be energy supplies available for his and our domestic use in years to come.

Senator BYRD. The bill before us now does not accomplish this objective?

Mr. GREY. This bill does not. This is our complaint, sir.

Senator BYRD. Thank you, gentlemen.

[The prepared statements of the preceding panel follow. Oral testimony continues on p. 797.]

STATEMENT OF E. L. WILLIAMSON, PRESIDENT, THE LOUISIANA LAND AND EXPLORATION CO., ON BEHALF OF AMERICAN PETROLEUM INSTITUTE, MID-CONTINENT OIL & GAS ASSOCIATION, ROCKY MOUNTAIN OIL & GAS ASSOCIATION, AND WESTERN OIL & GAS ASSOCIATION

SUMMARY

While we in the petroleum industry support the need for conservation, conversion to alternative fuels, and the development of renewable energy resources as quickly as possible, we are seriously concerned with the degree of reliance on conservation incorporated as an integral part of the National Energy Plan. We feel that the role of conservation has been over-emphasized, and the potential for increased domestic oil and natural gas exploration and development is greatly understated.

That potential can be developed if (1) prices received for domestic liquid and gaseous petroleum are permitted to reflect the full cost of replacing these resources; (2) Federal onshore and offshore lands are made available to exploration by the private sector on a timely and adequate schedule; and (3) government acts to assure a stable economic climate that will promote investment in petroleum and other energy sources.

However, with the search for new reserves of crude oil and natural gas in the U.S. turning to more remote and hostile areas and to deeper horizons, the cost of finding and producing that petroleum will rise significantly. Cost notwithstanding, however, that oil and gas must be found and brought to market, if we are to reduce our growing dependence on imported oil . . . for petroleum will have to continue to provide the major share of our energy until other sources can come onstream in the 21st Century.

Where will that domestic petroleum come from? We will have to find more oil and gas in our existing fields . . . by drilling deeper and in less promising areas, and by applying secondary, and tertiary recovery techniques. And we will have to look off our shores and in remote areas for other supplies.

Whether or not that search can be made, or the more costly techniques applied, will be determined by the ability of the industry to attract capital, and by actions taken by government to provide a long-range economic climate conducive to the acquisition of new domestic energy resources. That includes accessibility to those resources, both from the standpoint of lease lands and operating conditions set by government.

If these conditions are met, there is no doubt but that more petroleum will be found in the U.S., for the historic record shows that . . . provided the opportunity and the ability to recover the costs of exploration and development exist . . . higher prices do bring forth additional supplies.

It is imperative, therefore, that we turn from controlled prices to a marketplace economy. Despite allegations to the contrary, the world price is reflective of the true value of oil. The existence of the international cartel of oil producing and exporting nations does not negate this fact, it emphasizes it.

In this respect, we have been our own worst enemy. We have discouraged domestic production and subsidized the oil cartel through years of price controls. And it is these controls, not the OPEC cartel, which have distorted both exploration and production activities, and the domestic energy marketplace. These controls must be removed, if our dependence on foreign oil is to be significantly reduced.

STATEMENT

Mr. Chairman and members of the committee, my name is E. L. Williamson. I am president of the Louisiana Land and Exploration Company with headquarters in New Orleans, Louisiana. I have been with The Louisiana Land and Exploration Company for the past 23 years and president since 1974. I have been directly involved in exploration and production activities for the past 28 years.

I am here today to testify on behalf of the American Petroleum Institute, the Mid-Continent Oil and Gas Association, the Rocky Mountain Oil and Gas Association, and the Western Oil and Gas Association. In addition, I am here because I share with the President and Congress a growing concern over the energy supply problems of this country.

I am concerned, too, that the Administration has chosen to place so great an emphasis on trying to solve those problems through conservation, and that it seems to have written off domestic crude oil and natural gas production as a viable means of increasing future energy supplies. Moreover, in attempting to justify its conservation goals, the Administration has apparently greatly understated U.S. petroleum production potential.

Therein lies both the problem and the conflict.

I have no argument with the need to conserve energy. That need is real, and we must discipline ourselves to use every bit of energy wisely. But we cannot and will not solve our energy problems through conservation, alone—unless we are willing to accept far greater unemployment and the danger of a major recession in the years ahead.

Nor can we wait until other energy sources come onstream—increased coal and nuclear power, synthetic oil and gas from coal, oil shale, solar power, and a host of more exotic sources. Most certainly, these energy sources will, collectively, play an important part in our energy mix, as we enter the 21st Century. For now, however—and for the next two and a half decades—it is going to be petroleum that will support our economy. And our decision today must be whether that oil and natural gas are to come from domestic or from foreign sources.

If I am to leave this Committee with but one thought to be recalled as you consider our National Energy Plan, let it be this: Our nation has the potential for substantially increasing its production of petroleum—liquid and gaseous—and our success in developing that potential rests on three basic elements:

First, prices received for domestic oil and gas must reflect the full cost of replacing those resources, as they are consumed;

Second, Federal lands—onshore and offshore—must be made available to petroleum exploration and development by the private sector on a timely and adequate schedule; and

Third, this—and subsequent Congresses—must act positively to assure that a stable economic climate exists . . . a climate that will promote continued investment in petroleum and other energy sources.

These three elements are essential to the formation of any sound, national energy policy, and they form the basis for my comments here, today.

Let us first look at our oil and natural gas resources. (Figure 1.) I am aware that there is a great deal of confusion in the minds of many people concerning how much petroleum there is to be recovered in the United States. Some of that confusion stems from the definitions used in petroleum estimates. To set the stage, let me briefly describe what we mean by proved reserves, growth of known fields, and potential resources.

Proved reserves are those supplies which geological and engineering data demonstrate with reasonable certainty to be recoverable from known reservoirs in future years under the economic and operating conditions which existed at the time the estimates were made.

The American Petroleum Institute and the American Gas Association calculate our domestic proved reserves to be about 37 billion barrels of crude oil and natural gas liquids, and 216 trillion cubic feet of natural gas. A word of caution, though, is warranted here.

It is thought by some that, because these oil and gas reserves are developed and "proved," they are recoverable simply by opening valves at the surface or running small engine powered pumps. Some people think that oil and gas are in "underground storage" tanks, the dimensions and contents of which are precisely known and easily emptied. Let me assure you that this is not true. It is not that simple. Most of the oil and gas fields with which I am familiar undergo constant remedial work. Wells must be redrilled or worked over to maintain production. Equipment must be replaced. The energy in more and more oil reservoirs must be supplemented by water injection or some other secondary recovery technique. The point is we do have a fairly well known and identifiable petroleum reserve, but it does take constant effort and additional expenditures to recover those reserves.

Growth in known fields and potential resources include those volumes of oil and natural gas which may be indicated or inferred to exist, in known fields, based on the development of fields of similar characteristics, and reservoirs yet to be discovered. Where will this oil and natural gas come from? First of all there are the new and separate reservoirs underlying currently producing reservoirs in old fields.

Second, there are smaller reserves which had been previously by-passed as non-commercial and may be reopened.

Third, the total, ultimate recovery from known reservoirs may be increased by using additional or more sophisticated secondary recovery techniques. It is estimated that the average recovery from primary and secondary recovery in all U.S. reservoirs will be about one-third of the original oil in place which will leave almost three billion barrels of oil in the ground. Some of this oil is certainly going to be produced by tertiary methods. These methods are essentially still in the developing stage. They will be expensive.

Fourth, oil and gas are still to be found in the mature oil provinces of this country. It is a well known adage that the best place to look for oil and gas is somewhere close to where it has already been found. This will be expensive oil and gas because it will be trapped in either deeper and/or more subtle traps. The large, easily identified structures in all of the known producing areas have already been looked at and tested, particularly in areas like the Gulf Coast. New and improved seismic techniques are allowing us to identify previously untested traps on the flanks of oil fields.

Fifth, known but presently uneconomic reserves can be developed at higher prices. An example of this kind of reserve is the natural gas in tight sands and shales in the Rocky Mountain States. The thickness and areal extent of these deposits is enormous. The deliverability of gas from such reservoirs with present completion techniques is uneconomical. The Federal Power Commission has estimated that there is a potential of as much as six hundred trillion cubic feet of such gas.

Sixth, there are vast areas on the Outer Continental Shelf which are largely unexplored. Something less than four percent of the total Outer Continental Shelf has ever been leased. There are basins on both the East and West Coasts, and particularly the shelf area around Alaska, which apparently contain petroleum source material, reservoir rocks, and structures or trapping mechanisms. Because of the very size of these unexplored areas they probably hold the greatest potential for large new deposits.

Seventh, there are still areas onshore which may well be prospective which have, as yet, been relatively unexplored. These areas have not been explored for various reasons. They are remote, extremely expensive, and in some cases, particularly in Alaska, the land has not been available in recent years. Portions of the Rocky Mountains are in the very early stages of exploration. The best example of this is the recent activity in the Overthrust Belt in Utah, Wyoming and Idaho.

The attached map (Figure 2) indicates more than 20 totally unexplored offshore areas which are prime targets for exploration, along with a number of onshore basins which need to be explored more thoroughly. (Figure 3) points out that lease sales have been held in only seven of 28 Outer Continental Shelf areas and that production has begun in only two of those areas.

In addition, to these so-called "economically recoverable" resources, most estimators agree that there is an enormous remaining "resource base," particularly of natural gas, which can be produced. These resources are not likely to be recovered before the end of the century because of their high cost.

However, these potential resources are virtually certain to be produced in the future because the costs involved are less than those associated with synthetic or liquefied natural gas. The engineers and geologists do not like to apply the slide rule to the rank speculation, so we can only conclude that the potential is extremely large.

In fact, many geologists, geophysicists and engineers in this country—the people whose disciplines and experience qualify them as experts in this matter—are of the opinion that there is more oil and natural gas yet to be recovered in this country than has been produced since Colonel Drake discovered oil at Titusville, Pennsylvania, in 1859.

Let us bring this into perspective. In my opinion, a reasonable estimate of remaining recoverable petroleum in this country is over 150 billion barrels of crude oil and 800 trillion cubic feet of natural gas. This amount is approximately four times the current proved reserves of oil and gas. These numbers are within a reasonable order of magnitude, and I would be surprised if any knowledgeable government or industry source would quarrel with them. I am convinced that there is a petroleum resource base adequate to carry us well into the 21st Century at current levels of production or higher. I would expect that by then technology will permit us to secure additional quantities of petroleum from non-conventional sources which would stretch supplies even further.

I am not arguing that the reserves which are currently foreseeable, or those which are more speculative, could provide such a cushion that historic increases in the rate of consumption are acceptable. However, it is imperative that we recognize that large quantities of oil and natural gas remain to be discovered and produced if we design and adopt a balanced energy program. We are going to need this kind of a domestic energy resource base to protect the security and well being of our country. We will need it to permit an orderly conversion to fuels of the future. We are going to need it as insurance against any failure to meet the targets and timetables for conservation and conversion.

What can keep us from utilizing this energy resource base?

First of all, the assumption that we cannot substantially increase our domestic production will become a self-fulfilling prophecy if we are unwilling to create an economic environment to permit the search. The cost of recovering the remaining petroleum in this country will be high, and the prices allowed for that oil and gas must reflect those costs. And, by that, I mean all the costs of finding replacement reserves.

You can't look only at the successful exploratory wells and try to figure what the price of oil and gas delivered from those wells must be. You must examine the costs of all the dry holes as well. And there will be too many.

Historically for every one well that discovers commercially significant quantities of petroleum there are 49 others that do not during new field wildcatting. And only one out of every seven wells drilled in search for new oil and gas finds any petroleum at all. Moreover, it may well be that—with operations of the future taking place in more remote and hostile climates and at deeper horizons—the successful completion may be harder to come by in the years ahead.

I have mentioned before, but I feel it must be emphasized, that the costs are there whether or not the petroleum is. With those costs running as high as \$15 million per well, the costs mount up . . . and mount up fast. Two prime examples come to mind: drilling on the Destin Dome (off the West Coast of Florida); and drilling activities in the Gulf of Alaska. Literally hundreds of millions of dollars have been spent in these frontier areas . . . and the results, so far, have been negative.

That doesn't mean we should stop looking in frontier areas. We'll need to look these and elsewhere to find the oil and gas this nation's consumers will need in the years ahead. But it does make two points. One, that the costs are high; and two, that we can't afford to put all of our efforts into new areas. We must also continue to search for oil in existing fields.

The second element that can keep us from utilizing the potential resources base of the United States is accessibility. By that I mean not only accessibility from the point of timely and adequate lease sales, but also accessibility by virtue of reasonable operating conditions, as established by Federal regulations. Unfortunately, the recent actions of the Federal government in these areas run contrary to energy development.

Not only have there been a series of lease sale delays, but millions of acres have been withdrawn from minerals development . . . and millions more are being readied for proscription in Alaska. Moreover, pending amendments to the

Outer Continental Shelf Lands Act would, if passed as introduced, mean additional years of unnecessary and costly delay.

Finally, I would suggest that the third element rests entirely on your shoulders . . . that is the development of a sound national energy policy. I think you will agree that this nation has gone far too long without a policy that will at once attract the huge amounts of investment capital essential to progress in energy resource development, and assure a continuing economic climate that will permit the recovery of replacement costs of new oil and natural gas reserves.

There is, of course, no guarantee that all of the oil and gas we believe exists in the United States and off its shores will be recovered. Of this, however, you may be certain. We can be confident that production will decline unless we significantly increase exploration efforts.

It's going to take a vigorous and continuing exploration and development program simply to maintain existing rates of production and to prevent a substantial decline from occurring. If we are to go beyond that and seek to reduce our growing dependence on foreign energy supplies, then it will take a Herculean effort . . . an effort far and above more demanding than this nation has ever faced before.

Whether or not that effort can and will be made rests squarely in the hands of government. That, members of this Committee, is your province and that of your colleagues. It is my hope that you will act promptly and decisively in favor of encouraging private sector development of our Nation's rich petroleum resource potential.

Let me make one more observation. As members of this Committee and of the Senate, you are getting into the energy business to a greater extent than ever before. And I would suggest to you that it is my firm belief that the marketplace holds the best and only long-term practical solution to our energy supply problems.

If the costs of energy development are fully recoverable, if the opportunity for exploration and development are there, if the economic climate is such that it encourages investment . . . more domestic oil and natural gas resources will be found and produced. There is no question in my mind but that such is true. The record shows that, in response to price increases—real and anticipated—domestic exploration and production have increased time and time again. (Figures 4 and 5.)

I recognize that there are those who contend that the petroleum marketplace has been distorted by the Organization of Petroleum Exporting Countries, and by its control over prices and production in key areas of the petroleum world. But the allegations that current world prices are not reflective of true energy values simply is not true.

OPEC is real. The prices its member nations have established—and the production rates they have set—are real. It is the world marketplace. And, if you don't believe it is, ask any of the industrial nations which do not have domestic production. They may not be buying as much OPEC oil, but they are buying it at the world—and that means the OPEC nations—asking price.

In this respect, we have been our own worst enemy. As long as we, as a nation, continue to set artificially low prices for domestic oil—prices which subsidize the OPEC oil cartel—we will not be able to increase domestic production, so as to significantly reduce imports. That is the tragedy of following policies and pricing which fail to recognize the reality of OPEC market power. We have unintentionally aided and abetted its ability to hold and to raise prices, and our present course is destined to maintain that result.

It's as simple as that. We've tried too long to eat our energy cake and to have it too . . . and it just doesn't work that way in the real life drama of national and international energy supplies.

The National Energy Plan asserts that "the domestic oil industry would find it difficult in the short-run to utilize additional incentives due to physical limitations on the availability of drilling rigs and related equipment." The facts are that about 16 percent of the worldwide mobile offshore drilling rigs are currently

idle, chiefly in Southeast Asia and the North Sea. In spite of the overseas surplus, delays in exploring the Atlantic Outer Continental Shelf and other offshore areas are forcing other American mobile rigs to go overseas to find employment. Onshore rigs are at a high level of usage this year, but if adequate incentives were present, from 150 to 200 new onshore units could be manufactured in a year's time.

In summary, I would like to submit two more attachments, numbered as (Figures 6 and 7). These portray in graphic form what would happen under three scenarios: No new exploration, no exploration in frontier areas, and aggressive exploration in all areas. I believe you will agree that optimum recovery of domestic petroleum is preferable to reliance upon imported petroleum.

Thank you.

I'll be happy to try to answer any questions you may have concerning the testimony I have presented.

FIGURE 1

	Crude oil and natural gas liquids (billion barrels)	Natural gas (trillion cubic feet)
Remaining proven reserves at Dec. 31, 1976.....	37.0	216.0
Estimated economically recoverable reserves.....	150.0	800.0
Total cumulative U.S. production through Dec. 31, 1976.....	130.0	517.0
U.S. production in 1976.....	3.6	19.5



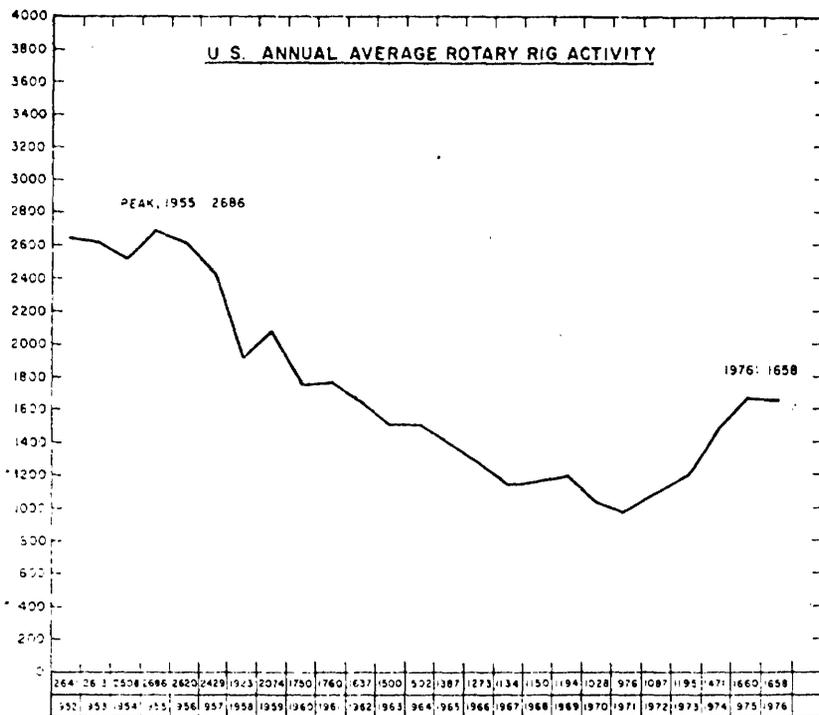
U.S.A. ONSHORE AND OFFSHORE BASINS

FIGURE 2

**U.S.A. OFFSHORE
WORK STATUS**

		REGIONAL STUDIES	RECONNAISSANCE SEISMIC BASIN EVALUATION	PROSPECT DETECTION SEISMIC	PROSPECT DELINEATION SEISMIC	TRACT EVALUATION	BID PREPARATION	SALE	EXPLORATORY DRILLING	PLATFORM CONSTRUCTION	PRODUCTION	BEGINNING 3 TO 5 YRS AFTER LEASE SALE
GULF OF MEXICO	CENTRAL	■	■	■	■	■	■	■	☆	■	■	■
	EASTERN	■	■	■	■	■	■	■	☆	■	■	■
	WESTERN	■	■	■	■	■	■	■	☆	■	■	■
PACIFIC COAST	SANTA BARBARA CHANNEL	■	■	■	■	■	■	■	☆	■	■	☆
	CALIFORNIA BORDERLANDS	■	■	■	■	■	■	■	☆	■	■	■
	OLYMPIC BASIN	■	■	■	■	■	■	■	■	■	■	■
	ASTORIA BASIN	■	■	■	■	■	■	■	■	■	■	■
	ELL RIVER BASIN	■	■	■	■	■	■	■	■	■	■	■
	ARENA BODEGA BASIN	■	■	■	■	■	■	■	■	■	■	■
	SANTA CRUZ BASIN	■	■	■	■	■	■	■	■	■	■	■
	SANTA MARIA BASIN	■	■	■	■	■	■	■	■	■	■	■
ATLANTIC COAST	BALTIMORE CANYON	■	■	■	■	■	■	■	☆	■	■	■
	GEORGES BANK	■	■	■	■	■	■	■	■	■	■	■
	SE GEORGIA EMBAYMENT	■	■	■	■	■	■	■	■	■	■	■
	BLAKE PLATEAU	■	■	■	■	■	■	■	■	■	■	■
	CAPE FEAR ARCH	■	■	■	■	■	■	■	■	■	■	■
ALASKA	GULF OF ALASKA	■	■	■	■	■	■	■	☆	■	■	■
	LOWER COOK INLET	■	■	■	■	■	■	■	■	■	■	■
	KODIAK SHELF	■	■	■	■	■	■	■	■	■	■	■
	BEAUFORT BASIN	■	■	■	■	■	■	■	■	■	■	■
	BERING-NORTON	■	■	■	■	■	■	■	■	■	■	■
	BERING-ST. GEORGE	■	■	■	■	■	■	■	■	■	■	■
	ALEUTIAN SHELF	■	■	■	■	■	■	■	■	■	■	■
	ARCTIC OFFSHORE BASIN	■	■	■	■	■	■	■	■	■	■	■
	HOPE BASIN	■	■	■	■	■	■	■	■	■	■	■
	ST. MATTHEW BASIN	■	■	■	■	■	■	■	■	■	■	■
BERING SHELF	■	■	■	■	■	■	■	■	■	■	■	
BRISTOL BASIN	■	■	■	■	■	■	■	■	■	■	■	

FIGURE 3



SOURCE: HUGHES TOOL CO

FIGURE 4

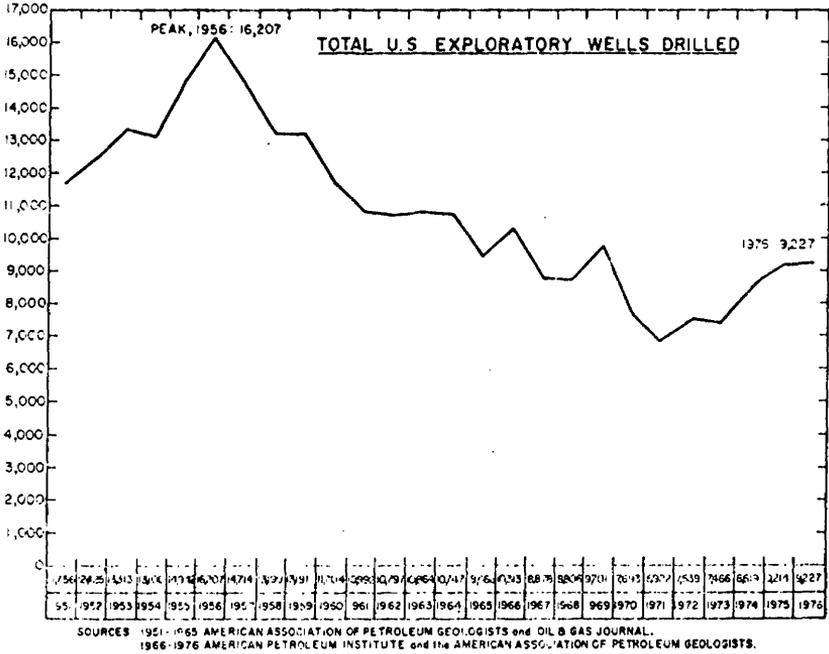


FIGURE 5

U.S.A. - CONVENTIONAL HYDROCARBON SUPPLY

MILLION BARRELS / DAILY (COE)

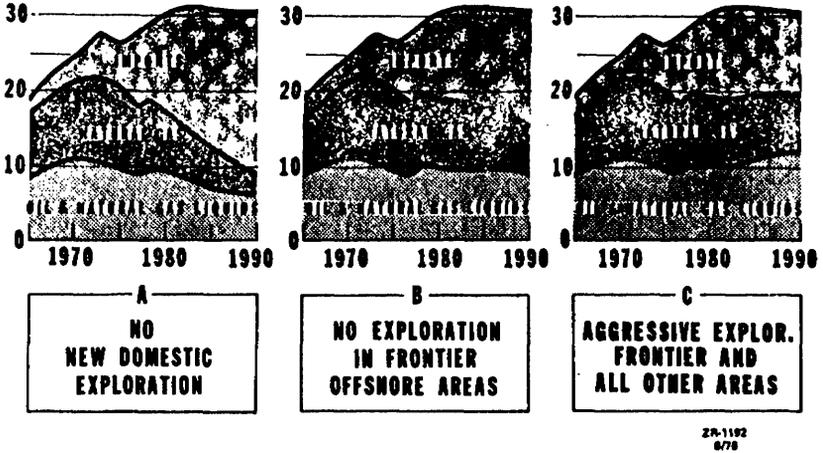


FIGURE 6

U.S.A. - CONVENTIONAL HYDROCARBON SUPPLY

MILLION BARRELS / DAILY (COE)

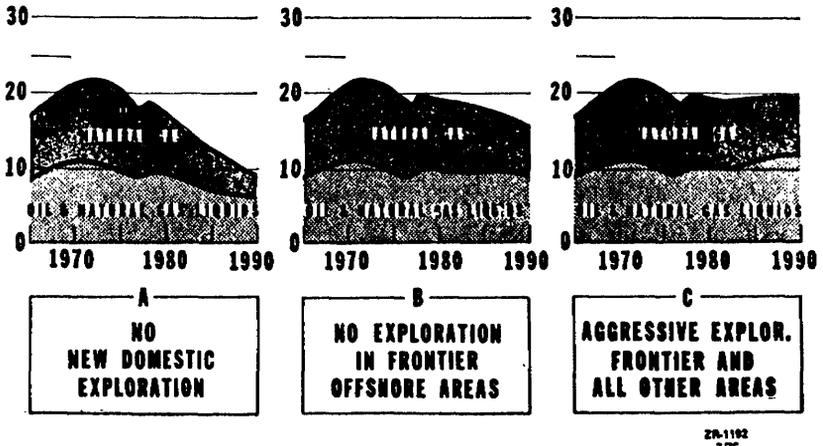


FIGURE 7

PREPARED STATEMENT OF HAROLD D. HOOPMAN, PRESIDENT, MARATHON OIL CO.

SUMMARY

Introduction. This submission will discuss the overall U.S. energy situation and will then comment on our concerns with the proposed national energy program. The House-passed bill, H.R. 8444, does not adequately recognize the need for stimulating domestic supplies. The Nation's energy goals could far better be achieved by phasing in market prices for crude oil and natural gas.

U.S. Energy Supply and Demand Situation. Prior to the 1973-74 embargo, U.S. energy demand increased at a rate of about 4 percent per year. Because of higher prices, conservation, and increased energy efficiency, demand growth over the next 15 years is projected to be only about 2.8 percent per year. This still results in total demand increasing by almost 50 percent by 1990. Continued economic growth requires more energy.

Real improvement in our national energy situation is dependent on increasing indigenous supplies, but the Nation has moved backward since the 1973-74 embargo. The Tax Reduction Act of 1975 largely eliminated percentage depletion. The Energy Policy and Conservation Act of 1975 has resulted in virtually no increase in lower tier oil prices and in substantial rollback of upper tier prices. Meanwhile, domestic production continues to decline and oil imports continue to increase.

Nuclear power is expected to supply slightly more than 10 percent of energy demand in 1990; hydroelectric and geothermal, perhaps 3 percent; coal, about 25 percent, although production is projected to double; and oil and natural gas, about 60 percent even with substantial growth in the other energy sources.

The alternative to increasing domestic oil and gas reserves is increased dependence on oil imports or energy shortages. Just to maintain production, it will be necessary to replace depleting domestic reserves with new discoveries. Over half of total 1990 oil production must come from reserves which have not yet been discovered.

Reserve Replacement Costs and Capital Requirements. The costs of replacing the Nation's oil and gas reserves will be several times greater because of the location and difficulties in finding such reserves. These higher costs for new reserves have been further increased by the effects of inflation, which has been particularly severe in the petroleum industry.

Various sources have estimated that total capital expenditures for oil and gas will range from at least \$20-30 billion per year (in 1976 dollars) over the next decade.

The National Energy Plan—Supply Policies. The petroleum supply policies consist of: an indefinite extension of price controls on existing lower and upper tier oil; creation of a third, higher priced but still controlled, tier of oil to provide incentives for very narrowly defined new discoveries; and imposition of a crude oil equalization tax on all controlled oil tiers.

The very existence of continued price controls creates an atmosphere of uncertainty which can only slow the development of new supplies, particularly in remote high cost Frontier Areas or deep inland areas. Furthermore, controls inevitably breed distortions and inequities which must be "corrected" with even more controls, for example, the entitlements system and the composite pricing system.

Crude Oil Equalization Tax. The tax is designed to provide replacement cost pricing to the consumer. The producer, however, would not retain any of this increased revenue. Moreover, the Administration and the House Committee expect that the domestic oil industry will have to absorb up to one third of the tax. This would translate into a \$2.5 billion annual reduction in after-tax profits—a one-third reduction in earnings for an industry whose profits have been about equal to the average for all manufacturing.

It would be far better to remove wellhead price controls and let the market operate. This would achieve replacement cost pricing. (If necessary, prices could be phased up to market levels to minimize consumer impacts.) Governments would receive over half of the increased revenue in the form of taxes; and recent history strongly suggests that the remaining revenue would be channeled into increasing domestic supplies. However, if concerns over "excess profits" persist, they can be handled more effectively through the tax system than with continuing controls.

A Viable Alternative. The best alternative approach would be an excise tax applied at the wellhead (collected by the first purchaser) and based on the actual increase in revenue to each producer. The wellhead tax should be imposed only on a declining production base so that we can stem the reduction in domestic crude oil production and increase ultimate recovery from existing properties. The tax should recognize high cost secondary and tertiary recovery projects, recognize additional state and local taxes incurred, reflect the impact of inflation, and be limited such that it does not preclude the development of high-cost projects, and the continued operation of marginal properties.

Other Tax Issues. H.R. 8444 makes permanent the minimum tax provisions enacted by the Tax Reduction and Simplification Act of 1977 with respect to intangible drilling and development costs (IDC) incurred by individual taxpayers in drilling oil and gas wells. The House bill would continue to limit the minimum tax to the amount by which the excess IDC deduction exceeds net income from oil and gas production. However, this provision does not go far enough; the IDC deduction should be left unfettered if it is to accomplish its full potential for attracting capital.

The geothermal tax incentive proposal would, on its face, provide for the application of percentage depletion for geothermal production and the current deduction of IDC incurred for drilling geothermal wells. In fact, this measure reduces incentives. The bill imposes a 15 percent minimum tax on individuals' excess IDC which exceeds net income from geothermal properties, and would reduce the percentage depletion rate from 22 percent to 10 percent and limit the deduction to the basis of the property. No limitations should be placed on the IDC deduction for geothermal wells and the current deduction for percentage depletion should remain at 22 percent and should not be limited to the taxpayer's basis.

SUBMISSION TO THE SENATE FINANCE COMMITTEE, SEPTEMBER 9, 1977

The United States is faced with a serious energy problem. Oil and gas now supply three-quarters of U.S. energy requirements. Even with substantial growth in other energy sources, oil and gas will still supply about two-thirds of domestic energy needs in 1990. However, U.S. oil and gas proved reserves and production are declining and reliance on imports is increasing. The Nation is faced with the absolute necessity of replacing these reserves even to maintain, much less increase, domestic production.

The real cost of replacing these reserves will be much greater than the original cost of existing reserves. Replacement reserves will come from deeper horizons and more remote and costly frontier areas. There will be much higher transportation cost resulting from longer hauls and changing logistical patterns. In addition, the impact of inflation on the petroleum industry has been particularly severe in recent years. The higher real costs coupled with the impact of inflation will necessitate a doubling or tripling of annual capital expenditures for oil and gas. A large portion of these expenditures must be financed internally from profits and capital recovery provisions.

What is needed is a sound U.S. energy policy which provides an environment conducive to both energy conservation and the accelerated development of domestic energy supplies. It is imperative that these policies specifically recognize: (1) the sharply higher real cost and capital expenditure levels that will be involved in replacing the Nation's developed oil and gas reserves, (2) the need for the petroleum industry to be provided a reasonable expectation of an adequate profit on development of these new reserves, (3) the importance of earnings from existing production in financing the development of new higher cost replacement discoveries, and (4) the need to minimize uncertainty and distortions resulting from controls and regulations.

President Carter's National Energy Plan has focused the attention of all Americans on the seriousness of the energy problems we face and has recognized the role of replacement cost pricing of energy at least in stimulating energy conservation.

But despite these positive elements, the President's program has failed to recognize the need for stimulating domestic supplies. All responsible studies by government and industry confirm our belief that there are significant new supplies to be found, as well as additional recoveries from known deposits, if the industry is allowed to operate in the proper economic and regulatory environment.

However, the President has recommended a complex system of continued oil and gas price controls coupled with a crude oil equalization tax (COET) to achieve parity between U.S. and world prices. We believe that this system will be unable to achieve the National Energy Plan goals of increased domestic production and reduced imports. This belief is confirmed by numerous studies by agencies such as the General Accounting Office, Office of Technology Assessment, etc. The Nation's energy goals could far better be achieved by the relatively simple approach of decontrol of crude oil and natural gas prices. The market system would be as effective as the proposed plan in encouraging conservation and the shift to more abundant fuels. At the same time it would provide a powerful stimulus for increasing supplies. If the consumer is required to pay the higher replacement cost for the energy, it is clearly in his interest to see that his increased payments contribute directly to the replacement of existing petroleum reserves.

Considering the replacement cost of the oil and gas we are consuming today, it is unlikely that decontrol would result in any real excess producer profits. However, if these concerns persist, they can be handled more efficiently by the tax system than by continued price controls. For example, the phasing in of market prices over a short period of time coupled with an appropriate excise tax applied at the wellhead would be a practical approach.

I

U.S. ENERGY SUPPLY AND DEMAND SITUATION

Real and permanent improvement in our national energy situation is dependent on increasing indigenous supplies. The U.S. has a large conventional energy resource base, and its expeditious development can make a significant contribution to meeting our energy requirements and to a healthy economy. It has been widely emphasized that one of the most critical factors in the development of these resources is the ability of the domestic petroleum companies to generate and attract adequate investment capital.

Unfortunately, since the 1973-74 embargo the Nation has moved backward, not forward. The Tax Reduction Act of 1975 largely eliminated percentage depletion and increased the petroleum industry's tax burden upwards of \$2 billion per year. Next, the Energy Policy and Conservation Act which was designed to raise U.S. oil prices to world levels by May 1979 was passed. In spite of its express intent, this Act has resulted in virtually no increase in lower tier oil prices and in substantial rollbacks of upper tier prices. In fact, it has insured that U.S. oil prices would not keep pace with inflation. Meanwhile, domestic oil production continues to decline; oil imports continue to increase; and the Nation's energy future remains clouded. The deteriorating U.S. supply/demand situation is dramatically underscored by the fact that to date U.S. petroleum imports have increased 29 percent over last year and now amount to almost half of consumption.

During the years prior to the 1973-74 embargo, U.S. energy demand increased at a rate of about 4 percent per year, coincident with rapid economic growth. This relationship between energy and economic growth is well known. Although more efficient use is possible and desirable, no one can accurately predict how much the energy/GNP ratio can be reduced and still meet the Nation's legitimate aspirations for jobs and a better quality of life. Because of higher energy prices, conservation, and increased energy efficiency, energy demand growth over the next 15 years is projected to be 2 to 3 percent per year, about two-thirds of the historical rate. This still results in total energy demand increasing sharply from an estimated 38 million barrels per day equivalent today to 50 to 55 million barrels per day oil equivalent in 1990. The importance of increased efficiency in this outlook should be noted. If demand were to rise at the historic 4 percent rate from the 1973 level, it would reach some 74 million barrels per day oil equivalent by 1990—another 20 to 25 million barrels per day.

Domestic energy sources available to meet this demand include:

Nuclear power is expected to supply slightly more than 10 percent of energy demand in 1990 even with very rapid growth projections (which may be optimistic in the light of recent public concerns about nuclear energy).

Hydroelectric and Geothermal, which will be limited by the availability of sites and by technological considerations, will supply perhaps 3 percent of 1990 needs.

Coal, although production is projected to double by 1990, will supply about 25 percent of energy demand.

Oil and natural gas will continue to be the predominant U.S. energy source over the next 15 years, supplying about 60 percent of the 1990 demand.

Since the mid-1960's, the U.S. has been consuming more domestic oil and gas than it has been finding, and as a result, U.S. proved oil and gas reserves have been steadily declining with the 1968 Prudhoe Bay discovery providing the only significant break in that trend. By the early 1970's producing capacity reached its peak, and both oil and gas production have been declining ever since. Just to maintain production, it will be absolutely necessary to replace these depleting known reserves with new discoveries. Given the proper environment, it should actually be possible to increase domestic oil production. However, over half of total 1990 production must come from reserves which have not yet been discovered. This same general situation holds true for natural gas. Still, U.S. oil imports must continue to grow to meet the needs of the economy.

II

RESERVE REPLACEMENT COSTS AND CAPITAL REQUIREMENTS

Since over half of the Nation's 1990 oil and gas production must come from reserves not yet discovered, it is critically important to consider the replacement cost of these reserves. Most estimates by industry and government reach the conclusion that the bulk of the major new oil and gas discoveries must come from new frontiers such as the Outer Continental Shelf, Alaska and unexplored deeper horizons. Additional recoveries from known reserves will also come from enhanced recovery projects which in the past have been uneconomical. This results in sharply higher real finding, development and production costs as compared to costs of reserves now being produced. Moreover, sharply higher transportation investments are required to bring these potential discoveries to market. The classic example, is the investment of over \$7 billion for the Alaska pipeline just to move the production across the state to a point still 1500-2000 miles from U.S. consuming areas.

In addition to the sharply higher real costs associated with finding and developing replacement reserves, the impact of inflation on petroleum industry costs has been particularly severe. For example, in the period 1974-mid-1977 inclusive, inflation in the overall economy [as measured by the Wholesale Price Index (WPI), Consumer Price Index (CPI) and the GNP deflator] averaged about 27 to 34 percent. At the same time petroleum industry inflation as measured by the Wholesale Price Index for Oilfield Machinery and Equipment¹ has increased 72 percent.

Finally, the petroleum industry is also faced with significantly increased costs incurred in complying with environmental protection requirements.

The cost of alternate sources to oil and gas, such as synthetic fuels, is higher than the cost of conventional sources, and these capital intensive facilities have been hit hard by inflation over the past few years.

All of these factors together have resulted in estimates by various sources that the total capital expenditures for domestic oil and gas exploration and production alone will range between \$20 and \$30 billion per year over the next decade. This will be some three times the average annual amount of about \$8 billion invested by the industry in exploration and production during 1971 through 1975.

These sharply increased capital requirements must be met from retained earnings, new equity issues, new long term debt, and from capital recovery allowances. In turn the availability of funds from each of these sources is strongly affected by industry financial performance and government fiscal and regulatory policies.

During the 1960's and early 1970's petroleum industry profitability, as measured by return on shareholder's equity, has been about the same as the average return for all manufacturing (Attachment 1).

During this period the industry dividend payment rate was about 50-55 percent of earnings, and debt/equity ratios over the period rose substantially. In fact, between 1965 and 1972 debt/equity ratios doubled. Note that the debt/equity ratios shown in Attachment 1 include long term debt only. If short term obligations and debt in the form of lease arrangements and other off-balance sheet financing were included, debt/equity ratios would be substantially higher.

¹ WPI-OFM = 136.2 in December 1973 vs. 234.6 in May 1977.

There is no way to determine analytically whether petroleum industry debt/equity ratios can be increased significantly from present levels. This will depend a great deal on investors' perception of the regulatory and pricing environment and the outlook for future earnings and cash flow. Similar considerations will control the industry's ability to raise capital by issuing new equity. In the meantime industry must continue to rely heavily on internally generated funds, retained earnings and capital recovery allowances. However, it should be noted that the effectiveness of capital recovery allowances has been significantly diminished by the effects of inflation and higher real replacement costs (i.e., depreciation based on costs of existing facilities does not begin to match the costs of replacement in frontier areas, particularly after inflation).

On balance it seems unlikely that debt or equity investors will view an indefinite extension and expansion of oil and gas price controls coupled with the COET as favorable for large expansions of industry debt or new equity issues. This is particularly true in view of other features of the National Energy Plan such as oil and gas user taxes and costly mandatory coal conversion programs.

It has been alleged by the Administration that many U.S. petroleum companies are "awash in cash" and are unable to spend their current annual cash flow. Two points need to be made in regard to these allegations. First, the data used by the Administration are at best misleading by their own admission. For example, they note that "The term 'excess funds' does not necessarily equate with excessive or windfall profits. Neither would it be reasonable to assume that all cash flows generated from domestic production operations would be used for domestic capital expenditures on oil and natural gas production. The excess portion of cash flow not so used could be applied to corporate dividends, reducing debt, the purchased assets for non-energy operation or various other corporate undertakings."³ Even this admission fails to note the absolute necessity of corporate dividends if equity capital is to be retained much less increased. The need for increased working capital also requires an adequate return on shareholders' equity.

Second, while it has been alleged that a few companies are currently unable to spend their annual cash flow, this situation is certainly not true industry-wide.

A comparison of the cash flow from operations with the total capital and exploration expenditures for four major oil companies indicates that for 1976 this group reinvested virtually all of its internally generated cash flow:

[1976 billion dollars]

	Mobil	Texaco	Exxon	Standard of Indiana
Cash flow from operations.....	1.582	1.520	4.679	1.693
Capital and exploration expenditures.....	1.494	1.504	5.100	1.728

Further, an analysis of the cash on hand for 15 large petroleum and other industrial companies (all Aaa Companies plus IBM) compared to annual capital expenditures (Attachment 2) indicates that the ratio for the seven oil companies included the group is 1.02 compared to 2.28 for the group of 8 non-oil companies, indicating that cash on hand is about equal to the annual capital expenditures for the large oil companies, while the ratio of cash to expenditures for the non-oil group is substantially higher.

III

COMMENTS ON THE PRESIDENT'S NATIONAL ENERGY PLAN AND H.R. 8444 RELATING TO DOMESTIC PETROLEUM SUPPLY POLICIES

The President's National Energy Plan as submitted in April proposed the following basic approach to U.S. oil and gas pricing:

Price controls on existing upper and lower tier oil were to be extended indefinitely, and a third tier of newly discovered oil, still controlled at levels below the market price, was to be established.

³ Letter from Leslie J. Goldman, Executive Office of the President, to Congressman Garry Brown, Aug. 2, 1977.

Replacement costs pricing of oil (i.e., raising domestic oil prices to world market levels) was to be accomplished by imposing a complex system of crude oil equalization taxes (COET) over a 3-year period. However, the proceeds of this tax (the difference between current controlled price and market price), rather than being used to develop replacement energy supplies, were to be rebated to the general public.

Natural gas price controls were to be extended for the first time to intrastate gas, rolling back the price producers could expect to receive for new intrastate discoveries. Moreover, the plan did not propose replacement cost pricing for natural gas. Instead, it preserved existing distortions by pricing new natural gas well below the cost of new oil.

While the Administration's plan recognized the merits of replacement cost pricing of oil as a means of encouraging conservation, it rejected the replacement cost, or market pricing, concept for stimulating the development of domestic oil and gas supplies. Moreover, it contained no provisions for removing other impediments to increased domestic supply development, such as OCS leasing delays, and excessive delays resulting from restrictive environmental legislation. At the same time the plan projected increased domestic oil and gas production and reduced imports by 1985. We are convinced that these goals cannot be met by the proposed oil and gas pricing and tax provisions.

Unfortunately, the bill before the Senate Finance Committee (H.R. 8444) embodies the Administration's proposed COET and rebate features, but it does not address the crucial issue of crude oil pricing. While we recognize that there is an issue of committee jurisdiction involved here, we believe that this omission is a serious deficiency. Because of the need to integrate the crude pricing and tax elements of the plan, and because of the critical effect of these elements on future domestic oil and gas supply and import levels, oil price and tax policy must be considered concurrently.

Plan's production goals unlikely to be met

The contention that the production goals of the National Energy Plan will not be met is supported by a number of independent studies conducted by various government agencies. For example, an analysis by the OTA³ states that while the incentives for "new" oil production appeared to provide encouragement to explore and develop new fields, it is questionable whether the necessary funds would be available, and that after the first few years returns to producers probably would not keep up with real costs. The report further concludes that OCS leasing and regulatory delays could reduce 1985 oil production by about 1 to 3 million barrels per day oil equivalent from levels projected by the plan.

A report by GAO⁴ supports the conclusion that the proposed system of continued oil and price controls and COET does not provide an overall economic and regulatory environment which is conducive to an expanded exploration effort:

"Also, the plan will reduce revenues to producers for most oil already discovered and may adversely affect oil companies' financial ability to support additional exploration. By not increasing the financial incentives for additional exploration and by reducing companies' financial strength, the plan falls to come to grips with the problem of increasing domestic crude oil production."

This statement reflects the financial requirements which must be met if the Nations' oil and gas supplies are to be increased. First, adequate funds must be available for investment; second, oil and gas activities must offer the prospect of a sufficient return to attract these funds; and, equally important, the pricing and regulatory environment must minimize uncertainty and thus induce investors to commit the funds. These requirements are essential and interrelated but they are not met by the complex system of continued price controls and taxes proposed in the Plan.

The GAO Report concluded that the Plan's gas production goal would fall at least one MMB/D oil equivalent below projected levels. Also it concluded that the Plan would reduce producers' realization on all controlled oil and would probably result in lower production. The report recommended consideration of unspecified alternate pricing systems.

Finally, several studies have observed that the oil and gas production levels projected by the Plan will require levels of oil and gas reserve additions which are sharply higher than those experienced over the past decade, and that such a

³ "Analysis of Proposed National Energy Plan," Office of Technology Assessment, Congress of the United States.

⁴ "An Evaluation of the National Energy Plan," report to Congress by General Accounting Office, July 26, 1977.

level of reserve additions will probably come from larger potential discoveries in the OCS and Alaska. We concur with that conclusion, and would further suggest that these discoveries will not be forthcoming under the pricing incentives included in the Plan, and without the removal of existing and proposed restrictions and delays in OCS leasing and development.

Impact of existing and continued controls

To understand why the very existence of proposals to extend and continue controls is detrimental to both the development of new supplies and to potential investors and lenders, we have only to look at the nature of investments to replace existing reserves and recent experience under controls. Investments in new energy supplies in frontier areas are characterized by:

A high degree of both geologic and technical risk and uncertainty;

High capital costs;

Large front end commitments of capital coupled with long lead times before production and income are realized.

Thus, any added uncertainty imposed by actual or potential price controls is extremely damaging.

The basis for uncertainty which arises from price controls is well justified by industry's experience under existing price control legislation. The two tier pricing concept was first imposed in late 1973 with the objective of providing replacement cost pricing (i.e., world market price) for new oil production, while preventing so-called "windfall profits" on existing or old oil production. Under this system "new" oil prices generally tracked market prices and by January 1976 had risen to about \$13 per barrel. At this time, old oil was controlled at about \$5 per barrel.⁵

In February 1976 EPCA became effective with the express intent of at least protecting upper and lower tier oil prices against inflation (i.e. maintaining constant dollar prices) and bringing U.S. oil prices into line with replacement cost or world market levels by mid-1979. However, the first step in accomplishing this goal was to rollback upper tier oil prices about \$1.50 per barrel to \$11.47.

By June 1976 upper tier prices were allowed to increase to \$11.60 per barrel and lower tier to about \$5.15 per barrel under the provisions of the law. However, in July 1976 both upper and lower tier prices were frozen at June levels to compensate for incorrect FEA estimates of both upper and lower tier crude prices and volumes which were used to establish the "composite price" limit specified in the EPCA legislation. The composite price is the weighted average first sale price of domestic controlled crude oil.

Lower tier prices have been frozen since that time (over one year). However, upper tier prices which apply to all new discoveries have been rolled back twice from the June 1976 freeze level and currently are slightly less than \$11 per barrel. The net result of the Energy Policy and Conservation Act (EPCA) to date is: A lower tier price that is only 3 percent higher than December 1973 levels and an upper tier oil price that is only 11 percent higher. This compares to a 27 to 34 percent increase in the general inflation indicators such as GNP deflator, Consumer Price Index and Wholesale Price Index and compares to a 72 percent increase in petroleum industry inflation as measured by the WPI-Oilfield Machinery and Equipment. (Attachment 3).

Moreover, contrary to the intent of EPCA, United States oil prices have not moved toward world market prices. Upper tier prices are below January 1976 levels. At the same time the spread between the refiner's average cost of imports and the average cost of domestic crude has increased substantially (Attachment 3). The so-called "composite price" ceiling has been the principal factor to creating these problems.

Under EPCA oil prices have been controlled by indexing the lower and upper tier classifications of domestic production to a composite price of \$7.66 per barrel.⁶ This composite price can be adjust administratively for inflation (GNP deflator) and production "incentive" factors at a combined rate of up to 10 percent. Stripper well oil (10 barrels per day) was removed from price controls in August 1976.⁷

⁵ FEA Monthly Energy Review, May 1977.

⁶ Energy Policy and Conservation Act of December 22, 1975, sec. 401(a), 89 Stat. 941.

⁷ Act of August 14, 1976, 90 Stat. 113 (15 U.S.C. 7571).

The \$7.66 per barrel statutory composite price was based on the erroneous assumptions that lower tier (old) oil averaged \$5.25 per barrel and amounted to 60 percent of domestic production and that upper tier (new) production averaged \$11.28 per barrel and amounted to 40 percent of total U.S. production. Actual dollars and amounts were \$5.05 and \$11.48 for lower and upper tier prices and 58 percent and 44 percent (including stripper well oil) of total production, respectively. The actual composite was \$7.87 or 21 cents over the legislative composite.¹

A mandated composite ceiling price ties the hands of the price administrator and destroys the flexibility essential to minimize the economic distortions and inequities inherent in government price controls. The mandated goals of EPCA recognize inflation and provide limited production incentives but these goals have been completely frustrated by the "composite." Indeed, the composite discourages new production, because each new barrel of crude brought into production at prices above the composite requires a reduction in the price of all other controlled crude oil. Similarly, any effort to provide needed price relief to marginal properties tends to force a rollback in prices of all other crude oil. Robbing Peter to pay Paul hardly seems to be the most effective energy policy. Below is an example of how the prices of oil in each of the two tiers can remain constant and yet the composite price increases:

	Amount	Percent	Amount	Percent
Lower tier price.....	\$5.05		\$5.05	
Upper tier price.....	11.47		11.47	
Lower tier volume.....		57		53.5
Upper tier volume.....		43		46.5
Composite price.....	7.81		8.04	

(See Attachment 4 for further information on the operation of the composite.)

Pass-through of the COET

In addition to the fundamental problems with crude oil price controls *per se*, various studies have suggested that all or part of the proposed COET cannot be passed on to consumers in the marketplace. While these theoretical predictions are subject to some question, it is important to recognize that the Administration expects that the domestic oil industry would have to absorb one-third of the proposed crude oil equalization tax.

In testimony before the House Ways and Means Committee on May 17, 1977, Dr. Charles L. Schultze stated:

"A full pass through of the wellhead tax would, in our best judgment, put U.S. refined product prices well above world prices for the same products. World markets will probably exert some pressure on U.S. prices and prevent a full pass through."

In testimony before the House Ad Hoc Energy Committee, Dr. Schultze predicted that only two-thirds of the tax yield could be passed through. That implies that the industry must absorb \$5 billion before taxes, based on Dr. Schlesinger's prediction that the tax would yield approximately \$15 billion. It is my firm belief that the industry could not absorb this \$5 billion and remain in business. To place this in perspective, the \$5 billion tax which the Administration expects the industry to absorb, translates into a reduction in profits of \$2.5 billion, assuming a 50 percent tax rate. In his appearance before the Senate Energy Committee, Dr. Schlesinger estimated that the entire industry's total domestic profits in 1976 were about \$7.5 billion (after income taxes). This would indicate a staggering one-third reduction in profits for a vital domestic industry whose returns have been about equal to the average for all manufacturing (Attachment 1).

As the Committee is aware, the petroleum industry has long advocated market solutions to the Nation's energy problems. Although the ability to pass through fully the cost of price decontrol is not certain, industry is willing to accept the discipline of a free market.

¹ "Monthly Energy Review," p. 68; H. Doc. 96-100, 95th Cong., 1st sess., Energy Action No. 11, p. 62.

IV

A VIABLE ALTERNATIVE

As we have noted and as several independent studies have confirmed, neither the National Energy Plan as originally proposed, nor the bill before you will achieve the National Energy Plan goals of increased domestic oil and gas production or reduced imports. However, there is a workable approach, which requires concurrent consideration of pricing and tax policy, that will be more likely to achieve these goals. Although such an approach requires a joint effort by the Senate Energy and Senate Finance Committees, crude oil pricing and crude oil taxing policies must be considered together.

A key step is to eliminate the composite price formula contained in the EPCA and provide the administrative flexibility essential to the implementation of the goals of EPCA. Such action would permit GNP deflator and other incentives to be applied directly to the different classifications of domestic crude oil. Then controls on domestic crude oil prices should be phased out in the shortest time possible, recognizing that economic impact on the consumer should be minimized.

Many people are concerned over the prospect that replacement cost pricing at the wellhead would unduly inflate producer profits. However, under existing law governments would receive over half of the increased revenue in the form of taxes. Moreover, recent history strongly suggests that the remaining revenue would be channeled into increasing domestic supplies. If these concerns persist, they can be handled more effectively and with far fewer distortions through the enactment of a wellhead excise tax combined with the price control changes outlined above. Such a tax should have the following characteristics:

1. *The tax must be an excise tax imposed at the wellhead on a property-by-property basis and the producer or royalty owner will be the taxpayer.*

Such a tax, coupled with market clearing prices at the wellhead, would recognize that it is the producer who is being taxed on the sale of his property. Further, basing the tax on the increase in revenue to producers from each producing property insures that no producer is placed in a worse position than under existing controls.

2. *The tax would be withheld by the first purchaser from the settlement with the producer and paid over to the Treasury.*

By providing for collection by the first purchaser from the producer, the existing mechanism of first purchaser reports to the FEA could be readily converted to report and pay the tax to the Internal Revenue Service. Use of the "first purchaser" approach retains the advantage found in the Administration's plan of having relatively few reporting units, as contrasted with a system requiring reports by the thousands of owners of producing crude oil interests. Moreover, the collection of wellhead taxes by the first purchaser is a system already familiar to the industry in the form of state severance tax administration.

3. *The tax will be measured by the difference between the total price received by the producer and a reference price computed under an extension of price control rules.*

The tax would be based on the additional proceeds received by producers and royalty owners as a result of moving wellhead prices toward world market levels, regardless of the pace at which such movement takes place. The additional proceeds would be measured by the difference between the wellhead price actually received for a given barrel of crude oil and a tax reference price based on the price that would have been applicable had existing controls been extended. The tax reference price must be escalated to reflect inflation and provide some production incentives.

4. *The tax will apply only to that volume of oil below a declining production base so that we can stem the reduction in domestic crude oil production and increase ultimate recovery from existing properties.*

A major shortcoming of both the Administration's plan and the House-passed bill is a failure to provide any additional incentive to producers to try to increase production from existing properties, particularly those saddled with lower tier prices. Considerable potential exists for stemming the decline in domestic crude oil production and increasing ultimate recovery from existing properties through workovers of existing wells, drilling additional wells in underdeveloped marginal reservoirs, applying various production stimulation techni-

ques, employing conventional secondary recovery systems, or other methods not involving more sophisticated enhanced recovery techniques. While such projects which are economically viable at existing lower tier prices are already underway, there are many more which would become viable at world market prices.

Theoretically, a production incentive could utilize an exemption from tax for all oil production from a property in excess of the "natural" decline curve. However, the most practical and effective way to implement this concept in a tax statute would be to use an approximation of the "average" production decline of properties upon which no additional investment to increase production (or stem decline) is made. Such an average decline of $1\frac{1}{2}$ percent per month was adopted by the Senate Committee on Finance in mid-1975. (Attachment No. 854 to H.R. 7715, July 31, 1975.)

The volume of production eligible for the production incentive exemption would be measured by the excess, if any, of the volume of crude oil actually produced from each property over a specified base volume. For example, the base volume could be the average monthly production volume from each property during the first quarter of 1977, reduced by the $1\frac{1}{2}$ percent monthly decline factor, beginning with April 1977. Such an exemption would provide maximum market stimulus to invest in projects to increase production from existing properties.

5. The tax will not apply to oil:

- (a) Which is exempt from price controls;
- (b) Which is produced from properties on the North Slope;
- (c) Which is produced and sold from a property from which no crude oil was produced or sold during a period of 90 days prior to April 20, 1977;
- (d) Which is used or sold for use in crude oil or natural gas exploration and production; or
- (e) Which is produced by enhanced recovery methods.

As contemplated in the National Energy Plan, stripper production certainly should be free of the tax. Other high cost production such as that from frontier areas also should be exempt from the tax. Without such an exemption production from frontier areas burdened with much higher than average transportation costs, such as the Prudhoe Bay Field in Alaska, might even cease to be economically viable.

Obviously the maximum incentive to search out and develop new petroleum reserves can be achieved through exempting production from all new reservoirs discovered in the future. Any threat of tax on new discoveries inevitably will reduce their number.

The tax should not be imposed in such a manner as to increase the costs of operating properties in which crude oil is used to produce oil and gas. An exemption for oil sold or used in production of oil and gas should be provided.

Enhanced recovery projects (including secondary and tertiary recovery other than conventional pressure maintenance, water flood, and cycling) should also be exempt from the tax to insure maximum recovery from existing fields. While it may be argued that the exemption should cover only the "incremental" production from such enhanced recovery projects over and above what would have been produced under primary methods, the difficulties in determining the increment realistically preclude any such a limitation.

6. The tax will make allowance for:

- (a) Additional state and local taxes resulting from increased prices, and
- (b) The impact of inflation on the tax base.

Existing state severance taxes range from about 5 percent to $12\frac{1}{2}$ percent of the value of crude oil at the wellhead. Property tax valuation of reserves is generally based on anticipated discounted cash flow. To avoid confiscatory effective rates, it is essential that the wellhead tax base be reduced by the additional severance or other taxes incurred on the additional proceeds received by the producer from the phase-in of market prices at the wellhead.

Controlled prices for lower tier oil have not been significantly adjusted since December 1973 despite the fact that costs of materials and equipment used by the petroleum industry have increased 72 percent since that time. Thus a sub-

stantial inflation adjustment to the base prices used in calculation of the tax would appear appropriate.

7. *The tax will be limited in such a manner that it does not preclude operation or development of marginal or high cost projects.*

A net income limitation on the tax designed to include recognition of all acquisition, development and operating costs, would permit the continued operation or future development of many properties which are submarginal under existing controlled prices but which would be operated and developed if the producer were receiving market prices.

V

OTHER TAX ISSUES RAISED BY THE NATIONAL ENERGY PLAN

TREATMENT OF INTANGIBLE DRILLING AND DEVELOPMENT COSTS (IDC) RELATING TO OIL AND GAS WELLS

The House bill contains a provision which would make permanent the temporary provision of the Tax Reduction and Simplification Act of 1977 with respect to the minimum tax on IDC incurred by individuals in drilling oil and gas wells. Under this provision, the minimum tax is levied only on the amount of the "preference" in excess of net income from oil and gas production. The preference is the amount by which the current IDC deduction for a taxable year exceeds the amount which would have been deducted if the IDC had been recovered through cost depletion or amortized over a 10-year period.

The proposed net income limitation on the minimum tax is a step in the right direction but does not go far enough, because of the limitation to income from oil and gas wells. The IDC deduction should be completely unfettered so that it might achieve its full potential in attracting capital for this most important function.

Geothermal tax incentives

Intangible Drilling Cost ("IDC").—The House bill provides for the current deduction of IDC incurred in drilling geothermal wells. This provision does not grant a new incentive, but merely confirms judicial interpretation and previous Congressional pronouncement.

Unfortunately, the bill also imposes on individual taxpayers a 15 percent minimum tax on that portion of the "preference" which exceeds net income from geothermal properties. The preference is measured by the excess of the current IDC deduction for a taxable year over the amount which would have been deducted for that year had the IDC been capitalized and amortized over 10 years.

This provision has merit in that it will end the current dispute between taxpayers and the Internal Revenue Service over the deductibility of IDC associated with geothermal wells; however, the imposition of the minimum tax serves to dilute the incentive intended to encourage the development of geothermal resources. The minimum tax imposes a particular hardship on geothermal producers during the development stage of their geothermal operations. This will discourage new investment in geothermal ventures and make it more difficult for new producers to enter the industry.

Percentage depletion

The House bill provides a percentage depletion allowance of ten percent for geothermal production. While this was apparently intended to be an incentive to increase geothermal production, it actually reduces in two ways the depletion allowance which exists under current law as interpreted by the courts.⁹ First, the allowance for depletion is limited to the taxpayer's basis in the property, a limitation not found in current law. With this limitation, the provision is of no significant benefit to geothermal producers. The second reduction in benefit results from the lower percentage (10 percent) contained in the House bill. Under case law geothermal production is entitled a 22-percent depletion rate.

⁹ *Reich v. Commissioner and Rowan v. Commissioner*, 454 F. 2d 1157, CA-9, 1972.

ATTACHMENT 1

HISTORICAL DATA—PETROLEUM INDUSTRY CAPITAL EXPENDITURES AND FINANCIAL PERFORMANCE

Year:	Capital expenditures	Return on net worth		Dividends as a percentage of net income ²	Debt-equity ratios ³
	(billions per year)	Petroleum	All manufacturing		
1963	\$6.1	11.5	11.6	49	15
1964	6.8	11.5	12.6	52	15
1965	7.0	11.9	13.9	52	16
1966	7.8	12.6	14.2	50	18
1967	8.3	12.8	12.6	50	20
1968	9.1	13.1	13.3	51	24
1969	8.9	11.9	12.4	56	27
1970	8.9	11.0	10.1	58	29
1971	8.0	11.2	10.8	54	20
1972	9.9	10.8	12.1	56	34
1973	11.5	15.6	14.9	35	29
1974	17.6	19.6	15.2	29	28
1975	18.9	13.9	12.6	41	25
1976	17.6	15.1	15.0	40	26

¹ U.S. capital expenditures source: Chase Manhattan.

² Source: Citibank.

³ Source: Chase Manhattan Group of 30. Note debt-equity ratios based on long-term debt only. Other debt forms such as long-term lease arrangements are not included.

ATTACHMENT 2 (REVISED)

YEAREND 1976 CASH AND MARKETABLE SECURITIES COMPARED TO 1976 CAPITAL EXPENDITURES (AAA COMPANIES PLUS IBM)

[Dollar amounts in millions]

	Cash and securities	Capital expenditures	Ratio
General Motors	\$4,625	\$999	4.63
Procter & Gamble	795	275	2.89
IBM	6,156	2,518	2.44
General Electric	1,613	740	2.18
Ford	1,664	1,025	1.62
Minnesota Mining	340	222	1.53
Gulf	1,989	1,362	1.46
Exxon	5,074	4,098	1.24
Standard Oil of California	975	794	1.23
Mobil Oil Corp.	1,280	1,286	1.00
Sears	223	229	.97
Standard Oil (Indiana)	957	1,361	.70
Texaco	763	1,239	.62
Shell	671	1,384	.48
DuPont	268	876	.31
Total	27,393	18,408	1.49
7 oil companies ¹	11,709	11,524	1.02
8 nonoil companies	15,684	6,884	2.28

¹ Oil company ratios somewhat overstated because exploration expenditures are excluded.

ATTACHMENT 3

COMPARISON OF U.S. CRUDE PRICES AND INFLATION INDEXES,¹ 1973-76

	December 1973	June 1977	Percent
U.S. lower tier crude	5.03	5.16	+3
U.S. upper tier crude	9.82	10.92	+11
GNP deflator	109.05	138.19	+27
CPI	138.5	180.6	+30
WPI	145.3	195.2	+34
WPI oilfield machinery and equipment	136.2	234.6	+72

¹ Crude prices in dollars per barrel. Source FEA (June/1977 data preliminary).

² 1st quarter 1977.

³ May 1977.

COMPARISON OF AVERAGE DOMESTIC AND FOREIGN CRUDE REFINER ACQUISITION COSTS

	Domestic (per barrel)	Imported (per barrel)	Difference
January 1976.....	\$9.14	\$13.27	4.13
May 1977.....	9.15	14.61	5.46

Source: FEA, May 1977 data preliminary.

ATTACHMENT 4

PROBLEMS RELATING TO COMPOSITE PRICE LIMITATION UNDER EPCA

A. The composite price is distorting because:

(1) it is based on inaccurate assumptions in 1975 as to prices and volumes of domestic crude oil;

(2) ceiling prices must be arranged so that the mathematical result will be the number prescribed;

(3) the composite price thus becomes the controlling factor which prevents the individual tiers of oil from being priced at the levels intended when EPCA was enacted.¹

B. The composite average is unworkable because the number can rise while lower or upper tier crude oil prices remain constant or even decrease. This occurs because of decreasing volumes of lower tier oil through the natural decline in production from old wells and increasing volumes of upper tier. The shift in volumes decreases the percentage of lower tier oil by approximately 3.5 percent per year. As a result, the composite price rises 3 to 3.6 percent even though both upper and lower tier prices remain constant because the average is weighted by more of the higher priced upper tier oil.² An example of how the two tiers remain constant while the composite price increases is as follows:

	Amount	Percent	Amount	Percent
Lower tier price.....	\$5.05	.....	\$5.05	.....
Upper tier price.....	11.47	.....	11.47	.....
Lower tier volume.....	.....	57	.....	53.5
Upper tier volume.....	.....	43	.....	46.5
Composite price.....	7.81	.....	8.04	.....

Therefore, without any change in either upper or lower tier prices on domestic oil production the composite average has increased 23 cents per barrel.

C. There is a continuous shift of lower to upper tier production which results from several factors, including:

(1) different decline rates for different fields;

(2) implementation of secondary and tertiary efforts;

(3) all new production is at the upper tier price level—or possibly a higher level if a "new-new" classification is ultimately created;

(4) stripper production at a market clearing level can sustain production longer than a lower tier price on a low volume well.

D. The increasing ratio of upper tier oil will continue. At present, lower tier crude oil makes up approximately 44.8 percent of domestic production; by the end of 1977 this will slip to 41.1 percent.³

E. The prices for domestic crude oil have declined in real value since the imposition of price controls. Domestic oil prices compared to landed costs of imported oil indicate a consistent downward trend in terms of percentages for both upper and lower tier oil. Since the composite average requirement was imposed for domestic oil, upper tier producer realizations have decreased in terms of current dollars by nearly \$2 per barrel while lower tier prices have increased approximately 2.3 percent from \$5.02 to \$5.17, but resulting in a net loss in real dollar terms.⁴

¹ S. Conf. Rpt. 95-516, on S. 622, 94th Cong., 1st sess., pp. 187-194.

² Energy Action No. 11, Mar. 14, 1977, Federal Energy Administration, pp. 3, 4.

³ Lower and Upper Tier Crude Oil Price Ceiling, 42 FR 41393. The influx of Alaska North Slope crude oil in upper tier category accounts for sudden shift.

⁴ Monthly Energy Review, p. 68.

STATEMENT OF JOHN R. GREY, PRESIDENT, STANDARD OIL COMPANY OF CALIFORNIA ON BEHALF OF AMERICAN PETROLEUM INSTITUTE, MID-CONTINENT OIL AND GAS ASSOCIATION, ROCKY MOUNTAIN OIL AND GAS ASSOCIATION, WESTERN OIL AND GAS ASSOCIATION

SUMMARY

Use of this Nation's abundant coal is essential for a workable comprehensive energy plan. In recent years, government regulated pricing of oil and natural gas below replacement cost has discouraged the use of coal.

The National Energy Plan now sets goals for higher coal use. However, Congressional studies conclude that economic and environmental constraints on coal production and transportation will not permit us to meet the Administration's goal which requires a supply of 1.2 billion tons of coal in 1985.

Replacement cost pricing of oil and natural gas—whether achieved through market forces or artificially simulated by the Crude Oil Equalization Tax—will provide incentives for conversion wherever feasible. The extent of conversion will be limited by the supplies of coal, not by the financial incentives to convert. The proposed new user tax will not accelerate the conversion of industries and utilities to coal.

Because the user tax cannot accelerate coal conversion, it is an added burden which can only lead to inflation. The user tax will increase the costs of American goods, reduce our ability to compete in world markets, and lead to higher unemployment.

The House of Representatives provided several vital exemptions from the tax which recognize that, in many instances, forced conversion to coal will be infeasible, impractical, and unproductive. However, the House failed to provide sufficient exemptions and failed to take into account time, site, and permit limitations. Further, the tax should be applied only on those combustors having a significant capability for conversion. The tax credit provisions should be liberalized and the definition of qualified property expanded.

The user tax would not accelerate conversion to coal beyond that stimulated by replacement pricing of energy. Further, the tax will cause increased inflation and unemployment. Until the many questions concerning coal production, transportation, and use are resolved, it would unduly burden the American consumer—the ultimate payor—to impose this tax. It would be legislative overkill.

STATEMENT

INTRODUCTION

Coal is one of the Nation's most abundant and under-utilized energy resources. The increased production and use of coal is a requisite for a workable, comprehensive energy plan. To date, though, conversion to coal has been impeded by governmental actions artificially pricing oil and gas below their true replacement cost. Stringent environmental constraints on the production and usage of coal have also inhibited conversion.

To induce conversion to coal and to encourage the conservation of oil and natural gas, the proposed National Energy Act would impose Federal excise taxes on utility and industrial users of oil and natural gas. The House Ad Hoc Committee on Energy estimates that these proposed new user taxes would total more than \$25 billion between 1979 and 1985,¹ reaching a level of more than \$6.6 billion in 1985 alone.

There is strong evidence that U.S. coal producers will not be able to provide sufficient supplies by 1985 to achieve the level of domestic coal consumption envisioned in the National Energy Plan. Several government agencies have independently concluded that the plan sets overly ambitious goals, given the economic and environmental constraints on coal production, transportation and use. Consequently, the proposed excise tax would penalize those American businesses which, through no fault or their own, were unable to convert. Even worse, by siphoning off huge tax revenues, it would take away capital which might otherwise assist conversion.

These considerable tax changes will not accelerate or facilitate the conversion of industries and utilities from oil and gas to coal. Where conversion is feasible, the adjustment of domestic petroleum prices to their replacement values should be an adequate inducement. Where conversion is not feasible, the additional business costs imposed by the proposed excise taxes would be redundant and

¹ National Energy Act, Report of the Ad Hoc Committee on Energy, U.S. House of Representatives, table 4, p. 63.

counterproductive to our economic well-being. Such legislative overkill would put U.S. manufacturers and workers at a competitive disadvantage in world markets and cause more products to be imported rather than produced in this country. The effect of this tax would be rising imports and falling exports, fewer jobs for American workers, and higher prices for products made in the United States.

The user tax provisions of the National Energy Act would impose a senseless burden on the Nation's economy. At a time when inflation is a critical national concern, imposition of these taxes would raise the cost of American output to all consumers by billions of dollars of unnecessary and nonproductive taxes. While it is clearly in the best interests of the Nation to develop America's vast coal resources and to expedite those conversions which are cost effective and feasible, the proposed tax will contribute nothing to that effort. Replacement cost pricing of oil and natural gas, whether achieved through market forces or artificially stimulated by the crude oil equalization tax, would be sufficient alone. The unreasonable concept of penalizing utilities and industries for not converting to coal . . . particularly before it becomes possible for them to do so . . . should be rejected. To adopt the proposed user taxes would constitute legislation overkill.

I

THE TECHNOLOGICAL AND ECONOMIC FEASIBILITY OF LARGE-SCALE COAL CONVERSION

The proposed tax would take effect whether or not the affected utilities and industries would be able to convert. Yet, conversion in a large number of cases would either be technologically impossible or economically unwise. According to independent reports recently published by the Congressional Research Service of the Library of Congress, the General Accounting Office, and the Office of Technology Assessment, several insurmountable barriers stand between the aspirations of the National Energy Act and reality.² The Congressional Research Service has concluded for the following reasons that it would be impossible to achieve sufficient coal production to enable the immediate conversion anticipated by this bill:

1. Lack of adequate capital to finance new coal development;
2. Manpower shortages in the coal industry;
3. Inadequate transportation networks to carry the coal to where it is needed, as well as insufficient capital availability to correct the situation;
4. Environmental protection measures required for coal production and usage—their kinds, timing, severity, availability and capital cost;
5. Delays in gaining access to coal reserves on government properties; and
6. Shortages of mining equipment.

This report estimated that United States coal production would be 940 million tons in 1985, far below the Administration's projected requirements of 1.2 billion.

In its report to Congress, the Office of Technology Assessment found that the most effective delivery systems for coal were large volume barge and rail shipments. "By contrast," this report said, "the market for coal that would be created by industrial users switching from oil and gas consists of a large number of widely dispersed installations, each of which can consume relatively small amounts of coal." Clearly, the system to deliver the coal—be it rail, barge or coal slurry pipeline—does not now exist and will not exist at the time the tax is imposed.

In other words, U.S. coal production will almost surely fall short of the Administration's goals for 1985. But even if more coal is somehow produced, there will be inadequate facilities to transport it to where it is needed. And even then, environmental constraints may prevent its use in most areas. Nonetheless, oil and natural gas users who cannot convert because of these constraints will be taxed.

Under these circumstances the proposed tax does not represent a constructive approach to encouraging coal conversion. In its present form, it is solely a revenue-raising bill rather than a conservation measure. Such a penalty tax would exacerbate inflation without providing relief in the form of lesser dependence upon imported oil.

² "Project Interdependence: U.S. and World Energy Outlook Through 1990," Congressional Research Service, Library of Congress, June 19, 1977. "An Evaluation of the National Energy Plan," Report to the Congress, Comptroller General of the United States, July 25, 1977. "Analysis of the Proposed National Energy Plan," Office of Technology Assessment, Congress of the United States, June 1977.

II

SOME PROBLEMS HAVE BEEN RECOGNIZED

The advocates of this proposal contend that tax credits would offset a major part of the \$25 billion in user taxes to be imposed by this legislation in the next 7 years. But these credits would be available only to those industries and utilities which are able to convert to coal. Due to the obstacles mentioned previously, many industries and utilities would be forced to pay the tax but would be unable to take advantage of the tax credits because of their inability to convert. The program itself then would become an impediment rather than a needed positive step to encourage conversion.

In partial recognition of this problem, the House approved several important exemptions from the tax. Among these are exemptions for feedstocks, for process use, and for those facilities precluded from using coal because of environmental constraints such as Federal or State air quality regulations. This latter exemption is of particular significance but it does not go far enough. For example, the disposal of solid and liquid wastes could pose significant environmental constraints on the use of coal, but a user confronted with these constraints would not be exempt.

All of the exemptions presently in the legislation should be retained because they recognize fundamental problems associated with the tax. Among these exemptions are some which are of particular significance to the petroleum industry:

1. *Oil field and pipeline uses.*—The House exempted from the tax the use of oil and gas in the exploration for, the development, extraction, transmission, and storage of crude oil, natural gas, or natural gas liquids. This exemption recognizes, for example, that it would be impractical and wasteful to haul coal to offshore oil fields in the Gulf of Mexico or to Alaska's North Slope.

Petroleum withdrawn from pipelines is frequently used to power remote pumping stations. Ordinarily, it would take more oil and gas to transport the coal than these facilities would consume.

2. *Process uses.*—The House provided an exemption from the user tax for industrial process uses of oil and natural gas when use of a substitute fuel would materially and adversely affect the manufacturing process or the manufactured goods and where there is no economically and environmentally feasible substitute fuel.

In the petroleum industry, there are no realistic substitute fuels for oil and natural gas used in refinery process heaters. Corrosion poses a serious threat when high temperatures and high pressures are encountered and many metal salts common to coal ash will quickly destroy the highly alloyed materials used in these heaters. Such process heaters are also used extensively in the chemical and fertilizer industries. In addition, many refinery and chemical processes require close prediction and control of heat flow to assure safety and a satisfactory operating period between shutdowns for maintenance. Coal fired petroleum process heaters would not provide this temperature control and could increase the fire hazard because of the residual energy stored in the firebox.

The American Petroleum Institute, on April 18, 1977, submitted a statement to the Federal Energy Administration commenting on proposed amendments to the regulations of the Energy Supply and Environmental Coordination Act of 1974. This statement discussed the difference in capability regarding conversion of steam boilers to coal as contrasted with hydrocarbon process heaters. A copy is incorporated as an attachment to this testimony because this statement reflects the most up-to-date study conducted by the petroleum industry on the overall subject of coal conversion.

3. *Non-marketable gases.*—The bill excludes from the definition of taxable natural gas any substance of a kind which is not generally marketable for use as a fuel. This provision gives recognition to the fact that pipeline and utility systems in many parts of the country are not able to accept gas with a low or variable Btu content or which contains corrosive impurities. Such gas originates from several sources including, for example, refineries and natural gas plants. Since typically this gas cannot be marketed, it is reasonable that it should be utilized within the industry and not subject to the user tax.

OTHER PROBLEMS ASSOCIATED WITH THE TAX

Tax on total use versus large combustor use.—The tax would be imposed on all of the taxable uses of the taxpayer. As proposed, each taxpayer would be allowed a minimum tax exempt usage equal to the Btu content of 50,000 barrels of oil per year. Generally, any use of oil or natural gas in excess of this amount not otherwise exempt would be taxable.

While this approach would tax those large steam boiler plants which could be prime candidates for conversion, it would also require the accounting for and payment of taxes on a multitude of small uses once the exempt threshold is exhausted. This would result in unnecessarily complex and costly tax compliance procedures and cause significant audit problems.

Many corporate taxpayers affected by this bill have a great number of installations, some large and some small. But each of these would have combustors with varying and different degrees of capability for conversion. Any realistic user tax program should recognize this. Many studies have shown that generally the most feasible candidates for conversion are large steam-generating boilers. If, at all, the tax should be applied only on those large steam-generating boilers where conversion is feasible.

Mandated conversion and the tax.—As reported by the House Ways and Means Committee, the bill would have exempted from the tax any user granted an exemption from the mandated use of coal as provided in Title I of the bill. The House of Representatives deleted this sensible provision and, as a result, certain facilities would be subject to the tax even though their inability to convert to coal was recognized in the mandated conversion provisions. Realistically, no significant savings of oil and gas would be achieved by taxing these users.

A classic example of this problem arises with those Hawaiian utility plants which are not subject to the mandatory use of coal. Application of the user tax in this instance would simply raise the price of electricity in Hawaii to every consumer who would pay for this tax in increased utility bills. Recent projections indicate that, by 1983, this tax would add over \$30 million annually to the price of fuel oil paid by the electric utility and ultimately by the consumer.

Fuel users, already faced with the higher costs of oil and natural gas imposed under this legislation, will maximize their efficiency in fuel usage. Imposing an unnecessary and punitive tax on these users aids neither conversion nor conservation. The tax exemption for users who are exempted from mandated conversion should be restored.

Time, site, and permit limitations.—It should be recognized that most conversions will require the replacement of existing fire boxes. The new fire boxes, scrubbers, and auxiliary equipment will require more space than is available in many areas. Further, there would be significantly long down times involved in conversion whenever direct retrofitting is required as contrasted with adjacent construction. A business or utility user wanting to convert cannot commence the conversion program until the necessary permits have been secured from appropriate governmental agencies. There is substantial likelihood that the permit approval process could be prolonged. The legislation does not provide any relief for the user in this situation, rather it would subject him to the tax. These factors should be recognized through appropriate exemptions and extensions of time for application of the tax. The failure to do so would not promote the goal of conversion; instead it would only tax the consuming public.

Capital requirements and proposed tax credits.—The great cost of this tax proposal is a matter of serious concern. In submitting the Plan to Congress, the President estimated that between now and 1985, conversion would require an additional capital investment of more than \$45 billion.⁸

Yet, in many cases, converting to coal will not yield any economic benefit to the industrial or utility user. This penalty tax will not have any significant additional impact on the rate of coal conversion beyond that which could reasonably be expected if energy were priced at its replacement value. The factors mentioned previously—technical, environmental, and economic—will limit the expansion rate of coal demand and coal supply, at least through 1985—whether the user tax is imposed or not. To impose the user tax can only result in increased costs to consumers and higher capital requirements. It is appropriate that this added burden be lessened by tax credits.

⁸ The National Energy Plan, p. 97.

The legislation provides for an additional 10 percent investment tax credit for investments in alternate energy equipment or a dollar-for-dollar credit against the user tax. At best, these credits would only partially compensate the taxpayer for potentially nonproductive conversion investments. Furthermore, the overly restrictive election and carry-over provisions makes these credits less effective than should be in easing the economic burden of conversion.

For example, there is a contradiction in the stated objective of rapid conversion and the failure to make the use tax offset election applicable to qualifying expenditures made after April 20, 1977, and through December 31, 1978. This is a clear disincentive for immediate investment in alternative energy equipment, and encourages taxpayers to delay conversion investment until 1979 or later.

In order to make these provisions more effective, the following modifications should be made:

1. Investments made after April 20, 1977, should carry forward to all succeeding years to offset future use tax liability.

2. There is no logic in the requirement that taxpayer's make a binding election between the offset and the additional ten percent credit. In any event, however, the use tax offset election should only be binding in any taxable year to the extent of use tax liability. If a taxpayer has investments in excess of his use tax liability for a taxable year, he should be able either to carry over this excess to offset future use tax liability or to claim the additional ten percent credit.

3. The qualified investment category should be expanded to all expenditures incident to and necessary for conversion; e.g., all structures, transportation equipment and facilities, and coal liquefaction as well as gasification equipment.

IV

CONCLUSION

The Plan recognizes that a key component of national energy policy must be replacement-cost pricing of energy. Because of our dependence on imported oil, replacement cost today is the cost of foreign oil. Eliminating the artificial price controls on domestic oil and gas would stimulate greater domestic oil and gas exploration and production—the Nation's bridge to the future. Allowing the market to establish domestic oil and gas prices would attract capital.

Replacement cost pricing of oil and natural gas, whether achieved through market forces or artificially stimulated by other provisions of this legislation, should provide sufficient incentive alone for conversion where it is feasible. But it would not force conversion where it is neither feasible nor cost effective.

Since each barrel of oil displaced by coal or domestic oil would be a barrel of foreign oil, our dependence on imports would be reduced. With replacement cost prices providing an economic incentive to stimulate supply, the proposed penalty tax to induce coal conversion would be unnecessary. The inequities that would discriminate among different industries and different areas would be eliminated and there would be none of the unnecessary administrative costs that a user tax would inflict on America's industries and utilities.

There is no need and no reasonable justification for such a tax. It would simply add to the utility bills of consumers and impose unnecessary costs and economic burdens upon industry and ultimately consumers. Until the many questions concerning coal production, coal transportation, the environment and conversion technology, are resolved, it would be totally inequitable to impose this indirect tax on the consumers of America. In this context, the tax could only add to the problems of inflation and unemployment.

The proposed tax on the industrial and utility use of oil and natural gas should be rejected.

ATTACHMENT

AMERICAN PETROLEUM INSTITUTE,
Washington, D.C., April 18, 1977.

EXECUTIVE COMMUNICATIONS,
Federal Energy Administration,
Washington, D.C.

GENTLEMEN: With reference to Federal Register, Vol. 42, No. 54, Monday, March 21, 1977, p. 15320, "Energy Supply and Environmental Coordination Act of 1974," American Petroleum Institute (API) wishes to present comments on the proposed Amendments to ESECA regulations:

These comments are designed to focus our concern on the difference in capability regarding converting steam boilers to coal firing vs. hydrocarbon process heaters. They were prepared by a special API Task Force on Major Fuel Burning Installations.

We would suggest that FEA recognize the current lack of technology and equipment to convert hydrocarbon process heaters to coal firing and institute a process for timely waivers on such major fuel burning installations.

Further, API has started plans to encourage the promotion of technical knowledge of heating hydrocarbons with coal and suggests a regular review of the state of the art by government and industry to determine if the current lack of capability will change.

Appended are two documents:

Appendix I—Comments to Office of Coal Utilization. This document contains a general description of API opinion; a listing of the types of process heaters to which we refer; and a grouping of these heaters into categories of difficulty regarding conversions.

Appendix II—This appendix contains a technical description of the hydrocarbon process heaters listed in Appendix I.

Sincerely,

FRANK N. IKARD.

APPENDIX I

AMERICAN PETROLEUM INSTITUTE COMMENTS TO FEDERAL ENERGY ADMINISTRATION OFFICE OF COAL UTILIZATION

The American Petroleum Institute wishes to submit several recommendations regarding energy conservation and domestic energy supply development, two of the most important elements of a sound energy policy. It is clearly vital to the economic health and security of this country that immediate action be taken to accelerate domestic energy production and to increase energy conservation. To arrest and reverse the increasing dependence on foreign sources for this country's energy needs will require the best efforts, over a sustained period of time, of government and the private sector working cooperatively, constructively and with deliberate speed toward the goal of a reasonable degree of energy self-reliance. The API believes that the role of the government should be to provide workable and practical policy guidelines for accomplishment of domestic resource conservation and development. Private industry's role should be the timely development of U.S. energy resources, within the policy guidelines, operating in a free market environment with price as the incentive for supply and the restraint on demand. Together, government and private industry must speak out and work for sound national energy policies and provide the leadership and education in the energy conservation and energy development effort.

Our society, which has become accustomed to exponential growth in consumption of energy from natural gas and petroleum, has difficulty in coming to terms with the finite nature of these valuable resources. We must therefore redouble our efforts to educate the public, government and industry to conserve these two resources for higher-value uses and begin to utilize more abundant, domestically secure energy sources.

Over the next 10-15 years we must count heavily upon coal as the primary domestic source to augment declining domestic supplies of natural gas and oil. The API supports the basic objective of increased coal utilization which will result both in the conservation of domestic natural gas and petroleum supplies and a reduction of imported petroleum products. Currently, there are efforts within industry and the government to foster the increased use of coal to conserve the dwindling domestic reserves of oil and natural gas. Under current rules and regulations, as defined in ESECA of 1974 and EPCA of 1975, the FEA is authorized to require the utilization of coal as a primary fuel in certain utility and major fuel burning installations (MFBI). As a mechanism to accomplish this, the FEA has recently initiated the MFBI Early Planning Process Identification Reports. These reports, along with previous identification reports, recognize that the utilization of coal in certain industrial combustors requires consideration of the interrelationships of economic, environmental, safety and technological factors. We believe in the need to promote greater use of indigenous coal resources and believe generally that coal utilization will be cost effective in a free market environment, but we do not favor the principle of greater use at any cost. Mandatory utilization of coal must be evaluated on an individual combustor basis considering all of the above factors. Care must be taken to avoid forced conversion to coal in certain industrial processes which, because of safety, process control, and product quality considerations, are best served by noncoal fossil fuels. Careful evaluation of technological factors is a key requirement in considering use of coal in certain categories of combustors. An API task force of combustor users and combustor manufacturers has reviewed existing technology for the direct burning of coal in combustors, other than

boilers, used in refining. This task force, in considering the application of coal-firing technology to existing process heater design concepts, chose to categorize combustor designs by severity of process service. As discussed below, coal-firing is not feasible in certain applications but with the development of technology appears feasible in others. The task force has defined three basic categories of combustors, with stated coal-firing limitations, as follows:

1. Designs of heaters for high temperature process reactions or high pressures and elevated temperatures:

(a) Require that metal pressure parts be at temperatures approaching the coal ash fusion point, implying severe corrosion problems;

(b) Have metal pressure parts operating near the safe high temperature strength limit and require precise control of the heat flux to avoid overheating of these parts; and

(c) Commonly require many small burners in order to adequately control heat flux distribution.

Limited experience is available to identify the magnitude of the corrosion problem. However, studies of the effects of the (much milder) corrosive agents in oil fuels have led to the conclusion that sulfur and many metal salts, common to coal ash, will rapidly destroy the highly alloyed materials used in high temperature and/or pressure heaters. Also detailed knowledge of heat transfer from coal flames, as required to design for and control precise heat flux distributions in refining process combustors is presently lacking. Therefore, we conclude that it is presently, and for other foreseeable future, impractical to design for coal firing in heaters designed for high temperature process reactors or for high pressures and elevated temperatures.

Heater falling in the above class include those for ethylene pyrolysis, steam-hydrocarbon reforming, hydrocracking, and some hydrotreating. They are to be found predominantly in the chemical, petroleum, and fertilizer industries.

2. Designs that process fluids subject to thermal decomposition require close control of the temperature of the fluid adjacent to the heat absorbing surface (known as the fluid film). Overheating of the fluid film will lead to formation of decomposition products and plugging and/or overheating of the tubes. Relatively close prediction and control of heat flux is required in order to obtain satisfactory run length and operational safety. Also, it is necessary to provide for rapid extinction of combustion for the case when thermal decomposition is detected. These factors will likely remove stoker-fired designs from consideration for these services. Since adequate knowledge of heat flux prediction and control is lacking, the application of coal firing to this class of units is presently unfeasible and should be deferred until coal-firing is developed and proven for less severe services. Services susceptible to thermal decomposition include heaters in cokers, visbreakers, thermal crackers, and vacuum flashers in the petroleum refining industry.

3. Designs for general process service are not available for installation today, but are considered as first priority candidates for development of coal-firing designs. Current and traditional designs do not satisfy the fundamental technical requirements for burning coal. In addition, we expect that larger combustion chambers and fewer burners of greater heat release, as compared to current designs, will be required for firing pulverized coal. Vertical upward firing, as currently applied with gas or oil fuels, to give the most even heat distribution in economically-sized fireboxes will not be possible with coal fuel. Maintenance requirements on combustor, fuel, and ash systems may limit heater availability. Experience with coal-fired boilers indicates that stream factors are less than currently considered desirable in process applications.

Existing coal-fired boiler technology and features are deemed directly transferrable to process heater design in the areas of coal handling, ash or slag handling, flue gas conditioning, and maintenance facilities. Improvement of pulverized coal firing control is possibly indicated. Problem areas requiring solution before general application of coal firing to process heaters can be attempted are:

(a) Obtain detailed knowledge of coal flame characteristics and heat transfer from coal flames.

(b) Solve problems of slagging, fouling, and corrosion of high temperature pressure parts and refractory.

(c) Develop techniques for controlling heat flux distribution with coal firing. This includes consideration of fuel distribution, air distribution, and small burner development.

A review of the foregoing indicates that one is unlikely to find any existing process heaters that would be suitable for retrofitting for coal burning. Also, the auxiliary equipment (air preheater, ash collection and handling facilities, fuel facilities) requires much more plot space than is available in most plants. Therefore, we judge that no existing heaters are candidates for modification to burn coal.

Also, we judge that no existing fired heater designs readily lend themselves to revision for coal firing. Since the heater design is a marriage of process side and combustor designs this means that new designs for coal firing will probably have to include additional modifications to handle process considerations. Thus, the design uncertainties will be magnified and care in selecting initial applications is recommended.

While technical feasibility is a primary consideration in the nation's coal-conversion strategy, it is not the only one. Guidelines concerning cost effectiveness, environmental conservation, safety, coal availability, logistics and other important factors must also be provided. A mechanism to assure cost effectiveness should be established. The most straightforward approach would be to establish a priority order based on combustor size. Use of coal in the largest installations will, in general, be the most cost-effective use of available resources while at the same time making the most substantial impact upon conservation of oil and natural gas. Mandating coal-firing for combustors which are not cost effective, which is more likely to be the case in small installations at the threshold MFBI level of 100MM Btu/hour, will create an undue burden on human and capital resources, will be destructive to the small fuel user, and will inhibit real growth of the economy.

If implementation of coal conversion is to be timely, we believe that current environmental regulations, initiatives, and legislative proposals must be re-examined for consistency with the current MFBI regulations. This may require restructuring of existing programs and proposals. Development of coal supplies may involve environmental/energy tradeoffs to assure that coal conversion is implemented in a timely manner.

A coordinated government/industry effort is essential to assure that coal supply and logistics will be coordinated with industry's conversion to coal. Such an effort would necessitate that planning efforts to address minemouth-to-user transportation are consistent with the coal conversion timetable. Current debate between government, rail, barge and pipeline interests must be brought to a successful conclusion quickly if potential coal suppliers and identified coal users are to proceed with coal-conversion implementation.

In summary, the American Petroleum Institute believes that substantial progress can be made in reducing our dependence on foreign energy supplies through development of sound conservation practices and the dedication of human and material resources to the development of indigenous energy supplies. This can best be achieved through cooperative government/industry efforts. The government can and should provide leadership and policy guidelines for accomplishment of conservation and domestic resource development objectives. The private sector, and specifically industry, should have the responsibility, working within the policy guidelines, to achieve the conservation goals and develop the energy resources while operating in a free market environment with price as the incentive for supply and the restraint on demand.

APPENDIX II

REPORT OF SUBCOMMITTEE ON TECHNICAL FEASIBILITY TO THE SUBCOMMITTEE ON COAL CONVERSION/MFBI EARLY PLANNING PROCESS, API ENERGY CONSERVATION TASK FORCE

Subcommittee members present at March 24, 1977 meeting: M. O. Fankhanel, Vice President, Heat Research Corp.; E. C. Grace, Vice President, Born, Inc.; T. F. O'Sullivan, Manager of Engineering, Heat Transfer Div., C-E Lummus; E. A. Barrington, Staff Engineer, Shell Oil Co.

Invited but not attending: M. Kraus, Vice President, Foster Wheeler Energy Corp.

The subcommittee addressed the question of the technical feasibility of converting existing designs for process heaters to direct coal firing applications. Note that this does not imply retrofitting existing heaters although this is

discussed briefly at the end of this report. Also, coal suspensions in an oil carrier stream were not considered as direct firing of coal; only designs utilizing pulverized coal or stokers were included.

A review of feasibility necessarily must view past experience. The participants have no knowledge of coal firing in process heaters but suggest that some knowledge may lie with European operating companies. Current U.S. knowledge of coal firing is limited to boiler operations.

Early boiler designs have some similarity to modern fired process heaters in that both use liquid-filled tubes placed in front of refractory walls. These boilers evolved into designs with the tubes imbedded in the refractory walls in order to improve slag handling.

Considering pulverized coal systems and currently available equipment size ranges we find that pulverizers are available down to 50MM Btu/hr sizes while burning systems are also limited to about 50MM Btu/hr. release. Smaller pulverized coal burners may have been used in the past but we have no knowledge of the success of these applications.

There are certain fundamentals basic to the successful utilization of coal fuels.

1. Ash handling facilities must be provided at the furnace and the flue gas exit.

2. Preheated air is required if coal is fired in a pulverized form.

3. Slag management must be considered in the combustor design.

(a) This might mean design that allows the slag to form on the walls and pool at a removal point, or

(b) The design might be such that the temperatures of refractories and heat absorbing surfaces are below the softening point of the ash. The ash is then handled as a solid.

Note that the quality of the slag or ash is a function of the coal quality and source, and coal combustor designs are often limited in flexibility of fuel selection.

4. Ash "dropout" and removal facilities must be provided in the convection zones.

5. Convection zones must be designed to avoid ash bridging between tubes.

6. Combustion volumes must be large in order to accommodate the slower combustion of coal as compared to gas or most oils. This is most applicable to pulverized coal firing.

7. Since corrosive conditions exist in coal-fired furnaces means to maintain surfaces at low temperatures and/or higher metallurgy are considered essential.

8. Refractories, if used, must be resistant to decomposition by slag attack.

9. Precipitators or other fly ash collection equipment is needed since as much as 90% or more of the ash may discharge with the flue gas.

10. Facilities for control of sulfur and nitrogen oxide emissions are required.

11. Devices to clean the heat absorbing surfaces without interrupting combustor operation are needed. These are usually sootblowers utilizing steam, or sometimes water, as cleaning medium.

12. Ash, and possibly sludge, disposal facilities are needed.

13. For pulverized coal systems firing must be in the horizontal or downward direction so as to allow ash removal from the combustor without interfering with burner operation.

14. An alternate fuel for startup and pilot flame (if used) is needed for pulverized coal applications.

15. A great deal of plot space is required to provide for the combustor, the fuel receiving and storage systems, the fuel handling systems, and the ash collection and removal systems.

In order to consider the application of coal firing to existing process heater design concepts we chose to categorize designs by severity of process service.

1. Designs of heaters for high temperature process reactions or high pressures and elevated temperatures:

(a) Require that metal pressure parts be at temperatures approaching the coal ash fusion point, implying severe corrosion problems;

(b) Have metal pressure parts operating near the safe high temperature strength limit and require precise control of the heat flux to avoid overheating of these parts; and

(c) Commonly require many small burners in order to adequately control heat flux distribution.

Limited experience is available to identify the magnitude of the corrosion problem. However, studies of the effects of the (much milder) corrosive agents in oil fuels have led to the conclusion that sulfur and many metal salts, common

to coal ash, will rapidly destroy the highly alloyed materials used in high temperature and/or pressure heaters. Also, detailed knowledge of heat flux transfer from coal flames, as required to design for and control precise heat flux distributions, is presently lacking. Therefore, we conclude that it is presently, and for the foreseeable future, impractical to design for coal firing in heaters designed for high temperature process reactions or for high pressures.

Heaters falling in the above class include those for ethylene pyrolysis, steam-hydrocarbon reforming, hydrocracking, and some hydrotreating. They are to be found predominantly in the chemical, petroleum, and fertilizer industries.

2. Designs that process fluids subject to thermal decomposition require close control of the temperature of the fluid adjacent to the heat absorbing surface (known as the fluid film). Overheating of the fluid film will lead to formation of decomposition products and plugging and/or overheating of the tubes.

Relatively close prediction and control of heat flux is required in order to obtain satisfactory run length and operational safety. Also, it is necessary to provide for rapid extinction of combustion for the case when thermal decomposition is detected. These factors will likely remove stoker-fired designs from consideration for these services.

Since adequate knowledge of the characteristics of pulverized coal flames to allow relatively precise heat flux prediction and control is lacking, we see the application of coal firing to this class of units as unattractive until proven in less severe services. Services susceptible to thermal decomposition include heaters in cokers, visbreakers, thermal crackers, and vacuum flashers in the petroleum refinery industry.

3. Designs for general process service are considered as first priority candidates for development of coal-firing designs. Current and traditional designs do not satisfy the fundamental technical requirements for burning coal as covered previously. In addition, we expect that larger combustion chambers and fewer burners of greater heat release, as compared to current designs, will be required for firing pulverized coal.

Vertical upward firing, as currently applied with gas or oil fuels, to give the most even heat distribution in economically-sized fireboxes will not be possible with coal fuel. Maintenance requirements on combustor, fuel, and ash systems may limit heater availability. Experience with coal-fired boilers indicates that stream factors are less than currently considered desirable in process applications.

Existing coal-fired boiler technology and features are deemed directly transferable to process heater design in the areas of coal handling, ash or slag handling, flue gas conditioning, and maintenance facilities. Improvement of pulverized coal firing control is possibly indicated. Problem areas requiring solution before general application of coal firing to process heaters can be attempted are (a) Obtain detailed knowledge of coal flame characteristics and heat transfer from coal flames. (b) Solve problems of slagging, fouling, and corrosion of high temperature pressure parts and refractory. (c) Develop techniques for controlling heat flux distribution with coal firing. This includes consideration of fuel distribution, air distribution, and small burner development.

A cursory review of the foregoing indicates that one is unlikely to find any existing process heaters that would be suitable for retrofitting for coal burning. Also, the auxiliary equipment (air preheater, ash collection and handling facilities, fuel facilities) requires much more plot space than is available in most plants. Therefore, we judge that no existing heaters are candidates for modification to burn coal.

Also, we judge that no existing fired heater designs readily lend themselves to revision for coal firing. Since the heater design is a marriage of process side and combustor designs this means that new designs for coal firing will probably have to include additional modifications to handle process considerations. Thus, the design uncertainties will be magnified and care in selecting initial applications is recommended.

Senator BYRD. There will be a slight change, because Senator Benton has to go to the floor of the Senate on an important matter. The next panel will consist of Mr. John Mason, senior vice president and general counsel, El Paso Products Co., accompanied by Mr. Ed Sward, manager, long-range planning, El Paso Products Co.; and also, Mr. Arthur C. Kreutzer, executive vice president and general counsel, National LP-Gas Association.

The panel will have 15 minutes.

STATEMENT OF ARTHUR C. KREUTZER, EXECUTIVE VICE PRESIDENT AND GENERAL COUNSEL, NATIONAL LP-GAS ASSOCIATION

Mr. KREUTZER. Mr. Chairman and members of the committee, I would first request that my remarks be fully incorporated in the record including the written statement that was earlier submitted to the committee. To briefly explain, my presentation will relate to the natural gas liquids problem as it holds down through the distribution channel to the distribution and retail level. And Mr. Mason will be dealing with the problems so far as petrochemical use is concerned.

I am Arthur C. Kreutzer, executive vice president and general counsel of the National LP-Gas Association. This statement that I am making presents the posture of the National LP-Gas Association, representing over 5,400 members, including 43 affiliated States. I have already been asked that my statement be incorporated in the record.

The members that I represent supply LP gas, predominantly propane, a natural gas liquid, an NGL, to over 13 million installations throughout the United States. These installations include approximately 10 million residences and farms.

The economic impact of the tax aspects of the bill will affect these millions of users, as well as thousands of dealers.

Let me first express our recommendations and then explain the rationale for these recommendations.

We recommend that the existing exclusion of NGL's from taxation, when used for residential, farm and as a feedstock in the production of NGL's, as contained in H.R. 8444, at a minimum, be retained.

We further recommend that this exclusion be further extended to cover all uses of NGL's.

We consider that these actions are justified. First, there is little contribution to conservation, particularly as related to propane when substantial conservation now exists. Since 1973, stimulated by increased costs and a conservation campaign carried on by LP gas dealers, the demand has been reduced by 10 percent, except for a temporary rise during the last winter's conditions.

We believe the possible has been largely achieved, and taxation will not provide further stimulation.

Second, no stimulus to exploration and development, an increased domestic supply, particularly of short supply propane, is provided by the method of taxation.

Propane domestic supply is forecast to decline at a 2.5 to 3 percent annual rate. We need an incentive to add production to meet a demand shortfall that is now only being met by overseas import.

Third, duplicate taxation will arise through the crude oil equalization tax, including the related NGL tax applied at supplier source, when coupled with a business use tax on the same products.

While only a small amount of propane gets into business use, less than 10 percent, duplication in taxation can be created. The amount of

tax is not significant. The tax because of the complex source and distribution presents an unproductive costly exercise for both Government and taxpayer. A complex system is involved in the production-distribution of natural gas liquids, particularly propane, with an equally complex propane market, which would require a very complex system of taxation that is not justified by the objectives that are of doubtful value in the legislation.

The administration of this tax would be extremely costly. Seventy percent of propane comes from natural gas processing plants, of which there are several hundred. Thirty percent comes from refinery sources. A tax at the point of first sale, as originally proposed, could create a tax imposition at anywhere from the hundreds of natural gas processing plants down to the ultimate retailer and vendor, numbering in the thousands. In some instances, a firm may be the first purchaser as well as the first seller of portions of the product.

A brief look at the point of ultimate sale and use in the energy and fuel marketing of propane will further amplify this complex market.

Propane is marketed by some 6,000 retailers, having bulk facilities, whose primary occupation is propane sale for residential and agricultural use, with a small fraction—less than 10 percent—going into commercial and industrial use. However, in addition to these propane dealers, there are thousands of other retailers, such as hardware stores, paint stores, department stores, who sell a small amount of propane, small quantities for a variety of uses.

The propane dealer's supply may come from either source, natural gas processing plants, or refinery, without identification.

Fifth, consumer cost of NGL's has doubly escalated with both taxation and increased ceilings on natural gas. Seventy percent of propane is secured in natural gas processing. However, we consider that the latter, to contribute significantly to increased NGL supply. It is strongly endorsed and a greater measure of natural gas deregulation urged.

Sixth, taxation and other costs that ultimately reach the consumer, will unnecessarily penalize rural and low income groups of propane users. Approximately two-thirds of the propane is used in residences and on farms. A substantial portion of this use is in areas of the country where lower income groups are concentrated. Retirement areas are particularly heavy users.

Our statement presents somewhat of a complex picture. A simple recital of background is not possible when related to the complex tax mechanism proposed and the equally complex nature of natural gas liquid production, distribution and ultimate use. Compounding this greater complexity, with the former will create an administrative nightmare without purpose.

As the National Energy Act was initially introduced, taxation of natural gas liquids per se was not included. This tax was later injected as an afterthought.

We suggest that the effective contribution and the complexity are not fully understood. For the reasons that we mentioned, we urge the taxation of natural gas liquids be eliminated, or, at a minimum, the provisions of H.R. 8444 in the same section, exempting certain uses of natural gas liquids from taxation be retained.

Thank you, gentlemen.

The CHAIRMAN. Thank you very much, sir.

Senator Bentsen?

Senator BENTSEN. I have no questions.

The CHAIRMAN. Senator Dole?

Senator DOLE. I will wait until the panel finishes.

[The prepared statement of John Mason follows:]

STATEMENT OF JOHN MASON, SENIOR VICE PRESIDENT AND GENERAL COUNSEL, EL PASO PRODUCTS CO., ACCOMPANIED BY ED SWARD, MANAGER, LONG RANGE PLANNING, EL PASO PRODUCTS CO.

Mr. MASON. Mr. Chairman, members of the committee, I am John Mason, senior vice president of El Paso Products Co. from Odessa, Tex. El Paso Products is a relatively small petrochemical producer that uses natural gas liquids such as butane and propane as raw materials or feedstocks to produce basic petrochemical compounds.

Two provisions of the energy bill particularly concern El Paso Products Co.: the equalization tax and the tax on business use of oil and gas.

The Ways and Means Committee extended the crude oil equalization tax to natural gas liquids subject to price controls. This action was not a part of the administration's tax proposals, and so was not commented on in the public hearings.

These natural gas liquids, commonly referred to as NGL's, constitute a small part of U.S. energy needs. They are used for residential and commercial heating, agricultural uses, gasoline blending and refining, and petrochemical production.

We believe the equalization tax should not be applied to NGL's. The proposed tax on natural gas liquids contributes little, if anything, to U.S. energy policy. It would have adverse employment, production, trade and inflationary impacts. There is little or no conservation potential in the case of NGL's.

About 70 percent of domestic NGLs are produced in the process of drying natural gas, primarily to render the gas suitable for transmission through pipelines. The remaining domestic NGL's are produced as a byproduct of crude oil refining, with production dependent on overall crude oil throughput.

Since NGL's are a byproduct, an equalization tax increasing the price of NGL's would do little or nothing to contribute to their conservation—the production and consumption rates of NGL's are determined primarily by factors other than price.

Imposition of the NGL tax will also not contribute to a rational pricing policy. The tax assumes that the NGL market is the same as the crude oil market, when in fact it is quite different.

NGL supplies rise and fall with natural gas production and the liquids have to be kept in rather costly pressurized storage facilities.

Uncontrolled prices of NGL's fluctuate considerably, depending on seasonal production and demand, storage capacity, and other factors.

The proposed tax would create an artificial price structure that disregards the natural functions operating in the NGL market.

These problems are particularly acute for the El Paso Products Co. The Products Co. is the only U.S. company producing butadiene solely

from butane. If the NGL tax is enacted, it will more than double the price of our butane feedstock, resulting in increased costs which Products Co. anticipates it will have to absorb.

As a consequence, we will be forced to close our Odessa, Tex. butadiene plant.

The equalization tax would also put in serious jeopardy continued operation of our other petrochemical facilities. The proposed tax would more than double the price of the propane feedstock needed for our olefins plant, and would be more than the pretax profits of that plant.

It would perhaps be useful to comment briefly on the competitive aspects of the petrochemical industry, using ethylene, a basic chemical building block. This will make it clear that exempting NGL's from the NGL tax will not of itself place petrochemical producers using crude based feedstocks at a competitive disadvantage.

U.S. ethylene producers generally fall into two categories: refiner affiliated producers, which rely almost wholly on crude oil based feedstocks, and non-refiner affiliated producers, which primarily use NGL feedstocks.

Refiner affiliated producers, unlike other petrochemical producers, can generate in their own refineries feedstocks for their petrochemical plants. These plants produce a broad spectrum of petrochemicals and byproducts, some of which can be profitably recycled in affiliated refinery operations.

Price differences and feedstock costs have not been uncommon, but generally are offset by economies of scale, technology employed, feedstock availability and mix, location, coproduct and byproduct sales prices, and many other factors.

An equalization tax would be imposed directly on the use of NGL's

The crude oil equalization tax, however, would be imposed on the barrel of crude oil. The crude oil tax would first be allocated to the refiner, who would decide how much tax could be passed on to such primary refinery products as gasoline, diesel, jet fuels, and home and industrial heating oils.

Thereafter, the refiner affiliated producer can allocate his costs over his entire spectrum of products. Many factors thus must be considered in comparing petrochemical producers using crude-oil based feedstocks and those using NGL feedstock.

The competitive impact of the equalization tax on producers using crude-oil based feedstocks, is most uncertain.

On the other hand, application of the proposed NGL tax would directly increase the raw material cost of the producers using NGL feedstocks.

The NGL tax would put one producer, El Paso Products Co., out of the butadiene business and would seriously jeopardize its other petrochemical operations.

I have already summarized the reasons why the proposed NGL tax would not contribute to the Nation's energy goals, but instead would adversely affect the economy. Under these circumstances, to impose a tax on NGL's simply because crude oil is taxed would be unconscionable. It would, indeed, be ironic to force one producer out of business in the name of competition by imposing an energy tax which does not further the Nation's energy goals.

It has been suggested that both NGL and crude-based petrochemical feedstocks be exempted from the equalization tax. We would have no objection if the committee were to adopt that suggestion.

With respect to the business use tax, in the interest of conserving time, I refer you to my prepared statement, in which El Paso Products Co. recommends that adoption of the tax be deferred pending a joint congressional-administration study which will permit development of a more coherent statutory pattern for conversion to coal, based upon a comprehensive analysis of the economic consequences of the specific programs recommended.

Mr. Chairman, this concludes my statement. Thank you.

The CHAIRMAN. Senator Bentsen?

Senator BENTSEN. Thank you, Mr. Chairman.

Mr. Chairman, this is an example of an afterthought by the House. The equalization tax on natural gas liquids was not proposed in the administration bill. It does not achieve the energy objectives that the administration is seeking.

The tax, as proposed by the House, is an exceedingly complex one. The committee staff now is trying to find out if it would really net us any money into the Treasury, and we have a serious question that it will. It is an administrative nightmare. It is based on a particular liquid by a particular vendor at a particular date.

I think that Mr. Mason has made some very good points. The petrochemical industry has a \$4.1 billion export surplus. We are facing this year possibly a deficit in trade of over \$20 billion. It does not make any sense to talk about imposing this kind of a tax on natural gas liquids, and I really think that it should be eliminated. The administration did not propose that it be a part of this particular bill.

It does not accomplish the objective.

The CHAIRMAN. Senator Dole.

Senator DOLE. How much is the propane price below distillate now, or is it?

Mr. KREUTZER. As far as the regional pricing is concerned, the relationship is to regional pricing, wholesale regional price, as far as the amount of tax.

The difference is not too great at the present time, but with the tax flow from the crude oil equalization tax into the wholesale No. 2 distillate tax, there could be a difference. The gap, in other words, is not now too great.

Senator DOLE. We presently import liquid petroleum products, do we not?

Mr. KREUTZER. Yes, sir. We are required to import them because of the fact that we have a shortfall domestically of about 2.5 to 3 percent a year, as I mentioned. We have to rely on overseas, in part, to fill the gap.

That requirement is going to increase unless we have some relief in increased domestic supply through greater exploration.

Senator DOLE. How will the measure help us decrease our demand for foreign oil products?

Do you see any impacts? Is it going to have any impact? Will it increase our demand?

Mr. KREUTZER. Foreign oil? At the present time, there is no particular relief in sight. The bill certainly will not do it.

Mr. MASON. I cannot see that it decreases our demand for that crude oil either, sir.

Senator DOLE. That is a problem some of us have. We all know there is a problem. One is growing dependence on foreign oil. Secondly, if there is no incentive in the bill that we can find, or not sufficient incentive for more production. You are all affected by what the bill does and does not address.

Mr. MASON. May I add, sir, the foreign crude that is imported is not for the purpose of supplying the LPG's. I think it comes as a by-product of that. It is our other petroleum needs that would dictate the amount of foreign crude that is imported, not the LPG.

Mr. KREUTZER. That is true. There is direct import of propane per se, though.

To answer your question, about the only real relief as far as propane is concerned, when you relate it to the fact that 70 percent comes out of natural gas processing plants, it is a greater measure of deregulation for natural gas to increase and enhance the ability to produce greater amounts of natural gas.

Senator DOLE. Deregulation is the only way I know to decrease the demand for foreign product.

Mr. KREUTZER. That is true.

Senator DOLE. I do not know how we are going to do it any other way.

Do you think there is sufficient incentives in the administration's proposal to do this?

Mr. KREUTZER. We doubt it. We doubt it because, as far as propane is concerned, a considerable amount of propane flows into the market from intrastate product. There is not going to be any significant change there.

Mr. MASON. I think the majority of the LPG production today, as Mr. Kreutzer pointed out, is from natural gas processing plants. And the majority of that is from plants that already are delivering their natural gas into the interstate system under old contracts.

Therefore, a change in the prices for new natural gas probably will not increase the supply of the liquids. I cannot say that it would.

Senator DOLE. What is the average cost per gallon of your supplies of NGL's?

Mr. MASON. For El Paso, in our company it is in the neighborhood of 11 or 12 cents a gallon. That is because our purchases are primarily from natural gas processing plants. We are buying material from some other plants. Where refiners have produced NGL's both from crude oil refineries and natural gas processing plants, they are able to average their prices. Such purchases constitute approximately 30 percent or so of our feedstocks, and are in the neighborhood of 25 to 30 cents a gallon; 70 percent is purchased from the natural gas processing plants that are not associated with refiners and thus are unable to average their prices higher.

Senator DOLE. Has there been any analysis by the administration that you know of to determine how much this tax would reduce demand for LPG?

Mr. KREUTZER. I have not seen any, Senator Dole.

Senator DOLE. Do you have any projection on the revenue?

Mr. KREUTZER. Any projection on the revenue would be extremely difficult. The administration has a projection of a little over \$200 million.

I recall, of course, in the process of passage in the House, not specifically related to NGL's or propane, there was a cost estimate of 3 to 4.5 cents a gallon.

Senator DOLE. How much is it going to cost to save a barrel of oil? I do not know. There are no studies; maybe they are not available.

Mr. MASON. I have not seen any numbers on that, sir.

Senator DOLE. That is all I have, Mr. Chairman.

The CHAIRMAN. Thank you very much, gentlemen.

Mr. MASON. Thank you very much, sir.

[The prepared statements of the preceding panel follow. Oral testimony continues on p. 814.]

STATEMENT OF ARTHUR C. KREUTZER, EXECUTIVE VICE PRESIDENT AND GENERAL COUNSEL, NATIONAL LP-GAS ASSOCIATION (NLPGA)

SUMMARY

This statement presents the posture of NLPGA, the national trade association, representing over 5,400 members including 43 affiliated states, whose members supply LP-Gas, predominately propane, a natural gas liquid (NGL) to over 13 million installations throughout the U.S. These installations include approximately 10 million residences and farms.

We recommend:

1. That the existing exclusion of NGLs from taxation, when used for residential, farm and feedstock and the protection of NGL's purposes, as contained in H.R. 8444 at a minimum be retained.

2. That this exclusion be further extended to cover all use of NGLs.

3. That complete elimination of the crude oil equalization tax including its extension to NGLs be considered.

We consider these actions justified in that:

1. There is little contribution to conservation particularly as related to propane when substantial conservation now exists.

2. No stimulus to exploration and development, and increased domestic supply, particularly of short supply propane is provided by the method of taxation.

3. Duplicate taxation arises through the crude oil equalization tax including the related NGL tax applied at supplier source, when coupled with a business use tax on the same products.

4. Tax handling involving NGLs, because of complex source and distribution, presents an unproductive costly exercise for both government and taxpayer.

5. Consumer cost of NGLs is doubly escalated with both taxation and increased ceilings on natural gas. 70 percent of propane is secured in natural gas processing. However, we consider the latter to contribute significantly to increased NGL supply. It is strongly endorsed and a greater measure of natural gas deregulation urged.

6 Taxation and other costs that ultimately reach the consumer will unnecessarily penalize rural and low income groups of propane users.

STATEMENT

INTERESTED PARTY AND PRODUCT

The National LP-Gas Association is a national trade association, having as members the producers of liquefied petroleum gas, the manufacturers of equipment and appliances using liquefied petroleum gas, and the distributors and dealers. LP-gas is the common name used for our product. The Association has over 5,400 member companies and 43 affiliated states. The membership represents over 90 percent of the industry's volume of business. Its membership is predominately at the distributor and dealer level. The Association's position as set out in this statement would also reflect the posture of the remaining industry companies.

The economic impact of the tax aspects of the National Energy Act will affect millions of users, to the degree indicated herein, as well as thousands of

the distributors and dealers who sell LP-gas at retail. The employment and well-being of over 75,000 employees is involved in the LP-gas dealer's business and the problem presented. The manufacturers of, and dealers in equipment utilizing LP-gas are also adversely affected.

Liquefied petroleum gas (LP-gas) is a natural gas liquid composed of propane, butane, propylene, butylene, and their mixtures. Propane is the principal LP-gas product involved. It is an energy source, or fuel, that has multiple uses, primarily on the farm, and in small town or rural areas. It serves over 13 million installations in the United States. Of this number approximately 10 million are residential or agricultural. These users include many retired and low income groups. In this statement we are equally protective of their interests.

THE TAX IMPACT OF THE NATIONAL ENERGY ACT

For an understanding of the taxation impact of the National Energy Act on "covered" natural gas liquids, and in particular propane, we first point out that natural gas liquids are obtained both from refinery sources and at natural gas processing plants. While H.R. 8444 in its introductory form, only presented a crude oil equalization tax, comparable taxation on covered natural gas liquids was later proposed. However, in the course of consideration by House Committees, residential, (including schools, hospitals and churches) farm, and feed-stock and the protection of NGL's use were excluded from taxation of covered natural gas liquids. This includes both covered natural gas liquids derived from natural gas processing plants and crude oil refinery source. Under these existing H.R. 8444 provisions, covered natural gas liquids are now taxed for industrial, commercial, utility and similar use at the ultimate vendor level. This would involve the several thousand LP-gas dealers. In addition under the industrial use tax, such user would face taxation under this Part IV of H.R. 8444. This can result in duplicate taxation of this use.

In the case of the covered natural gas liquids derived from crude oil refinery source, the crude oil equalization tax would initially apply, but the refiner is entitled to rebate on the volume of these natural gas liquids produced, as we interpret H.R. 8444.

NEITHER CONSERVATION NOR SUPPLY WILL BE STIMULATED

Natural gas liquids are the by-product of the production of natural gas and the refining of crude oil. Approximately 65 percent of all natural gas liquids are removed from natural gas at natural gas processing plants. The remaining 35 percent of natural gas liquids are produced as a result of refining crude oil.

To deal more specifically with propane, approximately 70 percent of propane is derived from natural gas extraction and 30 percent from refinery production.

While the National Energy Act may not present a disincentive to domestic propane production, it does not supply the needed incentive, for vitally needed added domestic supply, in the fact of declining production. Propane production peaked in 1972 at 601 MB/D and has declined since that time to 521 MB/D in 1976, a decline rate of 3.5 percent. This decline is forecast to continue at a 4 percent decline rate. Refinery production has increased slightly and this increase is expected to continue. However, a net annual decline in availability of domestic propane of 2½ to 3 percent is forecast. U.S. Bureau of Mines data demonstrates this supply shrinkage. FEA studies contain similar data. The restrictions in the definitions of "new oil" and "new gas" are not considered to present an incentive to development of added propane supply.

The purported incentives for natural gas that are directed at placing intrastate natural gas into the interstate gas stream will do little to increase propane supply, except to the limited degree that "new gas" above and beyond the existing rate will be produced. Propane is now being extracted from intrastate natural gas and no bonus increase appears probable. "New gas" incentives already exist to a degree in propane gas plant price and may appear in an FEA regulatory revision now in preparation. If the Energy Act results in a disincentive to natural gas production, as has been presented by others who are more expert in that area, it will contain a comparable disincentive to propane gas plant extraction. There appears to be no incentive for natural gas in that existing prices approach the level contemplated in Administration proposal. To enhance supply, we urge a greater measure of natural gas deregulation.

Conservation while praiseworthy does not produce new product. Conservation has been practiced in propane usage since 1973 stimulated by increased cost. This has been demonstrated in declining sales since 1973 as shown in U.S. Bureau of Mines statistics, wherein sales of propane declined as follows :

	<i>Thousands of gallons</i>
1972-----	13, 847, 948
1973-----	13, 494, 198
1974-----	13, 158, 599
1975-----	12, 371, 980

These figures include a new factor in use by utilities and as SNG feedstock. After excluding this factor, it is estimated that conservation measures reduced demand in the historical market by over 10% since 1973, except for some upward movement in the winter of 1976-77 due to the unusual weather conditions. We do believe that the conservation possible in the historical markets have largely been achieved and taxation will not further stimulate conservation.

Propane has major usage in residential and agricultural installations. These consumers are largely at lower income levels, in rural areas, and in many residential use instances, people in retirement. Propane cost has already induced conservation as earlier shown. Added taxation will only serve to penalize these consumers.

H.R. 8444, as passed by the House, moves toward solution of unnecessary taxation faced by the propane user. We fully support the elimination of taxation on residential, farm and feedstock and the protection of NGL's use as fully justified in removing a complex and costly tax that accomplishes neither conservation nor stimulation of needed supply. To act otherwise would impose this tax on many consumers in lower income levels for redistribution to less needy. Parenthetically, we suggest that a form of rebate, as considered in original text or consideration of the bill, is a very complex and costly approach that would only serve to create unnecessary administrative cost and add to bureaucracy. This is particularly true when related to the complex source and distribution of propane.

The burden imposed on the vendor is unrealistic, costly, and essentially impossible of performance when the millions of transactions involved, and the small business nature and corresponding abilities of the propane vendor are considered. Rather than consideration of rebate in solution, we urge adoption of other recommendations contained herein, that will eliminate need for this procedure.

We further recommend that in the consideration of natural gas liquids the exclusion from tax be extended to all covered natural gas liquid use in that the contribution to conservation and increased supply would be minimal as is the tax revenue involved. Other than propane, the covered natural gas liquids are butane and natural gasoline. Butane and natural gasoline have been under consideration for deregulation by FEA for some time, and the possibility of such deregulation is indicated in recent FEA regulatory proposals. Butane, other than in petrochemical use, and natural gasoline have predominant use in gasoline now proposed for decontrol. Gasoline is being severely taxed in other tax measures, and taxation under H.R. 8444 in this regard poses duplication in taxation.

THE COMPLEXITY OF AN UNPRODUCTIVE TAX

Taxation of natural gas liquids involves a very complex mechanism in distribution of natural gas liquids, and particularly of propane, with an equally complex propane market. It would require a complex system of taxation that is not justified by objectives that are of doubtful value. The administration of this tax would be extremely costly. The complexity of natural gas liquids production and propane source has been briefly mentioned herein. A tax at point of first sale could create a tax imposition site anywhere from the hundreds of natural gas processing plants, down to the ultimate retailer vendor, numbered in thousands.

In some instances a firm may be the first purchaser as well as the first seller for portions of product. A brief look at the point of ultimate sale, and use, in the energy and fuel marketing of propane will further amplify this complex market. Propane is marketed by some 6000 retailers, by having bulk plant facilities whose primary occupation is propane sale for residential and agricultural use, with a small fraction, less than 10%, going into commercial and industrial use. However, in addition to these propane dealers, there are thousands of other retailers, such

as hardware stores, paint stores, department stores, trailer parks, who sell a small amount of propane in small quantities for a variety of uses. Conservation in this latter distribution and use would be meaningless. The tax is unnecessary and unfair. Administration would be nonproductive, except in the creation of governmental cost and bureaucracy.

It would appear appropriate to simplify tax handling and remove meaningless taxation to exclude all natural gas liquids.

Insofar as propane is concerned, and assuming the House adopted exclusions are continued, the remaining covered natural gas liquid use subjected to taxation would be commercial, industrial and utility use of propane. The commercial and industrial use is not consequential in volume. It represents less than ten percent, according to most recent Bureau of Mines statistics, and the tax involved would be minimal. Administration cost would reduce net tax revenue substantially. The retailer, who would be required to collect this tax, is now burdened with a mass of governmental paperwork, and an added burden of little consequence should not be imposed. Again, taxing industrial and commercial use of the covered natural gas liquids will unnecessarily disrupt customary distribution and accounting patterns. We therefore recommend that covered natural gas liquids be completely excluded from taxation under H.R. 8444, including both natural gas liquids derived from gas processing and crude oil refining.

In briefly expressing our reaction to the crude oil equalization tax, it is our opinion that the method of taxation contributes little to conservation, and nothing to increasing supplies of petroleum products, particularly natural gas liquids. We understand that a plowback of tax proceeds may be viewed as a method of employing tax proceeds in increasing supply. It is our opinion that a much more effective use of the monies involved would be through elimination of the middleman tax collector and his administrative costs, and stimulation of new development and production through effectively monitored price adjustments coupled with any necessary prevention of undue profit.

H.R. 8444, as proposed also presents the possibility of duplicate taxation through the Crude Oil Equalization Tax, and the business use tax of Part IV. While this tax, with its rebate provisions, is directed at promoting conversions to energy sources other than natural gas and petroleum products, including natural gas liquids, taxation has earlier been imposed on petroleum products under other sections of the bill. Natural gas is not subjected to taxation other than in Part IV. This tax handling results in duplication of taxation on petroleum products, and possible discrimination in the treatment accorded natural gas serving the same markets.

CONCLUSION

In the foregoing statement we have attempted to briefly depict the ineffectiveness of the tax aspects of H.R. 8444 in either accomplishing the conservation objectives of the National Energy Plan or in providing needed stimulus for increasing supplies of energy, and more specifically as related to natural gas liquids. The statement presents a complex picture. A simpler recital of background is not possible when related to the complex tax mechanism proposed, and the equally complex nature of natural gas liquid production, distribution and ultimate use. Compounding the latter complexity with the former will create an administrative nightmare without purpose.

As the National Energy Act was initially introduced, taxation of natural gas liquids, per se, was not included. This tax was later injected as an afterthought. We suggest that effective contribution, and complexity were not fully understood. For the reasons herein expressed we urge that the Title II of H.R. 8444, Chapter 45, Subchapter A, Sec. 4088 taxation of natural gas liquids be deleted, or at a minimum the provisions of H.R. 8444 in this same section, exempting certain uses of natural gas liquids from taxation, be retained.

STATEMENT OF EL PASO PRODUCTS COMPANY

SUMMARY

I. Crude Oil Equalization Tax (pp. 2-15)

The House Ways and Means Committee extended the crude oil equalization tax to natural gas liquids (NGLs) subject to price controls, including those used for petrochemical feedstocks. This action, not part of the Administration's tax proposals (and, therefore, not commented on in the public hearings), would have extremely serious consequences not foreseen by that Committee.

The Ways and Means Committee action would almost certainly put one producer (El Paso Products Company), which supplies butadiene to several major synthetic rubber manufacturers, completely out of that business by more than doubling the price of its butane feedstock, forcing Products Company to close its Odessa, Texas butadiene plant. The proposed equalization tax would also apply to other NGLs (in addition to butane) used by Products Company and would jeopardize continued operation of Products Company's other petrochemical facilities.

The crude oil equalization tax should not apply to NGLs. Imposition of the tax on NGLs, which constitute only a small part of U.S. energy needs, would not serve to accomplish any of the Administration's energy goals. There is no conservation potential and the tax would produce irrational pricing policies which would distort the market. Furthermore, application of the tax to NGLs, such as those used for petrochemical feedstocks, would be inflationary, would adversely affect the U.S. balance of payments position, would result in closing some facilities and reducing production in others, and would necessarily create unemployment.

II. Tax on Business Use of Oil and Gas (pp. 15-22)

El Paso Products Company questions the advisability of adopting a tax on the business use of oil and gas at this time. The business use tax is a complex and far-reaching penalty tax which is intended to force conversion to alternative sources of energy. In light of present FEA policies and the increased costs of oil and gas which will result from the other provisions of this bill, it is not clear that the imposition of another penalty tax to force conversion is desirable. Nor are the economic or social consequences of imposing such a tax clear. El Paso Products Company recommends that adoption of the proposed business use tax be deferred pending a joint Congressional-Administration study. If a tax similar to the proposed tax were adopted following the study, certain amendments to the credit provisions should be considered.

III. Recommendations (Amendments, pp. 22-23)

1. NGL's should be exempt from the crude oil equalization tax.
2. The proposed tax on business use of oil and natural gas should not be adopted pending further study by the Joint Committee on Taxation in consultation with the Treasury and the Department of Energy. (If a tax similar to the proposed tax were adopted following the study, certain amendments to the credit provisions should be considered.)

STATEMENT

I. CRUDE OIL EQUALIZATION TAX SHOULD NOT APPLY TO NATURAL GAS LIQUIDS

The House Ways and Means Committee extended the crude oil equalization tax to natural gas liquids subject to price controls. This action, not part of the Administration's tax proposals (and, therefore, not commented on in the public hearings), would have extremely serious consequences not foreseen by that Committee.

Natural gas liquids—a brief description

Natural gas liquids (NGLs) consist of ethane, propane, butanes and natural gasoline. Of these, ethane is not subject to FEA price controls and, therefore, is not subject to the equalization tax. About 70 percent of domestic NGLs are extracted from natural gas to make the gas suitable for transmission through pipelines, and the remaining 30 percent is produced in crude oil refinery operations.

NGLs subject to price controls constitute a small part (approximately 5 percent) of U.S. energy needs. The principal uses of such NGLs include residential and commercial heating, agricultural uses, gasoline blending and refining, and petrochemical production. NGLs are used by the petrochemical industry as raw materials (i.e., as feedstocks) to make the basic chemical compounds which are, in turn, used to produce such things as hospital supplies, synthetic rubber, pharmaceuticals, plastics, paints, fibers and other essential commodities. Those FEA controlled NGLs used as petrochemical feedstocks comprise less than 1 percent of total U.S. energy needs.

The bill would completely exempt from the equalization tax NGLs used for residential and agricultural purposes.

Purposes of equalization tax not achieved by taxing NGLs

The stated purpose of the crude oil equalization tax is to establish a "rational pricing policy" which provides incentives for increased supply, helps stem imports, and promotes conservation. At the same time, the Administration's objective has been to develop an energy policy which will also maintain high levels of employment and production. The proposed tax on natural gas liquids would accomplish none of these goals.

No conservation potential

There is little or no conservation potential in the case of NGLs. By far the greatest portion of domestic NGLs—about 70 percent—are produced from the drying of natural gas, primarily for the purpose of rendering the gas suitable for transmission through pressurized pipelines to natural gas customers. The amount of these NGLs available for sale is, therefore, dependent upon the amount of natural gas which is produced. The remaining domestic NGLs—about 30 percent—come from crude oil refinery operations.¹ Here also the NGLs so produced are a by-product, with aggregate production dependent upon the overall crude oil throughput in the oil refinery operations. An equalization tax which has the effect of increasing the price of NGLs will do little or nothing to contribute to the conservation of such NGLs because the production and consumption rate of NGLs is determined primarily by factors other than NGL price.

Not a rational pricing policy

Imposition of the equalization tax on NGLs will also not contribute to "a rational pricing policy." The equalization tax assumes that the NGL market is the same as the crude oil market.

It does so by basing the equalization tax on NGLs on a Btu-adjusted comparison with the regional price for No. 2 distillate oil. The NGL market, however, is quite different from the crude oil market. As already explained, NGLs are a necessary by-product arising from the drying of natural gas to make it suitable for transmission through pipelines and, therefore, NGL supply rises and falls with natural gas production. It is a further physical characteristic of NGLs that they must be kept in costly pressurized storage facilities. As a consequence of these factors, uncontrolled prices of NGLs tend to fluctuate rather widely, depending on regional variations, seasonal production and demand, storage capacity, etc.²

The proposed equalization tax, although assertedly aimed at adjusting energy prices to uncontrolled world market prices, would create an artificial price structure which disregards the natural market functions operating in the NGL market.³ Such a pricing policy cannot be defended as a rational pricing policy of the sort advocated by the Administration, intended to give clear signals to consumers and investors in a relatively efficient manner. On the contrary, the tax would instead distort the NGL market to the detriment of the economy generally, and in the process would, for example, put petrochemical producers using NGL feedstocks at an economic disadvantage, with the consequence that some producers such as El Paso Products Company will be forced to curtail their business operations.

Proposed tax not consistent with objective of maintaining high levels of employment and production

The imposition of the crude oil equalization tax on NGLs could have significant adverse effects on the U.S. economy. Such effects may be illustrated by the impact of taxing NGLs used as petrochemical feedstock. Petrochemical feedstocks are the non-substitutable raw materials for the petrochemical industry. These basic chemical units are turned into products having a value many times in excess of their raw material costs, and result in substantial downstream employment in many additional industries dependent upon such petrochemical products. Any decline in petrochemical production as a result of an irrational NGL pricing structure will entail losses many times in excess of the direct losses

¹ Although the crude based NGLs are indirectly subject to the equalization tax since crude oil is subject to the tax, a credit is provided for the portion of the crude oil equalization tax which is attributable to oil from which NGLs are produced.

² Under uncontrolled market conditions—the conditions the tax is theoretically aimed at achieving—a petrochemical user of NGLs is therefore able to make purchases when prices are advantageous and thus can anticipate profitable operations.

³ In addition, the tax would cause propane and butane feedstocks generally to be priced from 25 percent to 30 percent higher per Btu than crude-based petrochemical feedstocks—a totally irrational result.

of basic petrochemical products. These consequences are inconsistent with the Administration's stated objective of maintaining high levels of employment and production.

Proposed tax would be inflationary and would have adverse trade impact

The proposed crude oil equalization tax, as applied to natural gas liquids, would also necessarily be inflationary, with adverse consequences to the entire U.S. economy in terms of higher prices for goods domestically produced and sold. This price inflation will have a further adverse impact on the U.S. balance of payments position. The U.S. petrochemical industry has in the past achieved a very substantial positive trade balance (about \$4.1 billion in 1978, for example). Imposition of the crude oil equalization tax on natural gas liquids used as petrochemical feedstocks will increase the cost of these raw materials significantly, and thus adversely affect the U.S. trade position in this important area.

Effect on El Paso Products Company

The effect of the crude oil equalization tax on NGLs is dramatically illustrated by the case of El Paso Products Company (Products Company). Products Company is engaged in the production of various petrochemicals utilizing NGL feedstocks (ethane, propane and butane). It is the only U.S. company producing butadiene solely from butane. A pipeline from this Odessa, Texas plant in turn supplies all of the butadiene needed by a synthetic rubber facility in Odessa owned by General Tire and Rubber Co.

Products Company purchases most of its NGLs from its parent, El Paso Natural Gas Company (EPNG).⁴ These NGLs are stored in underground facilities. The purchases are made at FEA controlled prices, which are the same controlled prices at which EPNG sells NGLs to third persons. (EPNG, incidentally, sells many more NGLs to unrelated third persons than it does to Products Company.) These FEA controlled prices are based upon the prices actually in effect at the time the FEA controls became effective. Upward adjustments have been made to the extent permitted by the applicable FEA regulations.

The equalization tax on NGLs is the excess of (i) the average wholesale price of a barrel of No. 2 distillate oil in the region in which the taxable NGL sale or use occurs, adjusted to reflect differences in energy content between the NGL liquid actually sold or used and No. 2 distillate oil, over (ii) the FEA controlled price of a barrel of such NGL liquid. This is the so-called "price gap." The equalization tax would be phased in, one-third of the gap being the tax for sales or uses in 1978, two-thirds of the gap constituting the tax in 1979, and the entire amount of the gap constituting the amount of the equalization tax for sales or uses of NGLs after 1979 and before termination of the tax.

Based upon the best available information Products Company has been able to obtain from refinery suppliers with which it has had dealings, assuming a crude oil price of \$14.10 per barrel (reflecting the January, 1977 refiner acquisition price of foreign crude), the average wholesale price of No. 2 distillate oil would be above \$18.60 per barrel, or nearly 33 cents per gallon of butane on a BTU equivalency basis. It is estimated that in the case of Products Company the "price gap" will result in a tax which, when fully in effect, would more than double the price of butane feedstock needed for Products Company's butadiene plant, and when fully implemented, would result in an additional tax cost greater than that plant's current pre-tax profits.

Products Company sees no way it can maintain production from its Odessa butadiene facility, if as anticipated, it is forced to absorb such additional costs for the raw feedstocks needed and, therefore, believes that if the Ways and Means Committee bill were to become law, it would have to close that plant. This would mean a direct employment loss of 130 jobs in Odessa, plus an estimated additional community loss of more than 300 jobs, and with the possibility of even more job losses if the General Tire synthetic rubber facility in Odessa (employing 245 persons) is also closed or its operations drastically curtailed.

Application of the crude oil equalization tax to natural gas liquids would have extremely adverse effects on the business operations of Products Company in other areas as well as butadiene production. Products Company estimates that the tax, when fully implemented, would more than double the price of the propane feedstock needed for its olefins (ethylene and propylene) operations. Further-

⁴ EPNG is a wholly owned subsidiary of the El Paso Co.

more, in the case of Products Company's olefin plant, the equalization tax on propane feedstocks, when fully phased in, would be in excess of the current pretax profits of that plant. Products Company is not a major petrochemical producer. It manufactures a limited number of chemicals and, therefore, it not able to adjust the prices of numerous products in order to lessen the impact of increased feedstock costs. Thus, the profitability of Products Company in these additional areas of production will be adversely impacted, resulting in further likely curtailments of operations.

Competitive aspects of petrochemical industry—comparison of crude-oil and NGL feedstocks

An analysis of the competitive aspects of the petrochemical industry can best be made by considering the case of ethylene, the most basic of all the chemical building blocks. United States ethylene manufacturers generally fall into two categories: (a) refiner-affiliated petrochemical manufacturers, which rely almost wholly on crude oil derivatives (naphtha and gas-oil) as ethylene feedstocks, and (b) non-refiner-affiliated ethylene manufacturers, which with one possible exception predominantly use NGLs (propane, uncontrolled ethane, and some butane) as ethylene feedstocks.

Refiner-affiliated ethylene plants are generally large plants which produce and sell petrochemical products covering a broad spectrum. These companies are able to generate in their own refineries feedstocks for their petrochemical plants. Such plants produce and shall a broad spectrum of petrochemicals and by-products. Some of these by-products which would not otherwise be marketed are in turn recycled in the refinery operations for other beneficial uses. These advantages are not enjoyed by non-refiner-affiliated petrochemical producers.

Price differences in feedstock costs have not been uncommon in the petrochemical industry, and may be and generally are offset by economics of scale, the technology employed, feedstock availability and mix, location, co-product and by-product sales prices and many other factors. Furthermore, refiner-affiliated petrochemical producers also have the ability to utilize fully by-products not otherwise readily marketable.

The proposed equalization tax would be imposed directly on the use of NGLs for petrochemical feedstock purposes and would therefore directly increase the cost of raw materials for those companies using NGL feedstocks. However, in the case of companies using crude oil-based feedstocks, the crude oil equalization tax would be imposed on the first purchase of the barrel of crude oil. This tax would first be allocated by the refiner, with the initial question being the extent to which the tax could be passed on to those primary refinery products such as gasoline, heating fuels, distillate oil, etc. Thereafter, the refiner-affiliated petrochemical producer can allocate his costs over the entire spectrum of petrochemical and energy products sold by him.

Many factors, thus, must be taken into account in comparing the basic economics affecting petrochemical producers using crude oil-based feedstocks with those using NGL feedstocks. Application of the proposed tax on NGLs would directly increase the raw material costs of petrochemical producers using NGL feedstocks. Furthermore, as noted previously, the NGL tax would put one petrochemical producer—El Paso Products Company—out of the butadiene business, and would seriously jeopardize its other petrochemical operations. On the other hand, the impact of the crude oil equalization tax in the case of petrochemical producers using crude oil-based feedstocks is for the reasons stated highly uncertain.

We have previously shown why the proposed equalization tax on NGL would not contribute to the nation's energy goals, but would instead adversely affect the economy. Under these circumstances, to impose a tax on NGLs simply because crude oil is taxed would, El Paso Products Company submits, be unconscionable. It would indeed be ironic to force one competitor out of business in the name of competition by imposing an energy tax which does not further the nation's energy goals.

Conclusion

Natural gas liquids subject to price control are a small part of total U.S. energy needs. Imposition of the crude oil equalization tax on NGLs would not materially affect consumption, but would distort NGL marketing functions instead of achieving a rational pricing policy. The proposed tax on NGLs would not serve to implement U.S. energy policy and therefore would not contribute to the

achievement of the Administration's energy goals. The proposed tax would have adverse effects on the economy in general, because of adverse employment, production, trade, and inflationary impacts. In addition, it would almost certainly put Products Company out of the butadiene business, requiring the closing of its Odessa, Texas butadiene plant, and would further jeopardize the continued operation of Products Company's other petrochemical operations.

El Paso Products Company recommends that the equalization tax on natural gas liquids be eliminated. As a small petrochemical producer, we urge the Committee to consider particularly the consequences of imposing an equalization tax on NGLs used as petrochemical feedstocks. Such use represents the highest and best use of these liquids, both in terms of the value capable of being added to the raw materials by reason of processing them into the chemical building blocks essential to many petrochemical products, and also in terms of the number of jobs which can be added to the United States economy downstream from the initial use of feedstock. While NGL usage for petrochemical feedstocks is less than 1% of the total energy picture, the benefits to the economy from such usage are much larger than this percentage indicates. It follows from these same facts that an unjustifiable additional tax burden placed on NGL usage for petrochemical feedstock purposes, where not contributing to U.S. energy goals, will make it just that much harder to develop an energy policy which will maintain high levels of employment and production.

II. TAX ON BUSINESS USE OF OIL AND GAS SHOULD NOT BE ADOPTED PENDING FURTHER STUDY

El Paso Products Company questions the advisability at this time of adopting the proposed tax on the business use of oil and gas.

Effect on El Paso Products Company

The difficulties which would be created by imposition of this severe penalty tax on business use of oil and gas are well illustrated by the situation of Products Company. The processing of petrochemicals necessarily involves the use of substantial amounts of energy. In order to control its operating costs, Products Company has consistently monitored its energy consumption and has adopted procedures designed to conserve energy. Two of the boilers in its olefin plant are operated on a mixture which includes 30% waste heat, 56% off-gases (i.e., gas "thrown off" from other processes), and 14% natural gas. If the waste heat and off-gases were not used to fuel boilers, they would not be used for any productive purposes. Similarly, in its butadiene plant Products Company has three boilers which are operated on a mixture of 75% off-gases and 25% natural gas. In its ammonia plant, Products Company has a boiler that adds heat to exhaust gases, enabling the use of such gases as an energy source. Throughout its facilities, Products Company, during 1976, was able to use the off-gases equivalent of 10.4 million cubic feet per day of natural gas, or approximately 17% of its total fuel gas requirements.

Section 4901 of the House Bill, subject to certain exemptions, imposes a tax on the business use of natural gas and oil. Products Company estimates that, based on 1976 usage figures, the section 4901 tax relating to its "nonexempt uses" of natural gas and oil would, when the tax is fully implemented, be approximately 37% of its current pre-tax income relating to petrochemical operations.

In order to avoid the adverse effects from imposition of the use tax, the possibility of converting to coal would, of course, be seriously considered. Products Company uses nine relatively small to medium size industrial boilers which could not be replaced by coal boilers on a boiler-by-boiler or plant-by-plant basis, because replacement coal boilers could not be operated on such a small scale. Since the various petrochemical plants are located in a single complex at Odessa, Texas, the feasibility of establishing a central coal-fired power plant to supply steam to each of its plants and of abandoning its existing boilers is being studied. One of the difficulties in operating such a power plant is that its larger size would make it necessary to site the plant $\frac{1}{2}$ to $\frac{3}{4}$ of a mile from the manufacturing facilities and there could be significant energy losses in transporting the steam to such facilities.

The construction of a coal-fired power plant would also require the construction of coal yards—which would include coal handling, crushing, transfer, unloading and weighing facilities. Preliminary estimates indicate that operation

of the power plant would require a 100-car trainload of coal every six days. Purchase of such a train by the user may be required by the railroads.

Products Company cannot presently estimate the total capital costs which would be involved in the construction of a coal-fired power plant (and associated coal yards, etc.) and the purchase of a coal train. Similarly, it cannot now accurately determine the additional operating costs of a coal-fired power plant. It is expected, however, that the additional costs would be very substantial and that there would also be significant increases in future operating costs.

The need for further study

Present FEA policies and the increased cost of oil and gas which will result from the other provisions of this energy bill are already substantial inducements to converting to alternative sources of energy. It is not clear that the imposition of another penalty tax to force conversion is desirable, particularly when the energy and other costs involved in the construction and operation of new facilities, and the extensive handling and transportation of the alternative fuel are considered. In this regard it should be emphasized that potential energy conversion should not be the *sole* criterion by which to evaluate the tax. Economic and social factors also must be considered. For example, should the national policy of full employment and the objective of avoiding economic dislocations take precedence in situations in which conversion to coal is a theoretical possibility but is not economically feasible?

The business use tax is a complex tax with a very great impact. The basic terms of the new tax, however, are deficient in many respects, resulting in inconsistencies, uncertainties and ambiguities. These defects would make the tax hard to administer and comply with. They also lay bare the underlying failure to develop a coherent statutory pattern for a major tax measure having such far-reaching consequences. The problems, consequences, and implications associated with the tax require more study than has been possible in the limited time thus far available. Congress should not adopt a penalty tax such as here considered without careful study of the alternatives, and without greater assurances than are presently available that the tax will not jeopardize the economic well-being of large segments of our industry. It is, therefore, recommended that adoption of the business use tax be deferred pending a joint Congressional-Administration study. Such a study should be required to commence forthwith, with a report to be made to the Congress no later than, say, June 30, 1978.

Technical considerations

If, after reviewing the study, the Committee were to propose a business use tax, it would be important to adopt a credit provision which would permit a taxpayer to claim with respect to its qualified energy investment for any year (i) a 100 percent credit against the business use tax, and (ii) a 10 percent refundable investment tax credit. Providing both credits would encourage investments in the capital equipment needed to convert to alternative sources of energy in a manner consistent with the policies of both the regular investment tax credit (by reducing the corporate income tax by a percentage of investment in eligible property) and the business use tax credit (by reducing that penalty tax by the amount of qualified investment where conversion plans have actually been implemented).

The 100 percent credit against the business use tax should be available for all expenditures related to the conversion to a central coal-fired boiler facility. Under the present bill IRC § 4998 would define property eligible for credit as "alternative energy property which is tangible property (not including a building and its components). . . ." Such language should be clarified to provide expressly that the structure which houses a coal-fired boiler facility is not a building or structural component for purposes of § 4998 where it is an essential or integral part of the central coal-fired boiler facility. *Cf.* Reg. § 1.48-1(e) (1). In addition, the definition of equipment qualifying as alternative energy property should be modified so as to apply to railroad cars which are used to transport alternative energy substances (such as coal), provided that the purchase of those cars by the taxpayer is made in order for it to obtain alternative sources of fuel.

Conclusion

The business use tax is a complex and far-reaching tax which is intended to force conversion to alternative sources of energy. In light of present FEA policies and the increased costs of oil and gas which will result from the other provisions of this bill, it is not clear that the imposition of an additional penalty tax to

require further conversion is desirable. Nor are the economic and social consequences of imposing such a tax clear.

El Paso Products Company, therefore, recommends that adoption of the proposed business use tax be deferred pending a joint Congressional-Administration study. Such a study should be required to commence forthwith with a report to be made to the Congress no later than, say, June 30, 1978. If a tax similar to the proposed tax were adopted following the study, certain amendments to the credit provisions should be considered.

III. AMENDMENTS

A. Crude oil equalization tax—Elimination of tax on NGLS

In Title II of H.R. 8444, Sec. 2031, delete proposed new Internal Revenue Code § 4986(c) and (d) (relating to imposition of tax on natural gas liquids), and delete all other provisions in bill relating to equalization tax on natural gas liquids.

B. Business use tax study

In Title II of H.R. 8444, strike out Secs. 2041 and 2051 and insert in lieu thereof the following new Sec. 2041:

Sec. 2041. Business use tax study: (a) *Study.*—The Joint Committee on Taxation, in consultation with the Treasury and the Department of Energy, shall make a full and complete study and comparative analysis of the economic, energy conservation, and energy conversion consequences from adoption of an excise tax on the business use of oil and natural gas.

(b) *Report.*—The Joint Committee on Taxation shall submit to the Committee on Finance of the Senate and to the Committee on Ways and Means of the House of Representatives a final report of its study and investigation together with its recommendations, including recommendations for legislation, as it deems advisable.

(c) *Reporting date.*—The final report called for in subsection (b) of this section shall be submitted no later than June 30, 1978.

C. Business use tax—Technical amendments

In Title II of H.R. 8444, Sec. 2051, revise the first four lines of proposed new Internal Revenue Code § 4998(a) to read as follows: (a) *Section 4996 property defined.*—For purposes of this part, the term "section 4996 property" means alternative energy property which is tangible property (not including a building and its structural components other than a structure which houses alternative energy property and is so closely related to such property that it clearly can be expected to be replaced when such alternative energy property is replaced) and—

In Title II of H.R. 8444, Sec. 2051, revise proposed new Internal Revenue Code § 4998(b)(1)(F) (relating to the definition of alternative energy property) to read as follows:

(F) equipment used for the transportation, unloading, transfer, storage, reclaiming from storage, and preparation (including washing, crushing, drying, and weighing at the point of use) of an alternative substance for use—(i) in equipment of the taxpayer described in subparagraph (A), (B), (C), (D), or (E), or (ii) in a facility of the taxpayer which uses coal as a feedstock for the manufacture of chemicals or other products (except coke).

The CHAIRMAN. Now, as I understand it, Mr. Raymond Golden yielded his place so the others could make a statement.

Are you here, Mr. Raymond Golden?

STATEMENT OF RAYMOND L. GOLDEN, GENERAL PARTNER, SALOMON BROS., ACCOMPANIED BY E. ANTHONY COPP, VICE PRESIDENT, SALOMON BROS., AND RONALD M. FREEMAN, VICE PRESIDENT, SALOMON BROS.

Mr. GOLDEN. Thank you, sir.

Mr. Chairman, my purpose today is to speak to certain financial aspects of the Energy Tax Act of 1977. I do so as a general partner of the investment banking firm of Salomon Bros.

As my remarks will show, I am concerned that current and proposed actions in the energy field, including the enactment of this bill in its present form, would lead to inadequate financial means to implement our national energy goals as enunciated by administration representatives and set forth in pending legislation.

In preparing this testimony, I have reviewed the Energy Tax Act of 1977, the existing legislation concerning the pricing of crude oil and the statements made by various administration spokesmen in proceedings before this and other committees in the Congress and in other forums.

I have been disturbed to read optimistic assessments of the financial capacity of the oil industry to carry out the programs needed to attain our energy goals. One example of such an optimistic view was that expressed before this committee by Hon. James R. Schlesinger, Secretary of Energy, during the hearings of August 8 and 9. On pages 11 and 12 of the transcript, Secretary Schlesinger said in response to a question from Senator Packwood: "With regard to the question of the financial capacity of the oil industry, let me indicate profits have doubled in these last 4 years. All the major companies recognize that they are awash in cash flow. They are unable to place that cash into exploration . . . The problems of the oil companies is not a problem of cash flow.

"If you take the President's program on oil and gas together, there is an expansion of revenues of the oil and gas industry relative to what would otherwise have been the case with the continuation of current policy."

I must respectfully express my fundamental disagreement with the Secretary's financial conclusions regarding the oil industry. First, the Secretary refers to oil company profits without considering the enormous size of oil company capital expenditures. In fact, it is impossible to come to any reasonable conclusion about the adequacy of oil company financial resources without simultaneously considering the requirements which will be necessary to carry out the Nation's energy goals.

My associates have analyzed the financial performance of 35 leading U.S. oil companies. This analysis shows that, while oil company net income increased by some \$5.8 billion between 1971 and 1976, oil company capital expenditures increased by \$14.7 billion or some two and a half times more than net income.

With respect to being "awash in cash flow," our analysis shows, on the contrary, that the share of oil industry external financing has more than doubled from 12 percent in 1971 to 27 percent in 1976. In dollar terms, issuances of long-term debt and equity by oil companies rose from \$4.2 billion in 1971 to more than \$9.3 billion in 1976.

[The following was subsequently supplied for the record:]

SELECTED FINANCIAL DATA OF LEADING U.S. PETROLEUM COMPANIES IN SUPPORT OF THE STATEMENT OF RAYMOND L. GOLDEN, GENERAL PARTNER, SALOMON BROS.

DATA DEFINITIONS

The financial data presented herein are drawn, in their entirety from public sources filed by the 35 oil companies listed below. The principal source of these data were the consolidated statements of income, the consolidated statements of changes in financial position and the consolidated balance sheets prepared by

these companies. All financial data is as reported in the year indicated, and does not reflect retroactive restatements, if any, made in subsequent reporting periods.

All data were drawn from statements filed by the companies with the Securities and Exchange Commission. Income statement data were collected for the ten year period 1967 through 1976. Data taken from the statements of changes in financial position were available only for the six year period 1971 through 1976. Under the accounting rules of the Securities Exchange Act of 1934 (Regulation S-X), Article 11A (adopted in Accounting Series Release #117 effective January 1, 1971) requires that all registration statements and (financial) reports filed with the Securities and Exchange Commission after December 31, 1970 include the statement of changes of consolidated financial position (referred to in Article 11A as a "statement of source and application of funds").

The following definitions refer to the terms included in the financial data summaries, below.

Retained cash flow.—Total funds from operations (net income, recovery of capital (depreciation, depletion and amortization), deferred income taxes and other non-cash charges less undistributed income of unconsolidated companies) less all cash dividends.

Capital expenditures.—As presented in the statement of changes in financial position.

Issuance of LTD (long-term debt).—As presented in the statement of changes in financial position without reduction for long-term debt repayments.

Equity issues.—All issuances or sale of equity securities.

Common dividends.—All cash dividends paid to common stockholders.

Preferred dividends.—All cash dividends paid to preferred stockholders.

Cash dividends.—Includes the sum of common and preferred dividends plus any cash dividends to minority stockholders of consolidated subsidiaries.

Total capitalization.—This figure and its component items, total long term debt, preferred stock and total common equity are drawn from balance sheets filed by the 35 companies included in the data base. As indicated, the preferred stock is included at its balance sheet valuation.

CONSOLIDATED REPORTS

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Industry aggregate:					\$9,059.08	\$9,876.03	\$14,131.29	\$19,501.29	\$14,702.84	\$18,339.33
Retained cash flow.....				\$10,076.41	10,251.45	10,824.85	13,076.13	19,733.51	21,407.44	24,986.69
Capital expenditures.....	\$8,431.79	\$9,939.02	10,384.49		.88	.91	1.08	.99	.69	.73
Cash flow/capital expenditures.....					4,009.67	2,950.24	3,191.06	4,513.13	7,940.19	8,441.33
Issuance of limited.....					197.69	250.18	336.27	338.99	557.69	831.56
Equity issues.....					3,138.14	3,136.69	3,300.51	3,857.57	4,170.23	4,425.65
Common dividends.....	2,523.17	2,802.90	3,015.22	3,099.44	193.01	183.57	186.46	167.78	172.46	165.11
Preferred dividends.....	85.01	158.62	198.32	203.67	3,398.77	3,388.53	3,570.54	4,100.22	4,420.25	4,665.99
Cash dividends.....										

Companies in consolidation:

AHC—Amerada Hess Corp.
 BPC—Beko Petroleum Corp.
 KMC—Kerr-McGee Corp.
 RVO—Reserve Oil and Gas.
 SD—Standard Oil Co. of California.
 GO—Gulf Oil Corp.
 PZL—Pennzoil Co.
 ELG—El Paso Co.
 LLX—Louisiana Land & Exploration.

AOL—APCO Oil Corp.
 CS—Cities Service Co.
 MRO—Marathon Oil Co.
 SUO—Shell Oil Co.
 SUN—Sun Co.
 MOB—Mobil Corp.
 HNG—Houston Natural Gas Corp.
 CGP—Coastal States Gas Corp.
 MSA—Mesa Petroleum.

ASH—Ashland Oil Inc.
 CLL—Continental Oil Co.
 MUR—Murphy Oil Corp.
 SN—Standard Oil Co. (Indiana).
 UCL—Union Oil Co. of California.
 TX—Texaco Inc.
 TXO—Texas Oil and Gas Corp.
 GAO—General American Oil Co. of Texas.
 SOC—Superior Oil Co.

ARC—Atlantic Richfield Co.
 GET—Getty Oil Co.
 P—Phillips Petroleum Co.
 SOH—Standard Oil Co. (Ohio).
 XOM—Exxon Corp.
 OXY—Occidental Petroleum Corp.
 PEL—Panhandle Eastern Pipe Line.
 HOI—Houston Oil & Minerals Corp.

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Industry aggregate:										
Total long-term debt.....	\$11,011.65	\$14,524.60	\$16,165.02	\$18,311.78	\$20,099.85	\$20,557.73	\$21,544.03	\$23,878.60	\$28,012.20	\$33,658.23
Preferred stock (at carry).....	521.54	580.79	597.81	1,434.78	483.78	479.05	433.99	339.95	325.63	261.37
Total common equity.....	43,617.61	47,912.12	52,716.48	54,895.91	58,706.78	61,688.78	67,873.34	77,551.01	81,651.30	89,941.26
Total capitalization.....	55,150.80	63,017.51	69,479.30	74,642.47	79,290.41	82,725.55	89,851.25	101,769.57	109,989.13	123,860.86

Companies in consolidation:

AHC—Amerada Hess Corp.
 BPC—Bakco Petroleum Corp.
 KMG—Kerr-McGee Corp.
 RYO—Reserve Oil & Gas.
 SD—Standard Oil Co. of California.
 MOB—Mobil Corp.
 HNG—Houston Natural Gas Corp.
 CGP—Coastal States Gas Corp.
 MSA—Mesa Petroleum.

AOL—Apco Oil Corp.
 CS—Cities Service Co.
 MRO—Marathon Oil Co.
 SUO—Shell Oil Co.
 SUN—Sun Co.
 TX—Texaco Inc.
 TXO—Texas Oil and Gas Corp.
 GAO—General American Oil Co. of Texas.
 SOC—Superior Oil Co.

ASH—Ashland Oil Inc.
 CLL—Continental Oil Co.
 MUR—Murphy Oil Corp.
 SN—Standard Oil Co. (Indiana).
 XON—Exxon Corp.
 OXY—Occidental Petroleum Corp.
 PEL—Panhandle Eastern Pipe Line.
 HOI—Houston Oil and Minerals Corp.
 UCL—Union Oil Co. of California.

ARC—Atlantic Richfield Co.
 GET—Getty Oil Co.
 P—Phillips Petroleum Co.
 SOH—Standard Oil Co. (Ohio).
 GO—Gulf Oil Corp.
 PZL—Pennzoil Co.
 ELG—El Paso Co.
 LLX—Louisiana Land and Exploration.

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Industry aggregate, percent of capitalization:										
Total long-term debt.....	19.97	23.05	23.27	24.53	25.35	24.85	23.98	23.46	25.47	27.17
Preferred stock.....	.95	.92	.86	1.92	.61	.58	.48	.33	.30	.21
Total common equity.....	79.09	76.03	75.87	73.55	74.04	74.57	75.54	76.20	74.24	72.61
Total capitalization.....	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00

Companies in consolidation:

AHC—Amerada Hess Corp.
 BPC—Belco Petroleum Corp.
 KMG—Karr-McCee Corp.
 RVO—Reserve Oil & Gas
 SD—Standard Oil Co. of California.
 MOB—Mobil Corp.
 HNG—Houston Natural Gas Corp.
 CGP—Coastal States Gas Corp.
 MSA—Mesa Petroleum.

AOL—APCO Oil Corp.
 CS—Cities Service Co.
 MRO—Marathon Oil Co.
 SUD—Shell Oil Co.
 SUN—Sun Co.
 TX—Texaco Inc.
 TXO—Texas Oil & Gas Corp.
 GAO—General American Oil Co. of Texas.
 SOC—Superior Oil Co.

ASH—Ashland Oil, Inc.
 CLL—Continental Oil Co.
 MUR—Murphy Oil Corp.
 SN—Standard Oil Co. (Indiana)
 XON—Exxon Corp.
 OXY—Occidental Petroleum Corp.
 PEL—Panhandle Eastern Pipe Line.
 HOI—Houston Oil & Minerals Corp.
 UCL—Union Oil Co. of California.

ARC—Atlantic Richfield Co.
 GET—Getty Oil Co.
 P—Phillips Petroleum Co.
 SOH—Standard Oil Co. (Ohio).
 GO—Gulf Oil Corp.
 PZL—Pennzoil Co.
 ELG—El Paso Co.
 LLX—Louisiana Land & Exploration.

	1967	1968	1969	1970	1971	1972	1973	1974	1975	1976
Industry aggregate:										
Net income.....	\$5,296.85	\$5,872.63	\$5,988.16	\$5,996.63	\$6,241.01	\$6,298.92	\$9,660.02	\$13,587.05	\$10,273.89	\$12,094.81
Common dividends.....	2,523.17	2,802.90	3,015.22	3,099.44	3,138.14	3,136.69	3,300.51	3,857.57	4,170.23	4,425.65
Payout ratio.....	47.64	47.73	50.35	51.69	50.28	49.80	34.17	28.39	40.59	36.59

Companies in consolidation:

AHC—Amerada Hess Corp.
 BPC—Belco Petroleum Corp.
 KMG—Kerr-McGee Corp.
 RVO—Reserve Oil & Gas.
 SD—Standard Oil Co. of California.
 GO—Gulf Oil Corp.
 PZL—Panzoil Co.
 ELG—El Paso Co.
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AOL—APCO Oil Corp.
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 MRO—Marathon Oil Co.
 SUO—Shell Oil Co.
 SUN—Sun Co.
 MOB—Mobil Corp.
 HNG—Houston Natural Gas Corp.
 CGP—Coastal States Gas Corp.
 MSA—Mesa Petroleum.

ASH—Ashland Oil Inc.
 CLL—Continental Oil Co.
 MUR—Murphy Oil Corp.
 SN—Standard Oil Co. (Indiana).
 UCL—Union Oil Co. of California.
 TX—Texaco Inc.
 TXO—Texas Oil & Gas Corp.
 GAO—General America Oil Co. of Texas.
 SOC—Superior Oil Co.

ARC—Atlantic Richfield Co.
 GET—Getty Oil Co.
 P—Phillips Petroleum Co.
 SOH—Standard Oil Co. (Ohio).
 XON—Exxon Corp.
 XOY—Occidental Petroleum Corp.
 PEL—Panhandle Eastern Pipe Line.
 HOI—Houston Oil & Minerals Corp.

Additional financial data on individual companies was submitted and may be found in the committee files.

Mr. GOLDEN. As regards the companies' ability to place cash into exploration, I would maintain that if this is a problem, it is a near-term one for a very limited number of companies. Whether it becomes a long-term problem for the industry will depend primarily on Government actions, particularly the rate of leasing of most prospective areas of the Outer Continental Shelf and Alaska and whether this industry is permitted to participate fully in energy development.

The CHAIRMAN. I am going to have to go vote. The five lights have lit up.

I am going to recess this meeting for 10 minutes, and we will be back and hear the rest of your statement.

[A brief recess was taken.]

Senator BENTSEN. Gentlemen, we will proceed. We apologize for the interruption.

We have done a great job of reforming and reorganizing the Senate so that we can work much more efficiently. We finished that reorganization this year. Instead of having three or four things at the same time, now we only have two or three.

If you would proceed?

Mr. GOLDEN. Finally, with respect to industry revenues expanding from the President's program on oil and gas, my analysis would indicate the opposite impact. For the near term, there will be no revenue gain, because oil pricing will continue to be regulated under existing legislation while intrastate gas will become subject to price regulation, with consequent reductions in revenues.

Therefore to draw meaningful conclusions about the effect of proposed legislation on the financial position of the oil industry, one must examine both the enormous size of oil company capital requirements to meet energy goals and the availability of funds to pay for these requirements.

There have been numerous estimates of the need for sizable increases in domestic exploration and production investments during the next decade. For example, based on Federal Energy Administration estimates, such investments in current dollars should rise from some \$10 billion per year in the 1973-75 period to an average of about \$27 billion per year—during the next decade.

I believe that the ultimate result of the existing and proposed legislation would be to restrain necessary energy investments by impairing the ability of the industry to generate adequate amounts of funds. The crude oil equalization tax does not provide incremental revenues to stimulate greater production. Instead, the increased revenues are returned to each taxpayer in 1978 in the form of a tax credit.

Furthermore, under the administration's proposals, crude oil pricing would continue under the Energy Policy and Conservation Act. This act requires the FEA to set prices based on a composite average of domestic crude oil prices. This mechanism would do nothing to increase the industry's cash flow needed to find and develop new oil or to squeeze additional oil from existing fields.

If, as a result of present and proposed legislation, sufficient internal funds become increasingly unavailable, then the oil industry would have to rely increasingly on external capital markets. In my view, that is a viable alternative only up to a point.

We have examined the methods employed by the group of 35 petroleum companies to finance their capital expenditure requirements. The principal finding which emerges from this analysis is that these oil companies have sought to meet the soaring capital requirements of their industry while protecting their credit worthiness by attempting to match internally generated funds to capital expenditure programs.

In fact, as internally generated funds have risen in the industry, capital expenditures have generally expanded faster than the increase in available financial resources. Consequently, available internal resources have become increasingly inadequate to enable the companies to meet their capital requirements.

Therefore, they have sought to employ a full range of supplementary financing sources in a manner consistent with the protection of their credit worthiness.

The result has been an inexorable increase in oil company indebtedness.

While capital markets have successfully absorbed petroleum company debt and equity issues in this year and in preceding years, they have done so at cost penalties to the issuers, measurable in terms of declining stock prices and rising cost of debt. These cost penalties imposed on oil companies by the financial markets may be considered to be a form of early warning indicator.

If oil company issuers seek to come to the external markets too often, for too much of their total fund requirements, while suffering a consequent erosion of their key financial ratios, then their ability to satisfy their capital requirements in order to meet national energy goals at acceptable cost in the market will ultimately be frustrated.

In conclusion, as investment bankers, we would be very concerned to see legislation which creates a conflict between preservation of industry credit worthiness and satisfaction of national energy goals. Our plea to you is that in carrying out your legislative responsibilities you be, first of all, consistent: If you believe, as we do, that the cost of developing indigenous energy supplies will be a rapidly increasing one, then you must not act in a manner which incorporates the unverified assumption that the financial markets will assume a greater and greater share of these programs. The logical result of this process will be less capital formation and hence, less energy development.

We believe that the most cost-effective solution for the Nation is to avoid impairment of cash flows adequate to carry out the massive energy program needed to meet the goals of the act.

My associates, Mr. Freeman and Mr. Copp, were instrumental in the preparation of this testimony.

Thank you very much, sir.

The CHAIRMAN. Senator Bentsen?

Senator BENTSEN. Mr. Chairman, I think that the witness has made an extremely valid point. In chairing the Subcommittee on Economic Growth of the Joint Economic Committee and the Financial Markets Subcommittee here in the Finance Committee, we started pointing out this problem some time ago. In the United States we have seen a small percentage of GNA go into capital formation. England is next to us, and we know the problem that they have.

I think that we have seen, time and time again, the oil industry beginning to try to divert into other fields that they thought did not have the kind of regulation and punishment exacted on them that you find in the oil industry.

You have seen the rules change on contractual agreements. The financing has been made. I very much concur that it is a serious problem.

Where are these examples coming from that I hear thrown about rather loosely that there is a surplus of capital in the oil industry?

Mr. GOLDEN. We have read the allegations. In some cases we are amused and bemused at the same time. It represents a one-sided analysis. It makes good press, but it is really only half-truths.

They fail to compare the two sides of the question, cash inflow and cash outflow, what we have tried to point out, that there is a deficit, a growing deficit, irrespective of specified examples within the industry for the industry as a whole.

There is a growing deficit occurring between inflow and outflow. Wise financial management will monitor this very carefully, because this will affect their credit worthiness and therefore their ability to enter the capital markets.

Mr. FREEMAN. We have tried to track down the source, the ultimate source, of some of the statements that have been made. The immediate source we have identified is certain spokesmen of the Administration who themselves quote media sources which we have examined and determined, to the extent they are quoted, that they are quoted only in part, not in full.

In many cases these media sources commit the error of examining revenues in isolation without considering the sources of funds required to maintain the development of the capital intensive industries, of which oil is one example.

Senator BENTSEN. As I understand it, compared to different industries with the very same bond rating, oil industry bonds are selling at a penalty, is that correct?

Mr. GOLDEN. That is correct.

Senator BENTSEN. Is it also true that some of the major companies have had their rating deteriorate recently?

Mr. FREEMAN. Yes; we have spoken with the rating agency analysts.

Senator BENTSEN. You may have addressed that, but I missed part of your presentation.

Mr. FREEMAN. The rating services have increasingly scrutinized oil company credit worthiness. As you know, one leading oil company, Texaco, had its rating reduced from Triple-A to Double-A-Plus by Standard and Poor's.

We discussed with a Standard and Poor's analyst the reason for this decision. His specific response concerned (a) the increasing difficulty on the part of oil companies which have invested a significant part of their funds in downstream assets in the United States, as Texaco has, to make a profit on that invested capital; and (b) the increased concern that the regulation would provide any additional revenues.

Senator BENTSEN. Let me understand this. Are you saying that they decreased their rating because Texaco has a disproportionate amount of their investment in the United States?

Mr. FREEMAN. In downstream energy facilities, the overwhelming of which are located in the United States.

Senator BENTSEN. Downstream?

Mr. FREEMAN. Downstream.

Senator BENTSEN. That means refineries and service stations and the marketing facilities?

Mr. FREEMAN. Everything necessary to get the oil into salable form and to market it.

Senator BENTSEN. Also, is there a correlative effect there with the production in the United States, or not?

Mr. FREEMAN. No.

The analysis concerned the downstream.

Mr. GOLDEN. It is also fair—Mr. Hoopman, one of the previous witnesses this morning, president of Marathon Co. his company suffered downgrading 2 years ago, I think from Double-A to Single-A.

Mr. FREEMAN. We, perhaps, can elaborate on Senator Bentsen's remark with respect to the rate penalty. We have compared Triple-A long maturity oil company bonds to Triple-A long maturity bonds of other industrial issuers; specifically these prices are as of September 1.

We looked at the bonds of General Electric, 7.5 percent coupon, due in 1996, which traded, on September 1, at a yield of 7.55 percent.

We compared those to the 7 $\frac{3}{8}$ bonds of Mobil Oil trading on the same day, at a yield of 7.80, or a 25 basis point spread. In our industry, in which trades are effected in hundreds of millions of dollars, a 25 basis point spread, a quarter of a percentage point, is a substantial yield penalty.

Senator BENTSEN. Thank you very much.

The CHAIRMAN. Let me ask you, are you gentlemen representing any of the oil companies?

Mr. GOLDEN. No; we are representing Salomon Bros.

The CHAIRMAN. What is your interest in solving the energy problem?

Mr. FREEMAN. We feel, Senator, that the energy problem and the health of the economy of the United States are very closely intertwined. We have two interests. One is, as investment bankers, our health and the health of the national economy are closely related.

Second, because we have in the past represented, underwritten with our funds, the securities of oil companies which are increasingly coming to market, we are vitally concerned that those securities retain their credit worthiness.

The CHAIRMAN. I happen to know that the President of the United States is under the impression that the oil companies have plenty of money. I think he got that impression from a statement by one of the executive officers of an oil company saying there is no shortage of capital in the oil industry.

I do not find that most people in the industry agree with that. My impression is that the overwhelming majority of them do feel that there is a capital shortage. I think that you are right when you said it is going to take a certain amount of money. No matter how you do

it, whether you decide coal or oil is the solution, it is going to require a huge amount of capital to solve this problem.

The capital can come from earnings on sales, or else by generating that much capital through the banks. One way or another, you are are going to have to find the money.

I am concerned about finding some way to raise the money. If the industry does not find it in the price system, then it seems to me they had better try to find it in the banking system. That is one reason I was thinking, you might try to have a Reconstruction Finance Corporation for energy, if we cannot do any better to help find money.

There were people before our committee representing the administration who testified that the industry is drilling more wells. My impression is that that may be so, but they should be drilling twice as many as they are.

They said we are going to get more coal production. My attitude is, that will be about one-half of the increased production we ought to be getting if we hope to solve this problem.

Is that about the way it looks to you?

Mr. GOLDEN. We frankly believe—we have the record to substantiate it—that as the cash flow of the oil companies have increased from their operations, so have their capital expenditures.

If regulation is going to constrain cash flow, and then the government, the regulatory authorities are going to turn around and criticize the industry for not spending more when it, the regulation, is impairing the cash flow and thus blunting increased expenditures, I do not think that is totally fair.

I think that the American way is to allow the company in a free pricing system, to see if they can do the job. The oil industry, unlike any other industry, has been operating under constraints, price controls, since 1971. Now the Government is coming back and saying, perhaps they are not doing enough.

Well, they have had their hands, in many ways, tied behind their backs.

The CHAIRMAN. What percentage of capital needed for exploration and development can be raised by borrowing?

Mr. FREEMAN. I think our analysis will shed some light on that, Senator.

At the present, virtually the entirety of oil company capital expenditures are just for their own business development—that includes exploration development as well as downstream investments necessary to bring discovered and produced oil to market. Obviously they cannot allow bottlenecks to appear in their system as they discover oil, the downstream investments have to follow suit to keep their system in balance.

On that basis, we have examined the percentage of their total investments in the energy business that is covered by internal funds, that is, by retained cash flow.

In 1971, that figure was 88 percent. That meant that they had to go to the external markets for the other 12 percent.

By 1976, even though oil company cash flow has increased and increased considerably, that percentage which was 88 percent of capital expenditures financed by internal funds, in 1971 had dropped to 73 percent in 1976.

The CHAIRMAN. To 74 percent ?

Mr. FREEMAN. 73 percent in 1976.

Instead of going to the capital markets for 12 percent of their requirements, they had to go to the capital markets for 27 percent of their requirements.

So at one and the same time, the oil companies' requirements were growing as a result of inflation and other factors, and they were also increasing the percentage of the funds that they had to go out and borrow, or sell shares to raise.

The markets have responded. The sum of \$4 billion was raised by the oil companies externally in 1971.

In 1976, that became \$3.5 billion. We believe that the markets are doing their share, but they are doing it at a cost.

One example of that cost is the remark made by Senator Bentsen concerning that oil companies must pay more to borrow money than other companies whose bonds are rated the same way.

For example, as I indicated before, Mobil Oil bonds on September 1 were traded at a rate penalty of 25 basis points, or one-quarter of 1 percent, compared to General Electric bonds, Triple-A bonds, for a nonoil company.

So the specific answer to your question is that so far the markets have responded to an increasing share of oil company requirements needed from the outside. They are financing three-quarters of their requirements today. They financed almost 90 percent of their requirements 5 years ago.

Our concern is to what degree the external markets can continue to respond at a reasonable price, if that percentage continues to decline.

The CHAIRMAN. Thank you very much, gentlemen. That was a very good statement. I will see to it that the other members of the committee are made fully aware of what you said, in view of the fact that some had to leave, as you know.

I appreciate your taking the time to appear before us.

[The prepared statement of Mr. Golden follows:]

STATEMENT OF RAYMOND L. GOLDEN, GENERAL PARTNER, SALOMON BROS.

Mr. Chairman, my purpose today is to speak to certain financial aspects of the Energy Tax Act of 1977. I do so as a General Partner of the investment banking and underwriting firm of Salomon Brothers.

As my remarks will show, I am concerned that current and proposed actions in the energy field, including the enactment of this Bill in its present form, would lead to inadequate financial means to implement our national energy goals as enunciated by Administration representatives and set forth in pending legislation. I refer, specifically, to the need to "develop this Nation's indigenous energy resources" and to reduce "the level of oil imports".

In preparing this testimony, I have reviewed the Energy Tax Act of 1977, the existing legislation concerning the pricing of crude oil and the statements made by various Administration spokesmen in proceedings before this and other committees in the Congress and in other forums. I have been disturbed to read optimistic assessments of the financial capacity of the oil industry to carry out the programs needed to attain our energy goals. One example of such an optimistic view was that expressed before this committee by the Honorable James R. Schlesinger, Secretary of Energy, during the hearings of August 8 and 9. For example, on pages 11 and 12 of the transcript, Secretary Schlesinger said in response to a question from Senator Packwood:

"With regard to the question of the financial capacity of the oil industry, let me indicate profits have doubled in these last four years. All the major companies recognize that they are awash in cash flow. They are unable to place that cash

into exploration. . . . The problems of the oil companies is (sic) not a problem of cash flow."

"If you take the President's program on oil and gas together, there is an expansion of revenues of the oil and gas industry relative to what would otherwise have been the case with the continuation of current policy."

I must respectfully express my fundamental disagreement with the Secretary's financial conclusions regarding the oil industry. First, the Secretary refers to oil company profits without considering the enormous size of oil company capital expenditures. In fact, it is impossible to come to any reasonable conclusion about the adequacy of oil company financial resources without simultaneously considering the requirements which will be necessary to carry out the nation's energy goals.

Salomon Brothers has analyzed the financial performance of 35 leading U.S. oil companies. This analysis shows that, while oil company net income increased by some \$5.8 billion between 1971 and 1976, oil company capital expenditures increased by \$14.7 billion or some two and a half times more than net income.

With respect to being "awash in cash flow", our analysis shows, on the contrary, that the share of oil industry capital expenditures financed externally has more than doubled from 13 percent in 1971 to 26 percent in 1976. In dollar terms, issuances of long term debt and equity by oil companies rose from \$4.2 billion in 1971 to more than \$9.3 billion in 1976.

As regards inability to place cash into exploration, I would maintain that if this is a problem, it is a near-term one for a very limited number of companies. Whether it becomes a long-term problem for the industry will depend primarily on government actions, particularly the rate of leasing of most prospective areas of the Outer Continental Shelf and Alaska.

Finally, as regards increased revenues to the industry accruing from the President's program on oil and gas, my analysis would indicate the opposite impact. For the near-term, there clearly will be no revenue gain, because oil pricing will continue to be regulated under existing legislation and intrastate gas will become subject to price regulation, with consequent reductions in revenues. Moreover, I have been advised that, various expert studies, including one by the General Accounting Office, have concluded that, for the long term, lower oil revenues will result.

I have similar concerns about statements made by other leading Administration spokesmen.

Thus, on August 9 before this Committee, the Honorable W. Michael Blumenthal, Secretary of the Treasury stated:

"Turning to the crude oil equalization tax, I am persuaded that there are many incentives under this increased price for new oil and gas that is allowed that provide for substantial incentives for additional production. I do not believe that we need a plowback of any of the additional revenues on old oil because all of the analysis that I have seen persuades me that there is plenty of cash available, plenty of cash flow available, plenty of resources available to expand the total supply of energy resources in this country." (Page 58).

In my opinion, Secretary Blumenthal does not accurately describe the impact of existing price regulations on oil company cash flow. And, as did Mr. Schlesinger, he considers oil company cash flow in a vacuum without regard to the burgeoning capital requirements of the industry. The "many incentives" that the Secretary states are now being offered for new exploration in fact net out to virtually no additional contribution to oil company cash flow under the workings of the "composite" ceiling price provisions of the Energy Policy Conservation Act of 1975 (EPCA).

Finally, President Carter stated in his Address to Congress on his National Energy Plan that:

"Government policies must be predictable and certain. Both consumers and producers need policies they can depend on so they can plan ahead."

In my opinion, the lack of predictability and degree of political and regulatory uncertainty surrounding the oil industry has been a material factor in the below average performance of oil company securities in the capital markets.

During my testimony, I will elaborate on each of these areas bearing on the adequacy of the oil industry's finances. In particular, I will provide my views on the industry's external financing requirements and will show how these prospects are affected by changes in the industry's outlook for the internal generation of funds.

From my perspective, unpredictable changes in regulatory philosophy and one-sided analyses of industry financial requirements from the regulatory sector lead to a progressive deterioration in investor perception of the oil industry and its securities. It is essential that this climate be improved. I will now proceed to my detailed comments.

ANALYSIS OF CURRENT LEGISLATION

It is my opinion that certain facets of current and proposed oil price regulations in fact impair the ability of the petroleum industry to invest the capital sums necessary to provide the Nation with adequate energy supplies. According to Federal Energy Administration estimates, investments in domestic exploration and production should increase from \$10.2 billion per year in the 1973 to 1975 period to an average of \$20 billion per year in constant 1975 dollars in the next decade. Translated into current dollars (using a 5.5-percent inflation rate), this would result in \$27 billion per year of capital investment, or almost a three-fold increase over the 1973-1975 past outlays.

I believe that the ultimate result of the existing and proposed legislation would be to restrain potential investment and, thereby, further increase dependence on imported oil, with obvious, adverse effects on our national and economic security. Moreover, the growing oil import bill, which is estimated at \$40-\$43 billion for 1977, would continue to increase, compounding our already serious balance of payments problems.

My focus in this section will be on items which, in my opinion, could affect oil company cash flow in a manner which could impair or wholly frustrate the successful implementation of our national energy goals. These items are: 1. crude oil equalization tax; 2. composite pricing of oil; and, 3. natural gas pricing.

Crude oil equalization tax

The National Energy Act proposes that the net receipts from crude oil equalization taxes would be returned to each taxpayer in 1978 in the form of a new tax credit. (H.R. 8444, Title II, Section 2034)

This is a peculiar twist. One could readily understand increasing the price of petroleum products to act as a disincentive to consumption and simultaneously reinvesting the incremental revenues in order to stimulate greater domestic production and reduce dependence on oil imports. Instead, the proposal goes halfway and then does an about face. It neither provides incremental revenues to producers nor does it really penalize consumers on a dollar for dollar basis.

The mechanism merely shifts revenues among consumers without increasing financial resources available to producers.

In his address to Congress on the National Energy Plan, President Carter stated that "we are only cheating ourselves if we make energy artificially cheap and use more than we really can afford."

I agree with this statement wholeheartedly. I disagree entirely that the proposed crude oil equalization tax constitutes an effective application of this laudatory principle.

The tax does nothing to increase production from reserves on hand and totally ignores the maintenance expenditures and further investment required to continue to product existing reserves. We should use the incremental revenues generated by the tax by reinvesting these revenues in new exploration efforts and in the pursuit of greater yield from existing petroleum sources.

Composite oil pricing

Under the Energy Policy and Conservation Act, the composite price of domestic crude oil was rolled back and set substantially below the world market price for crude oil. While the legislation envisioned a gradual escalation in the price of crude oil over the life of the Act to compensate for inflation and provide some incentive, in practice this has not occurred because of the composite price mechanism. Under EPCA a considerably higher price was set for new oil than for oil from existing reserves to act as an incentive to explore for and develop new reserves. However, since increasing volumes of new oil resulted in a higher composite price of crude oil than anticipated, the FEA enacted price freezes and rollbacks to keep the composite price within statutory limits. This has curbed incentives to explore for and develop new reserves, and impaired the capital generation needed to finance such activity.

As the proposed energy bill does nothing to eliminate or modify the composite price system, any action by the Administration to add another pricing tier for

so-called "newly discovered oil" at the world market level, would merely reduce the constant dollar price of existing oil. It would not do nothing to increase the industry's incentives to squeeze additional oil from existing fields.

In simple language, what they give with one hand, they take away with the other because of the composite price.

Natural gas pricing

In addition to the difficulties perpetuated by the present legislation for oil pricing, there are also new difficulties which will be imposed on natural gas pricing, specifically, through the extension of price controls to intrastate gas. The higher new interstate gas prices are a welcome indicator, yet we again fail to see the requirement for continued controls here when the overwhelming evidence suggests that unregulated prices are a superior policy.

In summary, we find that the current legislation simply adds more regulation on top of the existing regulation. The truly dangerous aspects is that in its present form, it surely will do much for greater government controls but little for greater energy supply. We can look to the future and see a government frustrated that supply is not forthcoming and demand growth is not adequately diminishing.

The petroleum companies

In the popular mind, petroleum companies as a group tend to be thought of as giant, world scale companies.

In point of fact, the petroleum industry includes a full spectrum of entities widely diversified in size, the use of debt and debt credit rating.

The Salomon Brothers analysis of 35 oil companies mentioned above, includes international integrated companies such as Exxon, Texaco, Mobil, Gulf and Standard Oil Company of California. These are all world scale companies bearing the highest credit rating, Aaa/AAA (with the exception of Texaco which is currently rated Aaa/AA+). These companies range over a size relationship of three to one including Exxon with \$2.6 billion of net income and capital expenditures (excluding exploration costs expensed) in 1976 of \$4.1 billion down to Gulf with \$816 million of net income and capital expenditures of \$1.4 billion.

Our analysis also includes 17 domestic integrated companies ranging in size from Standard Oil Company (Indiana) with 1976 net income of \$892 million and capital spending of \$1.4 billion down to Murphy Oil Company with net profits of \$48.9 million and capital spending of \$156 million.

In comparison to the international integrated companies, the domestic integrated companies are generally rated Aa/AA but also include companies whose debt is rated Aaa/AAA and Baa/BBB.

The balance of the Salomon Brothers analysis of 35 U.S. petroleum companies includes diversified companies such as Occidental Petroleum and Pannzoll rated A/BBB and Baa/BBB, respectively, and crude oil producers which are, generally, smaller companies with no rated debt outstanding. Typical of such companies is Mesa Petroleum with 1976 net income of \$30.7 million and capital spending of \$112 million.

Beyond these companies, there are literally thousands of still smaller companies, as well as partnership and sole proprietorships which engage in domestic exploration and production operations.

As indicated, the tabulation of 35 major U.S. petroleum companies established by Salomon Brothers includes corporations of which the largest, in terms of revenues, is some 100 times greater than the smallest. It also includes corporations whose creditworthiness is considered to vary over the full spectrum of rated corporate debt. Finally, as indicated each of the companies maintain extremely ambitious capital spending programs.

THE MARKET FOR OIL COMPANY SECURITIES

We have examined the methods employed by the group of 35 petroleum companies to finance their capital expenditure requirements. The principal finding which emerges from this analysis is that these oil companies have sought to meet the soaring capital requirements of their industry while protecting their creditworthiness by largely matching internally generated funds to capital expenditure programs. When internally generated funds have risen in the industry, as a whole, capital expenditures have generally remained in step with the increase in available financial resources.

Available internal resources have not been, however, adequate to enable the companies to meet all of their capital expenditure requirements; consequently,

they have also sought to employ a full range of supplementary financing sources in a manner consistent with the protection of their creditworthiness. These have included the sale of common stock, long term borrowing; and a variety of other measures including disposal of assets, sale of future production, project financing, joint venture investments and lower dividend payout ratios.

Because of its greater availability and lower cost, oil companies have primarily resorted to long term debt issues to complete their capital expenditure financing requirements.

Straight debt issuances by petroleum companies have risen from \$3.98 billion in 1971 to \$8.5 billion in 1976.

While the markets have successfully absorbed petroleum company debt issues in this year and in preceding years, they have done so at a measurable cost penalty to the issuers. Indeed, irrespective of their credit ratings, the outstanding bonds of virtually all leading petroleum companies tend to trade at a lower price and hence higher yield than do similarly rated bonds of industry issuers outside of the petroleum industry. At the present time, this rate penalty is on the order of 15 basis points for the typical double A petroleum company issuer. In prior periods during which interest rates were higher and the interest cost spreads between debt rating grades greater, this penalty has moved as high as 35 basis points. Consequently, oil companies have been forced to absorb a higher interest expense than similarly rated issuers in other industries.

These cost penalties imposed on oil companies by the financial markets may be considered to be a form of early warning indicator. If oil company issuers seek to come to the external markets too often, for too much of their total fund requirements, while suffering a consequent erosion in their key financial ratios, then their ability to satisfy their capital requirements in order to meet national energy goals at acceptable cost in the market will ultimately be frustrated.

External contributions to equity have also been realized by a wide range of petroleum companies in recent years. These have been carried out either through direct issuances of common stock, conversion of outstanding convertible debentures, and limited preferred offerings.

Equity issues by the 35 oil companies in the Salomon Brothers analysis rose from \$197 million in 1971 to \$382 million in 1976. This represents more than a four-fold increase in the industry's need for external equity to protect its balance sheet ratios.

These equity issues have helped the issuers finance their capital expenditure programs but have done so at a considerable near term cost, in terms of reduced growth in earnings per share.

This dilution is aggravated by the low price earnings ratios at which petroleum company common equities have recently traded. At the end of 1976, the median price-earnings ratios of all stocks with earnings was some 8.0 times. In comparison, the average price earnings ratio of integrated petroleum company stocks for the same period was only 6.8 times, some 15 percent below the median.

A number of leading investment surveys including our experience with major institutional investors find little current appeal in petroleum industry shares.

As an investment banker, I interpret the interest rate and price earnings penalties that oil companies securities now suffer in the markets as a warning. The capital markets are composed of an enormous range and number of institutional and individual investors with varying investment criteria with respect to risk and return. Thus, the penalties imposed today on oil company securities represent a consensus view from an extremely large population of providers of capital funds. These investors, both institutional and individual, are demanding higher levels of return than they demand from similarly rated securities in other industries to finance approximately 30 percent of oil company construction programs. If the result of the proposed legislation is a greater share of oil company fund requirements from the external market, we would logically have to assume that the cost penalties to be borne would be proportionately higher. Thus, at some point, the companies would be unwilling or unable to pay the price and, therefore, would be obliged to mount smaller capital investment programs.

The level of capital expenditures

We have analyzed the pattern of internal financing to capital spending for the 35 companies in our sample companies over the past six years. During this period, capital spending has risen far more than retained cash flow.

In 1971, \$9.1 billion of retained cash flow financed 89 percent of the industry's \$10.3 billion of capital expenditures. As retained cash flow grew in the post-

embargo years, capital expenditures first lagged (in 1973 and 1974) and then outpaced cash flow. By 1975, cash flow covered only 69 percent of the industry's \$21.4 billion of capital expenditures. The ratio improved in 1976 to 74 percent however, this was a substantial decline in the self-financing ability of the industry compared to historical levels.

Indeed, the ratio of net income to capital expenditures for the industry in 1975 and 1976 fell below 50 percent, a historical low in recent oil company history.

This slippage in the ratio of internal funds capital spending had a consequent effect on corporate balance sheets. The 35 companies in our sample increased their long-term debt outstanding from \$11.0 billion in 1967 to \$33.7 billion in 1976. This translated into an increase in oil company reliance on debt from 19.9 percent in 1967 to 27 percent of permanent capital in 1976.

CONCLUSION

As investment bankers, we would be very concerned to see legislation which creates a conflict between preservation of industry creditworthiness and satisfaction of national energy goals.

Erosion of creditworthiness, whether for a company or an industry, tends to be a process difficult to halt once initiated. The fact of the matter is that the companies who bear the greatest share of the responsibility for this country's capital expenditures in developing indigenous energy sources are those whose credit ratings must be most jealously protected. It must be recognized that the issuance of debt and equity by oil companies does not occur in a vacuum, but rather occurs in an efficient capital market in which the oil industry is but one participant. It must continue competing for funds with other industries who are not burdened by extraordinary risk and uncertainty stemming from government actions. You can legislate the level of internally generated funds through price controls but you cannot legislate capital allocation decisions in the financial markets.

Our plea to you is that in using your legislative responsibility you be, first of all, consistent; if you believe, as we do, that the cost of developing indigenous energy supplies will be a rapidly increasing one, then you must not act in a manner which incorporates the unverified assumption that the financial markets will assume a greater and greater share of these programs. A decline in traditional self-financing ratios will be measurable in increasing yield penalties for oil company bonds and decreasing price earnings ratios for their shares. The logical result of this process will be less capital formation and hence less energy development.

We believe that the most cost-effective solution for the nation in carrying out the massive energy program needed to meet the goals of the Act is to protect oil company creditworthiness through the avoidance of unnecessary obstacles to adequate cash flow.

The CHAIRMAN. Next, we will call Mr. Rogers Billings, president, Billings Energy Corp. I see he is not here.

Mr. Thomas V. Patton, National Oil Jobbers Council.

STATEMENT OF THOMAS V. PATTON, PRESIDENT, NATIONAL OIL JOBBERS COUNCIL

Mr. PATTON. Thank you, Mr. Chairman.

I am Tom Patton and I am a gasoline oil jobber, Mr. Chairman, from Doraville, Ga. My perspective is therefore from the standpoint of marketing the finished product.

My purpose in being here today is to represent the 12,000 members around the country who make up the National Oil Jobbers Council. Our members cover the entire country, providing some 75 percent of all heating oil sold in this country and about a quarter of all the gasoline. Our members also serve some 90 percent of all America's farms.

In that diversity, we interface with the consumer rather closely. We think, therefore, we have some unique expertise regarding the energy program of this country.

Mr. Chairman, we have submitted to you a rather lengthy statement. I am going to, if I may, just talk here, openly from a few notes that I have and not read the entire statement.

Let me say first of all, starting early in this year, the leadership of our group came together to try to tackle this question, after having dealt with it in our own minds for several years, the question being, what is the proper American energy policy?

From that, we fashioned a plan that we think is a rather good one. We think the best things relative to energy in this country from the standpoint of the small businessman came together on that plan.

The document was discussed in great detail with a number of leaders in the administration. Many of the ideas that we expressed, particularly those that were conservation oriented, were included in the plan submitted by the President to the Congress. In much of the conservation area we find ourselves in accord.

But on many other areas, Mr. Chairman, we find that we cannot concur. This disagreement has to do particularly with the question of taxation. We have found ourselves, I guess, a bit frustrated in conversations with the administration in this regard. We seem to find some sense there that too many of our leaders feel that we cannot solve the problem, that we must simply learn how to live with this.

We cannot accept that. We think the problem can be solved.

The original plan which Mr. Carter proposed had two taxes in it on petroleum. The first one, as you remember, was a standby tax on gasoline, but was to take effect if conservation goals were not achieved. That was rejected overwhelmingly by the House Ways and Means Committee. A modified version of the tax, the permanent 4-cent tax increase, was rejected by the full House by a 7 to 1 margin.

We hope that we have seen the last of a direct Federal gasoline tax. But in our view, the proposed crude oil equalization tax is even worse.

Every criticism that can be levied on the gasoline tax has got to be equally true, or even more so, with the hidden tax. It does not conserve energy in that it has been long since proven, I think, that energy demands, particularly in the form of gasoline, is almost inelastic.

During the Arab embargo where we had those massive jumps in price, the demand curve hardly altered.

Additionally, this tax discriminates against consumers in States with high per capita consumption of gasoline. It continues to increase regardless of consumption, since it is based on the world price of oil. We think it surrenders pricing authority over all crude oil to the OPEC countries. It is regressive. It impacts on the poor and on the elderly, particularly those living in rural areas.

Also, Mr. Chairman, these problems go beyond transportation. It flows into food, in the sense that fertilizer is going to be more costly; to clothing, in that petrochemicals are going to be utilized; and the price of housing, and so on. Throughout the whole economy of this country, the impact will be there.

Our biggest objection is that we have no additional incentives to supply us with additional crude oil.

Rather than trying to make this inequitable tax work, we should be putting our heads together, it seems to us, to find more energy. That is what this country needs. That is the problem that we must solve.

There must be literally hundreds of thousands of ways to solve the problem of increasing production. That is not our field of expertise, but in the testimony given to you formally, we reflected one idea that came from our own group, which we think makes some sense.

All we suggest by this is that this country is made up of brilliant minds who can indeed solve this problem, if given the opportunity.

Mr. Chairman, if all of that fails, and if at the final ditch it becomes this committee's judgment and the judgment of the Congress that there is going to be a tax, then in some way we must find ways to use the vast majority of that tax toward increased production.

It seems to me to be essential to this country. It is ludicrous, we think, in the extreme, to rebate revenue at a rate of \$22 per adult American, a pure absurdity. Last year, in the Congress, there were 15,000 ideas proposed in legislation. Surely there is one better idea of how to handle this problem.

I do want to comment that as repugnant as the whole scheme of rebates are to us, that if we end up with the tax, then we find it essential that we support, and that the Congress support, some kind of rebate for the users of home heating oil and propane, so as to alleviate the inequitable burden placed on heating oil and propane use as a result of other aspects of the plan.

The plan proposed by the President and approved by the House insulates consumers of natural gas and electricity from abrupt price increases, without a heating oil-propane rebate, no similar protection is provided users of those kinds of fuels.

Additionally, we support vigorously that portion of the bill which grants tax credits for certain energy conservation devices, but the list of devices should be expanded to include boiler and furnace replacements in a person's home.

In many cases, if that boiler and furnace are over 10 years old, it makes very little sense to replace the burner only. To maximize energy efficiency, the tax credit should be extended to include both.

We also hope that if the question of the electric heat pump arises again, that this committee will not let it be subject to similar tax credits because of its inefficiency relative to oil and natural gas; in electrical generation, two-thirds of the oil or natural gas Btu content is lost in the transmission to the point of use.

Perhaps, the most serious failing of the heat pump in terms of energy conservation however is that almost all of these devices are also air conditioners. Any promotion of the electric heat pump will add to the electric utility load in the summer, at the very time most utilities experience their season peak.

Mr. Chairman, in summary, let me say that nothing in our lifetime, I suppose, is more important than this question. You are working under a 30-day deadline to wrap this up. Lord knows, we need all manner of time to do this correctly.

The administration is wrong when it claims that a crude oil equalization tax bill will induce conservation. The hard reality is that our homes, our schools, our factories, our offices, our places of worship and recreation are underinsulated, widely dispersed, interconnected by the system of roads on which we operate almost 100 million vehicles.

To tax those patterns of living of every consumer and every busi-

nessman punishes him needlessly, and it would be equally wrong on the part of this committee and this Congress to let that continue.

The President started us off on the right road in focusing on the energy problem. The 12,000 of us who make up the NOJC now believe we must go ahead and complete that journey correctly. Thank you, sir.

The CHAIRMAN. Thank you for your statement.

[The prepared statement of Mr. Patton follows. Oral testimony continues on p. 860.]

STATEMENT OF THOMAS V. PATTON, PRESIDENT, NATIONAL OIL JOBBERS COUNCIL

SUMMARY

I. NOJC represents 12,000 small, independent petroleum marketers throughout the country. Members market 75% of the heating oil and 25% of the gasoline used in the country.

II. The Council, though pleased that the President adopted many of the suggestions recommended by NOJC early in the year, adamantly opposes the standby gasoline tax and the crude oil equalization tax.

III. Our opposition to the equalization tax stems from the fact that it is regressive, contains no additional production incentives, is discriminatory, surrenders the pricing authority over all crude oil to the OPEC countries, and will not conserve additional amounts of energy. Other specific objections to the tax are listed on page three of the statement.

IV. Our members feel that if the insidious hidden tax is enacted most of the revenue must be used for additional production incentives. Additionally, the revenue should be used for a heating oil rebate. Such special consideration for users of home heating oil is necessitated by the fact that other aspects of the plan insulate natural gas and electric uses from abrupt price increases. We reiterate our position, however, that we are opposed to the tax.

V. NOJC feels the items which are listed in the bill as eligible for residential insulation tax credits should be expanded to include replacement boilers and furnances as well as burners, since in many situations this would lead to the greatest energy savings. We also express our opposition to the heat pump being considered as an energy conservation device.

VI. We will be more than happy to work with the committee on any point or issues raised in this testimony.

PREFACE

The National Oil Jobbers Council is a federation of 43 state and regional trade associations representing thousands of independent small business petroleum marketers. Members include gasoline and diesel fuel wholesalers, commissioned distributors of gasoline, gasoline reseller-retailers and a large number of retail fuel oil dealers. Members also wholesale or retail many other petroleum products, including kerosene, LP gas, aviation fuels and motor oils as well as residual fuel oil. Together our members market approximately 75 percent of the home heating oils and 25 percent of the gasoline sold in America under either their own private brand or the trademark of their supplier.

Good morning. My name is Tom Patton and I am grateful for the opportunity, as President of the National Oil Jobbers Council, to speak before this committee today. NOJC is a federation of state and regional trade associations representing 12,000 independent small businessmen marketers of gasoline, home heating oil and a variety of other refined petroleum products.

Because we are small, highly competitive, independent of the major oil companies, and close to the consumer, we believe we can offer some special insight into the formulation of the national energy plan. Our unique perspective and experience could be of valuable assistance in the development of effective and equitable energy policies.

The independent marketers represented by the National Oil Jobbers Council welcomed Dr. Schlesinger's invitation to submit our ideas for inclusion in the National Energy Plan. The proposals we offered emphasized incentives to achieve conservation in the short term and increase production of energy for the future. We called these recommendations "An American Energy Policy". A copy of that plan is attached to our comments for the convenience of the committee.

On April 20 our members were pleased to learn that many of their suggestions had been incorporated in President Carter's program. Most of the principles which he selected as a basis for his program were similar to ideas we had emphasized. Conservation to reduce demand to a level consistent with the real cost of replacing the energy we use.

An emphasis on incentives rather than mandatory restrictions on our citizens. Energy prices which stimulate production and reflect the true replacement cost of oil and natural gas.

Fairness, especially through equal treatment of similarly situated end-users. And while the principles are not as consistently applied as we should wish, many of the President's specific measures were also quite similar to our own suggestions. Our members strongly supported and continue to support the President's proposals for:

Tax credits for thermal efficiency measures in residential buildings;

Federal insurance of credit extended for residential energy conservation measures;

A residential energy conservation program in which independent heating oil dealers and heating equipment contractors can compete fairly with electric and gas utilities;

Electric utility rate reform based upon cost of service;

Excise taxes on inefficient vehicles coupled with rebates for efficient cars and trucks;

Avoiding import quotas and end-user rationing;

Incentives for the development of all conventional resources including oil, natural gas, coal, and refining capacity both domestically and abroad;

Maintenance of appropriate environmental guidelines for the development and use of coal;

Programs and incentives for the development of oil shale and coal liquefaction;

Programs and incentives to develop solar and other renewable resources; and

Use of nuclear power only after safe and standardized technology is in hand and only to the extent that other alternatives cannot meet this nation's energy needs.

With this general observation in mind, let us turn to specific issues within this committee's preview.

NOJO IS OPPOSED TO THE HIDDEN TAX ON GASOLINE AND OTHER PETROLEUM PRODUCTS

The plan originally submitted by President Carter on April 20, called for two taxes on petroleum which would fall primarily on gasoline. The first, a standby gasoline tax which would add a nickel per gallon tax each year if conservation goals are not achieved, was rejected overwhelmingly by the House Ways and Means Committee. A modified version of the standby tax, a permanent 4¢ per gallon increase to be phased in 1978-79, was rejected by a 7-1 margin.

We applaud the House's action on this proposal. The inelasticity of demand for gasoline is well recognized. In 1973, when the price of gasoline rose 50 percent in a few months, consumption continued to grow until an embargo made growth impossible. After the embargo gasoline demand resumed its historic pattern of growth.

In addition, the gasoline tax discriminated against citizens in the less populous states who are far more dependent per capita on gasoline than are those citizens living in our urban centers. These states are also the areas in which no alternative such as public transit is or can be made available.

But Mr. Chairman, I have to say that as bad as the standby gasoline tax was, the crude oil equalization tax proposed by the President and approved by the House, is worse. All of the things that are bad about the gasoline tax are equally true, if not more so, with what we like to call the hidden tax on crude oil.

There are several specific objections to the hidden tax:

The tax will not conserve significant amounts of petroleum since demand for gasoline and heating oil is relatively inelastic;

The tax discriminates against consumers in states with high per capita consumption of gasoline since rebates will be given on a per taxpayer basis;

The tax is regressive and impacts severely on the poor, the elderly on fixed incomes and those citizens who live in rural areas;

The tax continues to increase, regardless of consumption, since it is based on the world price of oil;

The tax virtually surrenders the pricing authority over all crude oil to the OPEC countries;

The tax could lead to increased imports of gasoline and home heating oil since domestic refineries will be placed at a competitive disadvantage relative to foreign refineries thus exacerbating the country's balance of payments problems;

The tax, because it applies to all petroleum products, is sure to increase consumer prices for goods from industries such as plastics, agriculture, textiles and clothing which rely on petroleum and petroleum products in the manufacture or production of their goods.

But perhaps the most serious failing of the tax is that it contains absolutely no incentives for bringing about additional production. The Council does not represent producers, but we, the American consumer and you have a vital interest in assuring that adequate supplies of petroleum continue to be available. We believe strongly that the assumption that additional supplies are unavailable threatens the very economic stability of this country.

We must be creative, Mr. Chairman. We must devise new ways to encourage increased production. The best minds in our country should be at work developing numerous alternatives for improving the adequacy of petroleum and natural gas supplies.

As an example, we at NOJC believe one such idea is to allow producers to use the non-inflationary appreciation (i.e. the difference between old oil and the new oil price) on existing oil assets as security to which any lender may acquire title wherever a new domestic well for which that lender has extended credit becomes a dry hole. When an exploratory well fails, the lender could secure a steady return of his capital with interest if the price of the oil or natural gas from the existing well(s) used as security were allowed to rise to the level of the price for new oil or new natural gas subject to the requirement that the producer must then pay the additional revenues to the lender or his assignee. In this way losses on a dry hole are absorbed by the differential and not by the capital market to which every secured loan eventually returns money with interest. Equalization taxes and tax credits to distribute equalization taxes become unnecessary as do entitlements eventually. And, the prices which consumers pay for petroleum and natural gas rise gradually to the free market level as dry holes use up this asset. Naturally, the producer would have a powerful incentive to drill in higher risk situations—offshore, deeper, more inaccessible locations, and geologically marginal areas.

We realize this suggestion is far from perfect and that many details would have to be worked out. The point is that, we feel this demonstrates some creative thinking on providing additional production incentives without enactment of an insidious, regressive tax. We are sure there are thousands of ideas with equal merit. We only hope they be fully considered before Congress rushes headlong into enacting a tax which adversely impacts every consumer in this country.

If in your committee's wisdom, Mr. Chairman, the tax should be enacted then it is absolutely essential that most of the revenue be utilized for additional production incentives. We feel it is foolhardy to use such revenue to return \$22 per year to each taxpayer. We also reject the ideas that the funds be utilized for mass transit of welfare and tax reform. Although there may be many admirable ways to utilize this money, I hope the committee can see the inequity of imposing a regressive tax on the citizens of this country to do so.

Our fuel oil marketers also feel, and rightly so, that if this tax is put into place that a heating oil-propane rebate must be included to prove equal treatment of similarly situated end-users of various home heating fuels. And although the entire idea of consumer rebates is repugnant to the majority of our members, special consideration for users of home heating oil and propane is necessitated by other parts of the plan which insulate residential and natural gas consumers from abrupt price increases.

Because the President has chosen to continue the practice of regulating natural gas prices at less than market levels, the Congress should recognize and give consideration to the inequitable burden placed on consumers of home heating oil. This consideration should include a direct consumer rebate to agricultural and residential users of home heating oil and propane.

But do not misunderstand us, Mr. Chairman. Our members, be they from the Northeast, North Central, South Central or the West, see better solutions, to solve our energy problems than enactment of this insidious tax.

TAX CREDITS FOR ENERGY CONSERVATION MEASURES

Due to the time constraints facing you today I have limited my discussion to only a few of the many vital issues in this legislation.

The Council does, however, offer its support for many aspects of the bill as well as the rationale for supporting them. For example, we strongly endorsed tax credits for thermal efficiency improvements to residential buildings in our comments to Dr. Schlesinger. We are pleased that our suggestion is a part of the package before you, but believe that further perfecting amendments are required. We believe the tax credit provisions should be extended to include not only the minor retrofit measures but full replacement furnaces and boilers as well. Attached is an article from a recent Fuel Oil News which clearly illustrates that in many cases merely replacing a homeowner's burner is not always the best way to increase energy efficiency. Many times the furnace as boilers must also be replaced to maximize energy savings.

We also feel Mr. Chairman that the Secretary's authority to add additional items to the equipment list eligible for the insulation tax credit should be clarified to require that all newly proposed conservation measures be judged on source to site efficiency and not just on site efficiency. Restricting the efficiency analysis to the point of consumption will provide gravely misleading information with respect to utilization of energy.

To illustrate the significance of the source analysis approach we would use as an example an electrical device which is often characterized as an energy conservation measure—the electric heat pump.

If the heat pump is credited with an on site co-efficient of performance (C.O.P.) of two, which necessarily assumes that the temperature drops no lower than 32 degrees fahrenheit, the total efficiency of the system's energy use is only $0.3 \times 2.0 = 0.6$ where 0.3 is the efficiency level of an electrical generating system using fossil fuel and 2.0 is the heat pump C.O.P. Thus using a generous assumption, the efficiency of a heat pump is barely 60 percent.

The lowest oil heat efficiency in any part of the country is 65 percent to 70 percent. Hence, in terms of efficiency energy use, fuel oil in conventional furnaces comes closer to realizing the objective of significant resource savings than an electric heat pump because the amount of energy consumed to generate electricity for the heat pump is greater than the amount directly consumed in producing the same warmth at the site.

Only when compared to electric resistance heating, can a heat pump be a viable conservation alternative. When compared to gas and oil heating systems, a new heat pump is not as efficient as existing installations. Because of the inefficiencies involved in the generation and transmission of electrical energy, close to 70 percent of the BTU's in the fuel burned at the generating source is lost before it reaches any electrical device.

Electric heat pumps have also suffered from high operating and maintenance costs. But the other most serious failing in terms of energy conservation is the fact that almost all of these devices are air-conditioners. Thus, promotion of electric heat pumps will add to the electric utility load in the summer, the very time when most utilities experience their system peak. This will result in the need for additional generating capacity rather than conservation.

CONCLUSION

In summary, Mr. Chairman, I want to reiterate our sincere desire to work with your committee, with the rest of the Congress and with the President in the finalization of a comprehensive national energy policy. Nothing in our lifetime is more important.

We simply cannot concur with the administration's claim that the crude oil equalization tax will induce conservation. The hard reality is that our homes, schools, factories, offices and places of worship and recreation are under-insulated, widely dispersed, and inter-connected by a system of roads on which we operate almost 100 million inefficient vehicles. To tax these patterns of living punishes every consumer and businessman who relied upon the government's previous longstanding policy of cheap energy.

Prices incentives and disincentives should be applied where the consumer has a real choice about future consumption—in the new car show room and during the furnace tune up—and not at the pump or in the heating bill where the consumer can only pay for past mistakes. The President's program wisely recognizes

these appropriate opportunities and would apply incentives and disincentives at these vital points. An additional tax on the fuel itself is not only redundant, but also severely punishes every segment of our society.

The President has brought us a long way down the right road. We appreciate your giving us this opportunity to explain to you how 12,000 petroleum product marketers believe this nation should complete that journey.

Thank you for your attention and I will be pleased to answer any questions.

[From the Fuel Oil News, August 1977]

A DIFFERENT APPROACH TO RETROFIT: "REPLACE THE WHOLE HEATING PLANT"

WHY MONTOUR AUTO SELLS NEARLY 600 BOILERS AND FURNACES A YEAR

There is much talk these days about upgrading residential fuel oil systems by retrofitting them with modern, high efficiency burners. Many dealers are doing just that and are reporting excellent profits plus improved customer relations resulting from fuel savings.

Dick Thomas thinks such dealers are making a serious mistake—both for themselves and their customers. He feels so strongly about this that he often discourages his salesmen from selling burners for retrofit. His discouragement has been so effective that last year his company sold only 13 new burners. And the salesmen who brought in those orders had to have strong arguments before Thomas would approve the installations.

"We believe that in almost every instance where it makes sense to replace a burner, it makes even more sense to replace the entire heating plant," Thomas explains. "The customer will get his money back in approximately equal time. We have very detailed records to substantiate this."

Thomas is vice president and general manager of Montour Auto Service Company, Montoursville PA, one of the most successful dealerships in the country when it comes to equipment sales. Last year alone it sold and installed more than \$1.6 million worth of equipment to its oil heat customers in north central Pennsylvania. Equipment sold included 325 boilers, 266 furnaces, 57 air conditioning units, 267 oil-fired water heaters, plus those 13 burners.

PRESIDENT SLOWS PACE

Through April of this year, boiler and furnace sales were running at a pace slightly ahead of last year but then slowed noticeably immediately after President Carter's energy message to the nation.

"We felt a chill right after the talk," Thomas reports. "Strangely, while his emphasis on conservation strongly reinforces what we have been telling customers, people seemed to be hesitating. We think it is because they are waiting to see what Congress is going to do about tax incentives. If we are correct, we expect to be swamped with work when the energy package clears Congress."

Before the slowdown, which may prove momentary, Thomas was hoping to sell almost \$2 million in new equipment this year. All of this in an area with relatively little economic growth and not much new housing. As in the past, the great bulk of the sales are expected to be from existing customers.

RECORDS PROVIDE LEADS

Leads for sales come mostly from within the company. Servicemen are encouraged to report equipment that is due for replacement, of course, but the most valuable source of leads is the company's file of meticulously kept records on customer equipment.

It is an article of faith at Montour that a boiler or furnace installed before 1967 is a prime candidate for replacement. Among the reasons:

Before 1967, many coal-to-oil conversions were made. Usually this involved merely installing an oil burner in a coal fire box. The low cost of oil at the time made loss of 5 to 20 percent efficiency inconsequential.

Before 1967, very few flame retention burners were used; CO₂ readings averaged 8 to 9 percent.

The average life of a forced warm air heat exchanger is approximately 12 to 15 years. To invest \$500 in a new burner for a 12 year old furnace only to have the heat exchanger fail in two to four years is not economically sound.

CAN DEMONSTRATE SAVINGS

Having installed almost 4000 furnaces and boilers during the past ten years—and having kept careful before and after records of oil consumption—Montour can usually estimate fairly accurately how much oil a project should save and how long the payback period should be. Montour cannot guarantee savings, of course, because it cannot control all the variables, customer use habits being one of the most important. But the company is not bashful about pointing out savings to the customer after the job is done and the consumption figures are in.

Recently, Thomas and a salesman were doing a solar assisted domestic hot water survey on an apartment building in nearby Muncy, Pa. The project reminded Thomas that Montour had replaced the building's boiler and domestic hot water installation in late May 1976. Analysing the customer's records, this is what he found:

During 294 days prior to replacement, the company had delivered 9798 gallons of oil to the building. The comparison time span was June 8, 1975 through March 25, 1976. There were 4820 degree days during the period. Thus, the plant was operating at a rate of 0.4919 DD per gallon.

After the new equipment was installed, during the 296 days from June 1, 1976 and March 25, 1977, deliveries totalled 6726 gallons. This was a much colder winter, of course, with degree days during the period totalling 5763. But the plant used 3074 fewer gallons, operating at a rate of 22.72 degree days per gallon.

Projecting the before and after figures to cover a full year, Thomas could demonstrate that the owner is saving 42.58 per cent on fuel bills.

"The figures speak for themselves in terms of gallons and dollars saved." Thomas wrote to the customer. "At the above rate you will pay off your new equipment investment in less than three years—which is phenomenal."

UTILIZATION EFFICIENCY COMPARISONS OF OLD AND NEW BOILERS INSTALLED IN 1976

Customer initials	Old unit combustion efficiency (percent)	New unit installed (1976)	Start-up combustion efficiency (percent)	1975-76 K factor	Estimated gallons used 1975-76	1976-77 K factor	Estimated gallons used 1976-77	Savings (gallons)	Savings (percent)
CV.....	71.75	April 22.....	85.50	2.51	2,480	3.87	1,654	896	36.6
LL.....	66.00	April 23.....	80.00	9.56	669	13.08	489	180	26.9
AH.....	78.00	July 6.....	81.25	5.46	1,172	12.24	523	649	55.4
JH.....	81.50	July 12.....	82.25	2.23	2,870	2.94	2,177	693	24.1
CA.....	80.25	July 19.....	85.75	1.94	3,299	2.60	2,461	838	25.4
RW.....	75.00	July 20.....	80.00	3.82	1,675	5.38	1,190	485	28.9
BP.....	73.75	August 11.....	82.75	4.66	1,373	6.59	971	402	29.3
BS.....	NT	August 31.....	81.25	2.68	2,388	4.07	1,572	816	34.1
KB.....	80.25	June 29.....	82.75	4.98	1,285	6.71	954	331	25.8
JM.....	NT	July 15.....	NT	2.56	2,500	4.09	1,564	936	37.4
KB.....	75.75	July 28.....	82.75	5.88	1,088	8.55	748	340	31.2
CD.....	78.25	May 7.....	82.75	5.88	1,088	8.68	737	351	32.3
RM.....	NT	May 14.....	83.75	3.67	1,743	4.97	1,288	456	26.2
RS.....	77.00	May 19.....	82.75	5.69	1,125	7.74	827	298	26.4
GW.....	76.50	July 2.....	83.75	4.37	1,465	6.36	1,006	459	31.2

1 NT—No test.

NOT THAT 'PHENOMENAL'

To the apartment owner, the results certainly must seem phenomenal. They shouldn't to the company. Results like this—and better—have become almost routine. The accompanying table shows results achieved this past winter with residential boilers for hot water heating. All boilers are Axeman-Anderson Custom Mark III's, models 87, 108 or 128 CPO. All were installed during the spring and summer of 1976.

The 15 examples shown are from a random sampling but are not themselves randomly selected from the larger sample. Shown are the top results. For the total random sample, overall average reduction in fuel consumption was 27.26 percent. This translates to an average of 443.7 gallons per home. It should be noted that the averages were brought down by a few installations that produced under 10 percent savings. These installations are being checked—at the instigation of Montour—to find out why they did not produce the savings expected by the company.

In studying the table, note in particular the comparative combustion efficiency tests. Only one of the units replaced tested at less than 70 percent combustion efficiency; three tested at better than 80 percent. Obviously, if "combustion efficiency," as measured by conventional methods, were used as a criteria, only one of these boilers would have been considered to be a candidate for replacement.

But Thomas does not believe that combustion efficiency as commonly measured means anything. In fact, it can be and often is very misleading.

"Our approach has always been very simple—if a boiler or furnace is using too much oil, it should be replaced regardless of the combustion efficiency reading."

His case against combustion efficiency, which he has presented to FEA, NOJC and anyone else who will listen, boils down to this:

Combustion efficiency is only a measure of the percentage of heat lost up the flue at a given point in time. A Brookhaven National Lab report suggests that stack loss or combustion efficiency may vary from enthalpy flow technique percentages (See Brookhaven Drives For Efficiency, Fuel Oil News, July '77) from 0 to 10 percent. Other factors making it an improper criteria are:

Combustion efficiency can be made to appear high by lowering the firing rate of the unit.

Combustion efficiency can be inaccurately recorded if temperatures of boiler water, heat exchangers and surrounding ambient conditions are not considered.

Combustion efficiency can be increased by raising CO₂ through reducing the amount of primary air for combustion to a level too low for long term clean combustion. Smoke spot readings are not a factor in determining combustion efficiency.

Many times the flue or chimney in a home goes through the center of the house and heat radiating off of same is recovered as useable heat. No allowance for this is made in combustion efficiency; nor is standby loss up the chimney during off cycles measured. This is why utilization efficiency is the only real criteria for evaluating the amount of energy consumed vs. the energy requirement of the dwelling for a one year period.

- Instruments used by field service personnel in obtaining CO₂ percentage and stack temperature are very suspect. The expertise in using these instruments and the accuracy and calibration pose additional problems.

- Piping and pickup losses involve another area not evaluated in the combustion efficiency test. A homeowner's fuel consumption may be higher than necessary due to a unit being grossly underfired even though the combustion efficiency reading is high. This can be the case in a steam or gravity system where pickup is essential to economy. Also, piping losses, loss of heat off of a large uninsulated unit, etc., will also inflate consumption, even though the combustion efficiency appears to be high.

"The above are merely a few of the more obvious reasons why combustion efficiency cannot be justified as a basis for oil heating unit evaluation," Thomas says. "To say that this is the only way to make an evaluation in the field because it is easy is like basing a decision to buy a new car on what the salesman tells you about it. In either case, a little more knowledge and indepth research can prevent a wrong, costly decision from being made."

The Brookhaven enthalpy flow tests tend to support Thomas. Brookhaven is just now beginning to probe in the laboratory what Dick Thomas and some others in the industry have been saying for years—that fuel utilization efficiency is the only true criteria.

Years ago, Montour Auto Service realized that its own records told the story of the utilization efficiency of every one of its customers. For more than a decade it has been using that information to sell a whale of a lot of equipment.

EXECUTIVE SUMMARY OF THE NATIONAL OIL JOBBERS COUNCIL RECOMMENDATIONS FOR A NATIONAL ENERGY POLICY

The National Oil Jobbers Council, a federation of 42 state and regional trade associations representing 12,000 independent small businessmen marketing petroleum products, believes that a strong conservation program in the short term coupled with a long range policy of finding energy everywhere are the necessary ingredients of a comprehensive energy policy for the United States. The Council believes further that no policy can be successful without equal treatment of similarly situated end users, voluntary action by everyone, economic incentives from the federal government, the elimination of artificial constraints and efforts to insure maximum competition.

Specifically the Council recommends several immediate conservation measures for the energy uses which it primarily serves, residences and automobiles.

RESIDENTIAL CONSERVATION

For domestic residences the Council urges a system of periodic maintenance of combustion equipment, insulation and other thermal efficiency improvements, and retrofit and improvement of existing heating equipment. These actions should be voluntary, supported by government incentives in the form of tax credits and grants over a five year period.

Other recommendations of the Council for residential conservation include:

Electric utility rate reform with national objectives delineated for electric utilities pricing;

Allow the artificially low price of natural gas to rise to that which would exist in a free market so as to avoid discrimination among similarly situated end users.

Restriction of new residential natural gas hookups by natural gas companies dependent upon interstate natural gas supplies until the transition to free market consumption levels are completed; and

Expanded emphasis by ERDA on research and demonstration projects designed to improve the efficiency of oil heat.

PRIVATE TRANSPORTATION

The best way to insure conservation in the use of private automobiles is to apply price incentives and disincentives where the consumer has a real choice about future consumption—in the new car show room. We support a graduated tax on cars that fail to meet established auto efficiency standards and a rebate for vehicles which do. We oppose additional taxes on gasoline since demand is inelastic. We oppose quotas and rationing for fear of the severe damage that such artificial constraints may do to the American economy.

Other conservation recommendations for private automobiles include:

Strict enforcement of the 55 mile per hour speed limit; and

Government incentives for the use of radial tires.

LONG-TERM POLICIES

The United States long-term energy policy must be dedicated to finding energy everywhere. This includes expeditious development of our existing oil, natural gas and coal resources as well as developing the necessary technology to use less conventional sources such as oil shale, coal liquifaction and gasification. Ultimately, we must rely on our renewable resources—the sun, the winds and the tides. The Council supports necessary government incentives in each of these areas.

Other long term recommendations by the Council include:

Minimum reliance on nuclear fission consistent with providing adequate energy to fuel our economy; and

A trade policy which uses expanded exports of domestically produced products to pay for oil imports; and

Reliance on competition as the best regulator of prices and the best method of assuring that the public pays no more for finding, refining and distributing energy than adequate supply requires.

SUMMARY

The success of any comprehensive energy policy will be dependent on the nations' willingness to recognize and correct its past mistakes. To this end the National Oil Jobbers Council recommends:

A return to free market pricing for petroleum and natural gas in a manner consistent with maintaining a stable economy;

Tax incentives to encourage construction and use of private product storage;

Converting price and allocation controls on gasoline to a standby basis to be reinstated should a shortage of product develop; and

Using the multi-national oil companies as an essential tool to find and develop new energy resources.

This is a summary of NOJC's "An American Energy Policy", copies are available upon request.

**AN AMERICAN ENERGY POLICY—PREPARED BY THE NATIONAL OIL JOBBERS COUNCIL;
A FEDERATION OF FORTY-TWO STATE AND REGIONAL TRADE ASSOCIATIONS REPRESENTING TWELVE THOUSAND INDEPENDENT PETROLEUM PRODUCTS MARKETERS**

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PREFACE

"Who The National Oil Jobbers Council Represents"

The National Oil Jobbers Council is a federation of 42 state and regional trade associations representing 12,000 independent small businessmen marketing petroleum products. Appendix A is a list of the member associations. The individual marketers represented by the member associations include gasoline and diesel fuel wholesalers, commission distributors of gasoline, gasoline reseller-retailers and nearly every domestic retail fuel oil marketer. Members also wholesale or

retail many other petroleum products, including kerosene, propane, aviation fuels and motor oils as well as residual fuel oil.

Home heating oils

Fifty million Americans live or work in the 13 million buildings heated with fuel oil. In an average year the independent heating oil distributors represented by NOJC supply 75 percent of these consumers with approximately 900,000 barrels per day of heating oil.

Gasoline

Wholesalers and retailers represented by NOJC market approximately 25 percent of the gasoline sold in America under either their own private brand or the trademark of their supplier. Currently, this represents 1.75 million barrels per day of gasoline. Because our members are concentrated in rural areas, they sell somewhere between 20 and 40 percent of this gasoline to farms as well as to commercial accounts. They are the principal suppliers of these end-users. The balance of their sales are through service stations which are owned by independent dealers or owned by our members and leased to independent dealers, as well as through a few directly operated retail outlets.

These Small Businessmen Are Independent

The salient characteristics of the independent gasoline and heating oil marketers represented by the Council are that they are small, numerous, and fiercely competitive independent businessmen. The average member sells only 2.65 million gallons of all petroleum products annually, and almost 55% sell fewer than one million gallons per year. Ninety-five percent meet the Small Business Administration's loan size standard. Each member serves a local area and competes against other independents and against the direct marketing operations of the major oil companies.

The independent branded and nonbranded marketers are responsible for the effective competition which has kept retail prices well below legal price ceilings for the last three years. In addition to price, our members compete in providing services, such as storage tanks and equipment for agricultural and commercial users, furnace maintenance and repair, degree day deliveries, automotive services and insulation and equipment modernization. Beyond competition among themselves and with the major oil companies among themselves and with major oil companies, our members also compete with natural gas and electric utilities for the space and water heating market. Unlike these utilities, which are guaranteed a reasonable return by regulated rates established by public utility commissions, the independent distributor maintains his profitability by being as efficient and cost-conscious as possible.

This independent network gives the petroleum industry flexibility which is often unavailable to the large regulated utilities or even to the giant oil companies by themselves. This point was proven this winter. While customers of large natural gas and electric utilities were curtailed or cut-off in various regions, independent marketers of fuel oil successfully overcame supply and distribution obstacles caused by the weather to assure that no home heated by oil was without warmth.

BACKGROUND

In October, 1973 the Organization of Petroleum Exporting Countries quadrupled the price of oil. In so doing OPEC threatened the stability of friendly governments, greatly increased world-wide starvation, disrupted the markets for American exports, and slowed every major economy in the free world. Today, over three years later, the United States is finally trying to decide how it should respond. This paper offers a policy to meet that challenge.

The United States does not face the OPEC challenge alone. In fact, the direct impact on this country has, thus far, been milder than the impact on most other net importers of energy. Most countries that import oil import a larger percentage of their energy needs than does the United States. And, since almost every net importer of energy either is, or could be an ally or a market for American exports, the United States must be careful to include consideration of the needs of, and opportunities presented by, every affected nation.

There is, however, a peculiarly American aspect to the OPEC challenge. The American people use more energy per capita than do the citizens of any other nation and our growth in per capita consumption is greater, as well. To a significant degree, this results from the large distances Americans span in integrating

their economic activity—the United States is not as geographically compact as any one European nation, and Europe as a whole does not enjoy the full advantages of an integrated economy. But, our unusual hunger for energy also results from the painless access to energy Americans have enjoyed since the founding of this nation. Moreover, since 1954, the price of interstate natural gas has been held below the level which a free market would establish. As a result, the federal government has, for more than two decades, encouraged a higher level of energy consumption than would exist in a free market.

The regulated price of natural gas has distorted consumption of every fuel. Because natural gas was artificially inexpensive, industry and electric utilities more easily abandoned the use of coal as a boiler fuel, leaving us today with a great domestic resource but an industry no longer able to make full use of it. Because natural gas was artificially inexpensive, the demand for liquid fuels which compete with natural gas was also depressed. As a consequence, when American refiners built new capacity, they minimized the production of middle distillates and residual fuel oil, shifting production instead to gasoline. American refineries are the only units in the world with yields so heavily shifted to gasoline, and this abundance of gasoline freed Detroit to develop a second uniquely American institution: the bulky, overweight, inefficient automobile.

The federally established artificially low price of natural gas is not, by itself, responsible for every distortion and energy excess of the last twenty years. Americans like big cars; Americans like to roam; and Americans would have burned most of their natural gas even at a higher price since natural gas provided the simplest and least capital intensive method of meeting clean air standards. Still, it is certainly true that the price of interstate natural gas did significantly restrain the price of every other domestic fuel, thereby increasing the consumption of liquid fuels as well as natural gas and accelerating the decline of our domestic coal industry. As we choose new policies to discourage waste and develop domestic resources, we should be mindful of the old decisions which encouraged the distortions we must now hastily correct.

It is tempting to immediately reverse our mistaken policy. If Americans waste energy because it is inexpensive, then let us make it dear. But taking this step by itself would ignore the patterns of consumption which were woven into the fabric of our economy during the last two decades. The hard reality is that our industries and utilities burn natural gas and heating oil as boiler fuels, and that our homes, schools, factories, offices and places of worship and recreation are under-insulated, widely dispersed, and inter-connected by a system of roads on which we operate almost 100 million inefficient vehicles. To abruptly increase the cost of these patterns of energy consumption will, of course, encourage new patterns; but, until the new patterns are developed energy price increases will also punish every businessman and consumer who relied upon the government's previous long-standing policy of cheap energy. An abrupt shift, either in the form of new taxes or price increases, would unacceptably increase unemployment, slow the economic recovery and accelerate inflation.

Thus, while the nation's energy policy must include some mechanism to facilitate a transition back to free market pricing, it must also help our businesses and consumers adjust their patterns of energy consumption to fit the new price level. This means that we must all conserve energy, by modifying, in so far as possible, our existing patterns of living and doing business so that we approach the rate of energy consumption which would now prevail if we had been paying the energy price a free market would have set. As conservation achieves free market consumption levels, the transition to free market prices can be completed with a minimum disruption.

One other preliminary observation is critical to fashioning an energy policy. We must not lose sight of our other national opportunities and objectives. For example, reducing inflation and employing every American willing and able to work requires that the American economy have every resource other than labor available to it in abundance. Hence, we must be careful to avoid artificial constraints which reduce our per capita consumption of energy beyond the point where waste stops. Similarly, we must remember that we exist as a nation because we cherish individual freedoms. We must preserve those freedoms by emphasizing voluntary programs which are supported by credible public information and economic incentives. Finally, we must remember that competition is the most efficient regulator of prices and margins. In choosing energy strategies we should preserve competition wherever it thrives, and nurture it where it is weak, both domestically and around the world.

CONSERVATION AND EXPORTS ARE THE SHORT-TERM SOLUTION

The energy waste built into our economy during the last two decades affects every fuel and form of energy. Natural gas, fuel oil, gasoline, electricity, and even coal were all underpriced, are all wasted, and can all be conserved. It must be the central theme of the conservation program that industry, government, residents, and the owner of every automobile can and must conserve because the burden on each one of us will be easier to bear if the total burden is more widely and fairly shared.

The government has missed this essential point before. During the 1973 embargo the Federal Energy Office ordered heating oil distributors to enforce a mandatory 15 percent conservation of heating oil. Marketers were to inform customers that they must reduce thermostat settings by 6 degrees or face a cutoff of fuel oil deliveries. Residential users of oil complied, but many deeply resented being singled out to bear the entire burden. Had homes heated with natural gas and electricity been encouraged to make similar sacrifices, more natural gas and fuel oil would have been available to industry, freeing more oil for homes, reducing the level of each individual sacrifice, and perhaps even permitting the entire program to be voluntary. In any case, over the long run, we can expect full cooperation from our citizens only if the nation's leaders and their conservation programs afford equal treatment to similarly situated end-users. The American people will make sound judgment if they are told the truth and treated fairly, but if they are offered implausible goals or promised that their neighbors will bear their burden, or problems can only grow.

Within this matrix of equal treatment, voluntary action, economic incentives, public education, full employment, absence of artificial constraints and maximum competition, we recommend several specific conservation measures which will immediately reduce energy consumption in homes and by automobiles, the two uses primarily served by our members.

A. Short-term conservation in residential buildings

1. Periodic maintenance

The simplest conservation measure available is periodic testing and adjustment of the combustion equipment in homes with modern testing equipment. Periodic maintenance is encouraged by heating oil dealers but not every resident participates. Full participation would improve or maintain the efficiency of all 13 million installations with an average fuel saving of about 4 percent or 0.1 quads per year.

2. Insulation and other thermal efficiency measures

A second area of potential energy conservation is in the thermal efficiency of residential buildings. A study by the National Mineral Wool Insulation Association presented to the House Task Force On Energy and Resources in 1972 concluded that the potential savings in residential heating and cooling during the period 1973 to 1982 could be 15.3 quads—enough energy to heat and cool all the residential buildings in the country for two years—if strict adherence to maximum energy conservation measures was required for all dwellings.

Since this level of energy conservation would require every new home and all existing units to be insulated to maximum standards without regard to cost, the same report suggests these more easily attainable objectives: At least three of four new homes should meet FHA Insulation Standards, whether they are federally financed or not. In addition, the insulation in at least one out of every four existing buildings should be upgraded as best possible with emphasis on ceiling caps and at least one out of eight of these homes should also be equipped with added or improved storm windows and doors. With just this modest residential thermal efficiency program the study estimates energy conservation over a ten year period would amount to 8.2 quads with consumer dollar savings in 1982 of \$6.2 billion, and cumulative consumer savings for the ten year period of \$34.2 billion.

The Federal Energy Administration estimated in February, 1975 that there were 18 million dwellings in the United States with little or no insulation. Many of these structures are served by independent heating oil marketers, and we support a program to upgrade residential thermal efficiency standards in these homes. We will assist our customers in obtaining competent contractors and installation crews to properly complete any thermal improvement work.

3. Heating equipment improvement and retrofit

Many of the 13 million buildings using fuel oil as the primary energy source for heat and hot water are consuming this oil in systems installed 20 to 30 years ago. Many furnaces and boilers were designed for ease of operation and service, with scant attention paid to energy efficiency in a time of inexpensive energy supplies.

Recent technological improvements to current oil burning equipment design such as flame-retention burners, and more sophisticated operational controls such as clock thermostats, are reasonable in cost and can provide energy savings of from 10 to 25 percent. We support a federal program to encourage the retrofitting of existing oil heating equipment with the most efficient, practical type of burner and controls available. We estimate that retrofitting could cost from \$50 for a thermostat to \$250 for a burner with a modern control system. These improvements can be made in one day, and can provide immediate energy conservation and economic benefits to the consumer.

In some cases it is more appropriate to completely retrofit the heating or hot water unit, because the design does not allow sufficient improvement to warrant a simple burner replacement. Completely retrofitting the entire heating system with a modern oil fueled unit can reduce energy consumption by from 20 to 50 percent, with an annual economic saving to the homeowner of hundreds of dollars. Complete retrofit of an oil fueled system would cost from \$900 to \$1,500 and can usually be done in less than one week.

Approximately 13 million buildings in the United States use an average of 433 million barrels of oil each year for space and water heating. Even the most modest retrofit program will provide a saving of 10 to 15 percent for an annual saving of 0.4 quads per year. A comprehensive program including regular tune-ups would yield savings of about 25 percent, or 0.6 quads annually.

4. Tax credits should finance the upgrading of residential energy efficiency

To encourage Americans to voluntarily undertake the conservation measures just described, we endorse enactment of a five year tax credit for the installation of insulation, storm windows, thermal double-paned windows, and similar thermal efficiency improvements as well as heating equipment and control improvements which increase the energy efficiency of existing residences no matter how they are heated. We further recommend that in its last two years the value of the tax credit be gradually reduced so as to increase the incentive to make investments in energy efficiency improving equipment at the earliest possible opportunity. We also endorse a tax credit for the purchase of a new home which meets federal insulation standards to assure that new structures are designed in a manner consistent with the energy costs which are likely to prevail during most of their useful lives.

Where a tax credit is insufficient to encourage energy efficiency improvements in existing dwellings, due mainly to the low income level of the building owners, we support a system of grants for the same energy conservation improvements eligible for tax credits. Like the tax credits, the grant program should be gradually reduced and end after five years.

This program of tax credits and grants should be widely publicized in a systematic, believable campaign to convince the public that energy conservation is absolutely necessary, easily obtainable, and financially beneficial to the consumer. This public relations program should include mailings to each owner of a residential building by his heating fuel supplier explaining the tax credit and grant program and its limited duration, as well as existing Federal Housing Administration home improvement loan programs which will permit federally insured bank financing up to \$12,000 for even the most modest energy efficiency improvements.

This voluntary approach achieves conservation with public information and economic incentives that can be tuned to encourage the necessary level of participation. It will employ citizens now without work, and it will encourage competition since every local heating and insulation contractor will be anxious to bid for the new business created by tax credits and grants. It is sometimes argued that tax credits are an inefficient method of accomplishing a public goal because the credit is available to people who would take the desired action even if there were no credit. But that argument is inappropriate to energy conservation because those who do not require an incentive to install energy conservation measures have almost surely already done so in the three years that have elapsed since energy prices began rising.

Moreover, this approach would be welcomed by the American people. According to a poll conducted by Lou Harris for ABC News during the first week in March, two-thirds of those interviewed favored a program to allow the deduction of insulation expenses from federal income taxes and over three-quarters thought such a program would be effective. In sharp contrast, only 42% supported a compulsory insulation program by local gas and electric utilities.

The public's opposition to mandatory installation of energy conservation—measures by public utilities is shared by independent marketers. The regulatory formulas used to determine utility profits encourage these monopolies to "go first class". Where the guaranteed return to the utility is a percentage of the costs, higher contractor prices translate directly into higher utility profits. Expensive contractors could therefore be favored by utilities rather than a wide open competitive system such as that which would prevail if anyone could bid on thermal efficiency and retrofit contracts. Even without tax credits, several heating oil companies have been reinsulating homes for several years with extended payment programs. This low cost effort would end if a monopoly were granted to the utilities, and oil heating contractors best equipped to do the work would be excluded. Moreover, there is real concern that utility contractors might be selected on the basis of their willingness to urge conversions from oil heat.

5. Conservation of natural gas

The proposals to grant a monopoly to utility companies for a mandatory or even a voluntary thermal efficiency and furnace retrofit program form a natural bridge to issues involving the conservation of other heating fuels, since one of those proposals, the "Rosenberg Plan" would include a "finders-keepers" provision allowing gas utilities to take on new residential accounts with the natural gas saved through conservation measures.

The short term reality is that many of our factories and electric utilities use natural gas as a boiler fuel either because it is artificially inexpensive or because natural gas provides the least capital intensive method of complying with environmental requirements. This situation must be reversed, but until it is reversed, it is folly to curtail these users and increase unemployment if natural gas can be found to meet their needs. Thus, the "Rosenberg Plan" to use conservation gas for new residential hookups runs completely counter to the national interest. In fact, the nation's interest in full employment and a smooth transition back to free market energy consumption levels is best served by a policy which forbids any new residential natural gas connections except for industrial process gas as long as the needs of any user already dependent on this short fuel cannot be met.

Yet, under this nation's current fragmented energy policy, new residential connections continue even as curtailments mount. In 1976 natural gas utilities added over 840,000 new customers despite their own public statements that a cold winter could, as it did, force widespread curtailments and unemployment. Most of the new customers are residential users to whom utilities are permitted to charge the highest rates. Since there are areas where natural gas is the only heating fuel, some new connections are essential. But where adequate supplies of other fuels are available, conversions or new connections of natural gas are irresponsible as long as curtailments continue.

Since the 1975-76 winter, retail prices for No. 2 fuel oil have increased by about six to eight cents per gallon—or about equal per BTU to the increase in the consumer cost of natural gas during the same period. The major reason for the increase in fuel oil prices, however, is that larger quantities of foreign oil must be imported to fill the gap created by the natural gas shortage. As the production of natural gas continues to decline, increasing curtailments of large gas users have placed ever greater demands on fuel oil—the fuel which can be most easily imported and burned in most industrial gas burning equipment. And because natural gas production levels are falling, most of the increases in the nation's total energy demand are also placed on fuel oil, causing oil imports to increase still more. As the gas shortage intensifies and the need to import the more expensive foreign oil grows, the rising average cost of all petroleum products is reflected in an escalating retail price of fuel oil. Thus, residential fuel oil consumers are already paying more for their heating oil because of a policy of providing natural gas at artificially low prices to their gas heated neighbors. To add still further to this cost by permitting new or expanded residential connections is precisely the kind of discrimination between similarly situated end-users that currently stymies efforts to gain popular support for energy conservation.

New residential attachments and conversions by gas companies dependent upon interstate natural gas must be restricted until we have completed a transition to free market consumption levels. In the past, NOJC supported allocation on a national basis of petroleum products in short supply. The same action must now be taken by the federal government among interstate natural gas pipelines so that the shortage of interstate natural gas is spread evenly among those already dependent on this fuel.

In the event that restriction of new hook-ups is deemed inappropriate for policy or legal reasons, then we maintain that the new customers should alone bear the costs associated with obtaining the natural gas needed to meet added demand. The historical users are, to a greater or lesser degree, trapped by reliance on the historical pricing policies of the government and gas utilities. To the extent that they are unable to convert to alternative, more plentiful fuel sources for their residential and industrial use, these existing users should not be required to share the incremental expenses imposed on the system by new customer demands.

6. Conservation of electricity

Electric utility rate reform is essential. At this moment the Federal Energy Administration is reviewing rate design alternatives pursuant to a Congressional mandate in Title II of the Energy Conservation and Production Act. The final version of this study is to be submitted to the Congress on May 15 in the form of proposals for rate structures which are most likely to reduce the need for new generating capacity, maximize efficient use of fuel resources and keep customer costs to a minimum. Thus, the Congress will soon have a comprehensive analysis with which to move quickly toward electric rate reform.

We recognize that the state public utility commissions have a particularly keen appreciation of the peculiarities of their areas' electric supply and demand situation and these commissions should be allowed some measure of flexibility in adopting rate structures. However, specific national objectives should be delineated for electric utility pricing as a part of the comprehensive energy plan. At the very least a set of federal guidelines should be adopted which provide for a cohesive and consistent program which does not unfairly burden any one region. Federal authority to intervene in state rate proceedings and financial assistance to the state public utility commissions already provided in Title II of the Energy Conservation and Production Act will ensure implementation of these federal guidelines with adequate allowance for local problems.

The foundation of these federal guidelines must be that price is based on the cost of service. We believe that it is economically unsound and improper to attempt to stimulate or retard consumption of electricity through rate structures which are not cost based. In the past, failure to observe this basic tenet has led to unnecessary expansion of electric utility generating capacity, price discrimination between and within customer classes, and an unfair disadvantage to the electric utilities' competitors.

Technical experts agree that the most difficult problem in utility costing lies in the allocation of capacity costs. Theoretically, capacity costs are joint costs, and as such should be allocated based on the magnitude and elasticity of kilowatt demands placed on the system. However, little to date has been done in the area of estimating the elasticity of kilowatt demand and, as a result, proper and equitable distribution of capacity costs has been sporadic at best.

We submit therefore that specific effort should be made to develop models which integrate kilowatts, time and kilowatt hours into traditional models of consumer behavior such that a conceptual understanding of the impact of alternative rate designs can be obtained and used to construct practical rate structures which reflect economically sound principles.

One electrical device often characterized as an energy conservation measure is the electric heat pump. Yet, only when compared to electric resistance heating, can a heat pump be a viable conservation alternative. When compared to gas and oil heating systems, a new heat pump is not as efficient as existing installations. Because of the inefficiencies involved in the generation and transmission of electrical energy, close to 70 percent of the BTUs in the fuel burned at the generating source is lost before it reaches any electrical device. Thus, for example, even if the heat pump is credited with a coefficient of performance (COP) of two, which assumes that the temperature drops no lower than 32 degrees Fahrenheit, the total efficiency of the system's energy use is only $0.3 \times 2.0 = 0.6$, where 0.3 is the efficiency level of an electrical generating system using fossil fuel and 2.0 is the heat pump COP. Thus, using a generous assumption, the efficiency of a heat pump is barely 60 percent.

The lowest oil heat efficiency in any part of the country is 65 percent to 70 percent. Hence, in terms of efficient energy use, fuel oil in conventional furnaces comes closer to realizing the objective of significant resource savings than an electric heat pump because the amount of energy consumed to generate electricity for the heat pump is greater than the amount directly consumed in producing the same warmth at the site.

Electric heat pumps have also suffered from high operating and maintenance costs. But the other most serious failing in terms of energy conservation is the fact that almost all of these devices are air-conditioners. Thus, promotion of electric heat pumps will add to the electric utility load in the summer, the very time when most utilities experience their system peak. This will result in the need for additional generating capacity rather than conservation.

7. ERDA should emphasize further improvements in oil heating efficiency

The heating oil industry has been given inadequate consideration in federal conservation, research and development programs. With billions spent by ERDA and other agencies for energy development to meet increased demand, only \$300,000 has been earmarked for programs to make the existing oil heating equipment in 13 million buildings more efficient. Even that money is to be used only to test new heating equipment already developed by the heating industry without additional government support in research and development. Despite this minimal federal help, technology is now available to substantially reduce heating oil consumption, save consumers many dollars, and improve air quality now, not in the next century. Additional research and development in this area holds the promise of still greater efficiency and conservation.

B. Short-term conservation in private transportation

1. Vehicle efficiency improvements

Private automobiles offer a unique opportunity for energy conservation that is not available to space heating users. While heating systems are replaced only every 25 or 30 years, fully 10 percent of this nation's inventory of automobiles is replaced every year. Thus, since the embargo we have had an opportunity to replace one-third of our present inventory of inefficient vehicles with more efficient automobiles, and in the next five years half of the entire inventory will be replaced, regardless whether we make the new vehicles more efficient or not.

Large conservation savings can be effected at very little additional expense to anyone by ensuring that the new vehicles are more efficient than the ones they replace. For example, General Motors reports that the cars it is selling this year are, on average, 48% more efficient than the cars that company sold in 1974. If the entire automobile industry could just maintain GM's current level of efficiency improvement for the next five years, we would reduce our consumption of energy for the number of miles currently driven by about 1.7 quads per year.

This estimate uses current General Motors efficiency improvements, but, in fact, a federal program already in place assures that the inventory of new vehicles available for sale in the next few years will offer even greater energy savings. In 1975 the leadership of the Congress was already mindful of the opportunities to save gasoline offered by new car sales. Title III of the Energy Policy and Conservation Act, passed that year, requires the production of an ever more efficient mix of new American cars, eventually averaging 27.5 miles per gallon in 1985. Since General Motors' automobiles averaged only 12 miles per gallon in 1974, a mix of new cars with this statutorily mandated level of efficiency would save about 38.5 quads over a ten year replacement cycle for the number of miles currently driven and thereafter would save 7 quads annually. At current gasoline prices that is a savings to consumers of about \$13 billion per year after one full inventory cycle added to total consumer savings during the ten year inventory cycle of over \$64 billion.

Unfortunately, the most efficient new cars are not selling as quickly as the least efficient vehicles. For example, despite an emphasis on the production of big cars, the Ford Motor Company reports only a 50 day inventory of its full-sized LTD, while it has accumulated a 101 day supply of its subcompact, the Pinto. And, General Motors recently reported sales this year of only 19,366 subcompact Chevettes while it sold 63,874 full-sized Chevrolets during the same period. It seems clear then that what Americans need is a program which encourages them to buy the more efficient mix of vehicles which our manufacturers are already mandated to produce.

2. Taxes and rebates should encourage improved private vehicles efficiency

To assure that Americans buy the more efficient mix of new vehicles Detroit has been ordered to manufacture and to encourage consumer demand for even more efficient automobiles, we endorse immediate revision of the excise tax on new American-made automobiles to provide for a graduated tax for each mile per gallon a new vehicle falls short of the weighted average efficiency mandated for that model year and a graduated rebate which increases for each mile per gallon by which a new vehicle exceeds the weighted average efficiency mandated for that model year. The Congress should grant some administrative discretion as to the precise size of the rebate and taxes, so that they may be tuned periodically by the Treasury as a function of current sales and to assure that the demand for the most efficient new vehicles is maintained at the highest level consistent with the automobile industry's capacity to provide those cars. It will also be imperative to monitor the automakers' allocation of costs so that they do not absorb part or all of the rebate in higher small car prices.

This program of graduated federal rebates and excise taxes will be widely publicized by car dealers, but every American can be reminded frequently of the advantages of efficient cars through periodic promotional campaigns at service stations to enhance public interest in and understanding of the economic advantages of purchasing as well as operating a more efficient vehicle.

This voluntary approach achieves conservation with public information and economic incentives. If properly tuned, it will increase employment in the auto industry and, thereby, generally enhance the entire economy. Moreover, this program recognizes the hard reality that most gasoline consumption is necessary rather than merely convenient. The way our population is distributed and the way our homes, factories, offices, schools, shopping centers, and places of worship and recreation are scattered forces the average American to drive a given number of miles and will force him to drive most of those miles for many years to come.

Thus, the way to conserve significant amounts of gasoline is not to deny mobility to our industry and to our labor force, or make everyone pay more for each mile regardless whether it is essential or not. Rather we must conserve gasoline by making the vehicles Americans use to drive those miles more efficient. As with home insulation and furnace retrofit, it will take several years for the full benefits of this approach to be achieved but in the process we do not sacrifice our fundamental freedoms and we strengthen rather than disrupt our economy, both directly through increased vehicle production, and indirectly through all the other industries which supply and support the automobile industry.

The American people would clearly respond to this approach. According to the Lou Harris poll for ABC News conducted in early March, those polled favored banning the sale of new cars that do not achieve at least 20 miles per gallon by a two-to-one majority. Such a ban would have a catastrophic effect on the economy while thousands are laid off for extensive retooling, but price incentives and disincentives which reduce the number of inefficient vehicles sold to the minimum level which must still be produced would come as close to this desired goal as we can come without severe economic hardships.

3. Other gasoline conservation techniques

To assure that Americans use the more efficient vehicles wisely, we also endorse strict enforcement of the 55 mile per hour national speed limit. Service station promotions can gain additional support for this measure, and the federal government can encourage tough enforcement by making it a condition for continued participation in federal programs by state and local governments. Similarly, the federal and state governments should strongly encourage their employees to participate in car pools.

The use of radial tires also substantially reduces gasoline consumption. The domestic production of radial tires is currently at capacity, but as capacity expands, the federal government should evaluate replacing the excise tax on tires with a rebate/penalty system similar to that we have proposed for new domestic automobiles.

4. Mass transit

Mass transit is often suggested as a significant technique for reducing energy use in the transportation sector. Unfortunately, the time and money required to construct a fixed rail transportation system is enormous. To be economical, mass transit requires that a large number of people desire to make the same trip at the same time. Generally, this condition exists only in our large cities, and only there

during the morning and evening rush hour. Many people do not live in urban areas and many of those who do would still not be able to use a mass transit system. Appendix B contains a tabulation of the per capita gasoline consumption in each state during 1972. It is clear from that table that gasoline consumption per individual is highest in those states with small, widely dispersed populations. It is the most populous areas, where mass transit could best be used, which already have the lowest per capita gasoline consumption. In other words, mass transit does not offer an alternative means of transportation to those citizens who are already compelled to use large amounts of gasoline for transportation.

Even within high density areas, mass transit meets only a few transportation needs. According to the Department of Transportation ("Nationwide Personal Transportation Study, Report 10" FHWA May, 1974), only about one-third of all vehicle miles of travel are to and from work. There is no estimate of what percentage of these miles are driven in dense urban areas and along a route suitable for mass transit, but the small per capita consumption in urban areas suggests the percentage is not likely to be large.

Where fixed route mass transit has been constructed, most of the users are converts from other public transportation ("Squelching the Myths of Mass Transit", Yale Brozen and Laura Genero, Washington Star-News, November 24, 1974, p. F-3). Few users ever abandon the convenience of their private automobiles. The prospect of reducing private vehicle energy consumption with fixed route mass transit is, therefore, poor in both the short and the long term. It would make more sense to relax restrictions on flexible vehicles such as the jitney and increase the availability of buses on routes already traveled by large numbers of cars.

C. Taxes, tariffs, fees, quotas and rationing must be rejected

Two classes of short-term measures that have been widely discussed for one or more petroleum products should be rejected. It is argued that since energy is underpriced, we should immediately increase its cost through a tax, tariff or import fee. Others argue for an artificial shortage that forces Americans to make do with less under a quota or rationing. Both of these proposals should be rejected. In fact, both show a disturbing tendency to do to ourselves exactly what OPEC and the Arab Embargo did to us three years ago.

1. Taxes, tariffs and fees punish the wrong decisions

A tax, tariff or fee punishes the innocent and the guilty alike because, practically, these measures must be applied to every BTU. It may, for example, be possible for electric and natural gas utilities to calculate a base period per degree day use for each residential heating customer and then bill for excess use, but it would be difficult for small independent fuel oil dealers to assume that administrative burden. Moreover, it is impossible to define excess use for automobiles without adopting the entire administrative machinery of a rationing program at an annual cost of \$2 billion. Thus, taxes, tariffs and fees must apply to every gallon if they are to apply at all.

It should be fairly clear that a certain amount of energy is required to heat a home to a minimum level, which is to say that heating oil demand is at some point almost totally inelastic. But the demand for gasoline is equally inelastic. Recall, for example, that despite a 50 percent increase in prices during the Fall of 1973, consumption of gasoline grew until the embargo made further growth impossible. And, consumption resumed its growth in 1974 until the late summer, when it declined as usual despite falling retail prices (see Appendix C). Clearly, if an increase of 15 to 20 cents per gallon in the price of gasoline had no immediate conservation effect in a declining economy, there is little reason to expect conservation from a tax of that magnitude now.

This inelasticity means that the consumer who has insulated his home, renovated his furnace, installed a clock thermostat, set it at 60 degrees, and consolidated all his driving in one new highly efficient automobile must still pay the tax, fee or tariff for the remaining BTUs which he cannot avoid purchasing. He has no other option by which to conserve, so the tax cannot encourage further conservation. But the tax will reduce his dollars available for other spending, and that will, in turn, bring us reduced consumer spending, higher unemployment, and inflation as the tax on energy works its way through the economy.

The key point is that consumers who have purchased or who are saving to purchase a more efficient automobile or thermal efficiency improvements for their home must still use some energy. It is unfair and unwise to inflict higher prices that bring no benefit to them and which bring harm to the economy as a whole.

Price incentives and disincentives should be applied where the consumer has a real choice about future consumption—in the new car show rooms and during the furnace tune up—and not at the pump or in the fuel bill where the consumer can only pay for his past mistakes.

2. Quotas and rationing cause inflation and unemployment

The NOJC is opposed to any proposal which places non-economic constraints on the American economy. We are, therefore, opposed to the use of a quota or rationing, although the latter may become necessary in a prolonged and extreme supply emergency such as a war. Artificial constraints on the economy will force higher levels of unemployment and create shortages which will cause inflation and necessitate allocation and price controls on petroleum and, eventually, on the products for which petroleum is a necessary ingredient. Ultimately, this will result in a significant loss of individual freedom.

The American people share our strong opposition to artificial constraints. In a poll conducted in early March for ABC News, Lou Harris learned that fewer than one American in four favored end-use rationing as an energy conservation measure. Moreover, almost half those polled believed rationing would not work even if it were tried.

America was built on competition—the idea that we could make it better or cheaper and therefore out sell the competition. Like all restrictions on free world trade, a quota abandons this principle. We should, instead, recognize the tremendous productive power of our people and marshal that power to produce exports, particularly agricultural exports with which we can pay for the oil we need now and in the future. With every barrel of oil this country imported in 1973, it produced \$100 in goods and services (GNP/total energy consumed in barrels of oil equivalent). Even at \$15 per barrel, our economy is so strong that we can produce \$15 of exports to pay for the \$15 barrel and still add \$85 to our national wealth. To stop that last barrel is to lose this wealth and to idle our human and fiscal resources.

Thus, we must avoid a quota or rationing. Instead we should use all the energy we need to implement voluntary conservation programs that put our people and factories back to work through powerful economic incentives. In fact, as long as we export as much as we import, the only argument for reducing our dependence upon vulnerable foreign sources of energy is that we would suffer a catastrophe if we were cut-off from those sources. It is incredible that anyone would seriously suggest that the best way to avoid that catastrophe is to bring it about ourselves.

D. Federal revenues are wisely invested in conservation

The economic incentives of tax credits, grants, and rebates which form the core of our energy program will reduce federal revenues and increase expenditures. We believe a large part, if not all, of the potential drain on the federal treasury can be offset through the higher excise taxes on inefficient automobiles. Remember, the automobile manufacturers cannot avoid making a sizeable number of inefficient automobiles for several more years. This is roughly the period in which insulation and retrofit measures should be completed. Moreover, once the inefficient cars are no longer manufactured, there will be no need for a system of rebates for the efficient models. Finally, the public knowledge that each year the rebate for efficient cars will be smaller and that the tax credits and grants will one day expire, and will add an additional incentive to acquire promptly the benefits of these measures.

Even if higher excise taxes on inefficient automobiles do not entirely close the revenue gap, a net federal cost for energy conservation is a sound investment. In the short term energy conservation is at least as important as new energy development. Hence, some small part of the billions currently spent by ERDA and other agencies on nuclear development might be wisely diverted to energy conservation programs. Furthermore, the overall tax revenue gain from the generation of new employment in the energy and automobile industries may well more than offset the immediate revenue loss. Home improvements, and equipment installation are labor intensive and the building trades would immediately benefit from a retrofitting program. Finally, the savings to energy users from conservation would be available for other domestic consumption, since energy conservation saves dollars which would otherwise leave the country to import energy. This saving can provide a steady stimulus to the economy over many years, also adding to the general level of economic activity and the total revenues available to the Treasury.

E. Aggressively expanding exports can pay for oil imports now, and if necessary, in the future

Americans have so far escaped the monetary problems experienced by many other nations as a result of the OPEC price increases, because we have been able to expand our exports to pay the higher cost of oil imports. Until conservation has taken hold and our long term domestic policies are implemented, the practice of paying for oil imports with expanded exports must be actively encouraged.

The federal government should maintain policies which maximize the ease with which American goods are purchased abroad. We must refuse requests to restrict trade in order to protect one domestic industry or group of workers because such restrictions will inevitably lead to retaliation against our exports.

A large part of the increase in American exports has consisted of agricultural products sold to potential adversaries such as Russia and China. There is every reason to expect that these sales can continue, and, in fact, may grow. If this proves true, the United States could enjoy the prospect of fueling its economy with someone else's irreplaceable energy while maintaining our own reserves, and paying for that energy with our adversaries' capital, acquired each year with a renewable resource—food production.

THE LONG-TERM SOLUTION IS NEW ENERGY RESOURCES AND RESERVES

In the long term the only energy policy consistent with this nation's other national and international political and economic objectives is to find energy everywhere. The world must have an abundance of energy so that our own people will be fully employed and so that the rest of the world can develop to its full potential. If we are successful in finding energy everywhere, we will enhance our national security and encourage OPEC to follow more responsible policies.

Domestically, this search for energy begins with incentives for expeditious development of resources we already know how to use, our coal and our oil and natural gas. Later, we will need less conventional sources of energy such as oil shale and coal liquefaction and gasification. The development of marketable techniques for producing these new sources of energy must commence immediately. And, ultimately, we must look at renewable resources, the wind, the earth's core, the tides and the sun. Research on these alternatives must also begin now so that they are available when we need them.

At the same time, the United States must correct the mistakes it has made in its prior domestic energy policy by freeing energy prices as expeditiously as the maintenance of a sound economy will permit. If we find that new sources do not entirely end energy imports, as they almost surely will not for many years, then the federal government must aggressively maintain exports in normal times to pay for imports while preparing for any future supply interruption by arranging for crude oil storage and initiating incentives to expand private product storage commensurate with our national security needs.

A. National security and the assault on OPEC—Finding oil everywhere

The interest in domestic energy self-sufficiency must be tempered by the reality that despite new finds in the North Sea and Southeast Asia, America's most important friends, Western Europe and Japan, are by in large, hopelessly dependent upon oil imports. Because these countries are vital to its national security, the United States will always be vulnerable to an embargo, even if, by itself, it achieves energy independence. Recognizing this vulnerability, the United States can enhance its national security only if it encourages the development in both new domestic and new foreign sources of oil.

A troubling element in this strategy is the fact that Britain is considering joining OPEC. If our closest friend would do this, will not every nation that develops oil do the same thing? Perhaps so; but remember that in 1973 OPEC raised prices, but only the Arab countries participated in the oil embargo. Venezuela, a staunch OPEC supporter, actually increased its production to help the United States withstand the embargo. Hence, national security and the OPEC price are two different issues which must not be confused. We aim to break OPEC's price by finding oil everywhere in the world, and that price will be hard to maintain when OPEC has 50 members, any ten of which could be completely shut-in by a buyer's boycott. But, even if we fail in that aim, the United States can still enhance free world security by developing a multiplicity of new energy sources. In fact, the glut that an artificially high world price will produce is precisely what our national security requires.

A "drain America first" policy does not strengthen national security because, in the long run, this policy simply hastens the day when we will be totally dependent upon imported oil. It is far wiser to draw upon the reserves of insecure sources in peace time, while adopting domestic policies which permit exploration for, and development of new domestic fields without actually putting them into production.

A policy of aggressively developing world-wide energy resources is vital to our trade policies. Foreign countries cannot buy American goods unless they can earn American dollars. In recent years the United States has largely balanced its oil purchases with increased agricultural sales. This may, however, become more difficult because third world countries are borrowing the money to buy our food. They cannot continue their current rate of borrowing forever. One way to avoid widespread starvation and massive default is to help those third world markets become energy exporters. With oil, emerging nations can buy our food, strengthen their own economies, and, as their domestic agriculture develops, they, like the Arabs before them, will develop a taste for our finished goods. The world will be more secure for all of us, there will be a great multiplicity of oil producers, and we will have new markets for American goods.

To find oil everywhere, the United States must stop treating the multinational energy companies as its enemies. These companies are largely owned by Americans and five are based in the United States. The American people must be wise enough to use the oil companies as a powerful instrument serving our national goals. The federal government should grant incentives for new domestic exploration, and it should encourage our allies to grant similar incentives to those companies for foreign exploration and development. The companies must be monitored, but if properly motivated and guided, the oil companies can, over the next few decades, find more than enough oil to permit an economically sound adjustment to the use of renewable energy resources.

B. Develop new domestic sources

1. Use existing technology now

Expanding our domestic energy resources means doing immediately what we already know how to do best. We support all federal policies which encourage rapid private development of domestic oil and natural gas resources, both on-shore and on the outer continental shelf. In doing this, we must be careful to minimize environmental degradation and the social and economic impact on the areas in which the new production occurs so that the courts need not repeatedly examine projects when they are well underway. We also support the continued and expanded application of secondary and tertiary resource recovery technologies, and we support appropriate pricing and taxing policies to assure that these methods will be used to the fullest extent possible. Finally, we support expansion of our domestic refining capacity with steady policies that assure a secure investment climate and incentives that ensure the viability of new and small refiners.

The United States must also revitalize its coal industry so that industrial users and utilities, with economies of scale sufficient to permit the environmentally sound use of coal, can convert from oil and natural gas. Moreover, as with oil and natural gas, the development of the coal itself must also be consistent with our environmental goals. There must be provision for surface restoration within an acceptable time period; full compliance with state and federal laws pertaining to the health and safety requirements for extracting the coal; and, federal incentives sufficient to overcome the disincentives introduced by internalizing these environmental and social costs.

2. Develop new technology to supplement existing fuels

Not every oil or natural gas deposit will be found immediately, and not every deposit we do find will be commercially developable. Yet, many energy uses require a clean burning or portable liquid fuel. Thus, the successor to ERDA must help private industry rapidly perfect the existing economic and environmentally sound techniques for producing oil from our vast resources of oil shale. For example, Occidental Petroleum Company claims that it can produce oil from shale without water or waste deposits, at current new oil market prices. That plan should be tested immediately to bring it to commercial application.

Similarly, we do not now have a transportation network capable of moving all the coal that could be used or produced in this country. Since new transportation investments must be made, we should consider the comparative costs of liquefying or gasifying coal and shipping it by pipeline as an alternative to building a rail system to deliver the coal. Preliminary ERDA data indicates that

coal liqueraction and pipeline distribution may be one of the least expensive methods of delivering the energy locked in our coal reserves, and liquefaction could make some use of the existing pipeline network. Moreover, given the generation and transmission inefficiencies of electricity, pipeline transportation will also almost always be superior to burning the coal to generate electricity for transmission to the rest of the country. Hence, high federal priority should be given to developing technologies for manufacturing synthetic fuels in an economic and environmentally sound manner. This may include favorable tax treatment as well as a government commitment to repurchase facilities from their owners should they be made economically unsound by the actions of foreign governments.

3. Ultimately rely upon renewable resources

It should be the policy of the United States to foster and encourage the development and use of renewable energy resources such as solar, geothermal, wind and tidal power. The successor to ERDA should devote extensive resources to research on these alternatives so that they will be available soon enough to avoid a major investment in nuclear facilities.

4. Nuclear energy development

One of the basic advantages of a strong energy conservation program and extensive development of our existing fossil fuel resources, is that it allows the United States time to look at future sources of energy without making hasty decisions. The previous administration favored an ever expanding role for nuclear fission in our national energy policy; but the current energy marketplace does not support that judgment. Annual domestic orders for nuclear reactors peaked in 1973 and have been declining sharply ever since then. The capital markets which finance such installations are extremely wary of committing additional funding at this time.

Moreover, the scientific community is sharply divided over such issues as safety, waste disposal, enrichment capacity, fuel reprocessing, terrorism, and the reliability of operation. And, the future supply of uranium fuel for our present reactors may depend to some extent on foreign sources since the development of the breeder reactor has been delayed by financial, environmental, and national security problems.

Given these problems, the National Oil Jobbers Council can endorse no more than the minimum reliance on nuclear fission which is consistent with providing adequate energy to fuel our economy. We support conservation to make our energy use as efficient as possible; we support maximum development at free market prices of the resources we already know how to use in an environmentally sound manner; and we support rapid development of clean renewable resource technologies. If these policies do not provide the abundance of energy resources necessary to drive a full employment economy, then we reluctantly accept the need for a minimum reliance on fission reactors to close the gap. Should this reliance prove necessary, we strongly support a federal program to devise the safest possible techniques for using fission reactors and laws which require the use of these standardized techniques.

C. Correcting our past mistakes—Return to market prices

By shifting per capita consumption of energy toward the free market level, the conservation measures endorsed by the National Oil Jobbers Council will end the waste encouraged by twenty years of non-economic energy prices. But, as we conserve, we must also make the transition back to a market where supply is related to demand by a price free from the distortions which have brought us shortages and waste.

Gradual decontrol of energy prices and conservation work logically together. The certainty that higher prices are coming will enhance interest in conservation, just as conservation takes the sting out of decontrol. As the carrot diminishes, the stick must loom large. Thus, decontrol of energy prices should begin at the same time as the conservation program, and it should be completed as maximum conservation is achieved.

We are mindful that many of the objections to taxes, tariffs and fees can be applied to higher energy prices. If energy prices were abruptly decontrolled, the result would be inflation, unemployment, and higher costs even to those who make every reasonable effort to conserve. But, there is a critical difference between a tax increase and a price increase: price determines supply. For 20 years, price determined the supply of natural gas as well as the level of demand. The artificial low price reduced supplies and exaggerated demand by encour-

aging profligate waste. We will end the waste with conservation, but we can increase supply only by freeing the price of new energy resources.

The same principles which guided our choice of conservation strategies should apply to decontrol. A gradual phase-out of price controls on crude oil and natural gas at the well head must come as quickly as is consistent with full employment and our efforts to slow inflation. Moreover, the gradual end of price controls on raw energy resources should be coordinated so that rough per BTU parity between current free market oil and natural gas prices is quickly reflected in the controlled prices to ensure that similarly situated users are treated similarly. If we do not now begin decontrol of our energy prices at a rate consistent with a sound economy, America's short term exigencies will last forever.

D. Develop strategic storage

Because the efforts to develop domestic, or at least secure, sources of energy cannot be expected to satisfy the American need for energy at prevailing market prices for many years, the federal government must expeditiously develop national security stockpiles of oil sufficient to survive any embargo or other international disaster. Moreover, a policy of holding our domestic resources in reserve while drawing upon insecure sources in peacetime also requires an extensive incentive program for capping new wells in addition to storing oil.

The current strategic petroleum reserve program depends solely upon crude oil storage. Under that plan the United States would ship crude oil to Caribbean refineries and then ship finished product back to the East Coast. The balance of our essential product imports would be made up through rationing and shifting refinery yields to distillate. This plan assumes that the only supply interruption for which we must prepare is an embargo by an otherwise powerless adversary. What if our opponent sabotages refineries or uses submarines to disrupt shipping to or from the Caribbean? Thus, even if it were true that crude oil is an adequate substitute for finished product in an embargo, crude oil storage alone does not adequately protect the nation's strategic interests.

The federal government should, therefore, encourage the storage of finished products through tax incentives which encourage the construction and use of private product storage. The federal government would have first call on this product, but it should leave title in private hands because finished product must be turned over periodically to avoid deterioration. An immediate source of product storage could be the reopening of bulk plants abandoned because of new OSHA and EPA spill and vapor recovery regulations. It might well be appropriate to relax these rules at these facilities as long as they are used in a strategic product storage program.

COMPETITION

There are two other issues which should be treated in the nation's new energy policy. Throughout this paper the National Oil Jobbers Council has emphasized the role of competition in regulating prices. We believe that the national energy plan should include measures which increase competition to assure that the public pays no more for finding, refining and distributing energy than adequate supply requires. In some cases enhanced competition necessitates less government interference, while in other areas there must be greater federal vigilance, but every suggestion aims at giving the consumer the maximum benefit for his dollar.

A. Convert price and allocation controls on gasoline marketing to a standby basis

The National Oil Jobbers Council supported the imposition of controls during the embargo just as we believe some federal program of controls will be necessary in any future shortage, but these controls only inhibit competition during a surplus such as that which exists today.

Our central objection to continued controls on gasoline is that they inhibit innovation by smaller independently owned companies to the extent that these companies cannot grow. One need only glance at the names on the petitions granted by the FEA Office of Exceptions and Appeals to perceive that only the largest oil companies can afford the lawyers and experts necessary to obtain permission to change their marketing practices in seeking the consumer's business. Smaller companies cannot cope as well with bureaucratic restrictions and, therefore, find them more confining and frustrating.

As a result, new methods of attracting the consumer can only be effected by the largest companies which have enjoyed a tremendous growth in gasoline marketshare under controls. Since the allocation program began, refiners have increased their share of the direct retail gasoline market from 13 to 18 percent,

and the large chain retailers expanded their share from 7 to 11 percent. In the same period, the smaller independent marketers suffered a decline in market-share from 79 to 71 percent. If controls continue, these trends toward concentration will continue, leading to a far less competitive market in the future.

The present regulations are inadequate to deal with a real shortage. Yet, as long as they are in effect, the regulations must also be compatible with the surplus which now exists; and these conflicting requirements continually lead to useless complexity and endless disputes.

It is critical to understand that controls on gasoline marketing actually injure consumers by allowing larger refiner margins than would exist in a free market. For over three years independent marketers have realized margins far smaller than those allowed by the price regulations. In fact, independent branded and nonbranded marketers are today engaged in the greatest gasoline price war in the history of this country. Yet, controls lock these marketers into 1972 supplier relationships that prevent them from transmitting this competitive pressure to their refiner-suppliers. Removal of these controls will restore more vigorous competition among refiners and reduce their margins to a level which reflects the real value to consumers of the functions refiners perform. Even as crude oil prices rise to free market levels, competition from decontrol will keep the markup applied by refiners to a minimum so that the incentive of higher prices is not swallowed up by inefficiencies in refining and distribution. If a motorist does not like our service or prices, he drives to another station. Removal of controls on marketing will give independent marketers the freedom to, in effect, drive to another refiner.

Like the Federal Trade Commission and a recent President Task Force, the National Oil Jobbers Council strongly supports a phased end to allocation and price controls on gasoline marketing over a one year period during which supply assurances to the smallest companies should continue. Similar decontrol plans have been implemented successfully for every other major petroleum product.

We recognize, however, that complete price decontrol of refiners could amount to abrupt crude oil decontrol because so much crude is owned by refiners. Refiners will engage in marginal competition with each other to gain access to independent marketers, but there are far fewer refiners than marketers; and refiners, unlike marketers, have been consistently charging ceiling prices. The general level of refiner prices (but not margins) may therefore rise. Hence, we would not go as far as the Ford Administration proposal in January. Instead, we support retention of an overall limitation on refiner recoupment of increased non-product and crude oil costs while leaving the refiner free to allocate these costs among products and seasons during its fiscal year. This simple overall annual limitation will ensure maximum flexibility without allowing a larger increase in prices than is required by the gradual elimination of price controls on crude oil.

B. Major oil companies should concentrate on exploration and production of new resources

The American owned oil companies are an essential tool for finding and developing new energy resources. To break them up would simply reduce their usefulness to the nation; yet, legitimate concern exists that these companies are not concentrating their efforts on the activities which they do best, that they are instead dominating markets through the control of pipelines and direct retail product outlets.

The National Oil Jobbers Council believes these concerns can be adequately addressed through less stringent measures than divestiture. For example, most pipelines are common carriers. The federal government need only enforce existing laws to assure that privately developed terminals are granted the same access to and terms for pipeline use as the owners of those pipelines receive. In addition, the Justice Department and the Federal Trade Commission must vigorously enforce the anti-trust laws to ensure that the oil industry is as competitive as possible.

Beyond this, the administration should give careful consideration to a program of vertical accountability which would prevent the major oil companies from subsidizing marketing operations with revenues which should be more appropriately devoted to exploration and development. This program should include a standardized accounting system which discloses the costs and revenues in each of five distinct levels of operation: exploration and production, refining, pipelines, wholesaling, and retailing. Should subsidies actually be disclosed, the administration and the Congress must, of course, consider more stringent measures.

APPENDIX A

MEMBER ASSOCIATIONS OF THE NATIONAL OIL JOBBERS COUNCIL.

Alabama Petroleum Marketers Association, Inc.
 Arkansas Oil Marketers Association, Inc.
 California Independent Oil Marketers Association.
 Colorado Petroleum Marketers Association.
 Independent Connecticut Petroleum Association.
 Petroleum Association of Delaware.
 Oil Heat Association of Greater Washington.
 Florida Petroleum Marketers Association, Inc.
 Georgia Oilmen's Association.
 Illinois Petroleum Marketers Association.
 Indiana Oil Marketers Association, Inc.
 Intermountain Oil Marketers Association.
 Iowa Independent Oil Jobbers Association.
 Kansas Oil Marketers Association.
 Kentucky Petroleum Marketers Association.
 Louisiana Oil Marketers Association.
 Maine Oil Dealers Association.
 Maryland Oil Jobbers Council.
 Michigan Petroleum Association.
 Mississippi Petroleum Marketers Association.
 Missouri Oil Jobbers Association.
 Nebraska Petroleum Marketers Association, Inc.
 Independent Oil Men's Association of New England.
 New England Fuel Institute.
 Fuel Merchants Association of New Jersey.
 New Mexico Petroleum Marketers Association.
 Empire State Petroleum Association, Inc.
 North Carolina Oil Jobbers Association.
 Northwest Petroleum Association.
 Ohio Petroleum Marketers Association.
 Oklahoma Oil Marketers Association.
 Oil Heat Institute of Oregon.
 Pennsylvania Petroleum Association, Inc.
 South Carolina Oil Jobbers Association.
 South Dakota Independent Oil Men's Association.
 Tennessee Oil Men's Association.
 The Texas Oil Marketers Association.
 Virginia Petroleum Jobbers Association.
 Washington Oil Jobbers.
 West Virginia Oil Jobbers-Distributors Association.
 Wisconsin Petroleum Association.
 Wyoming Petroleum Marketers Association.

APPENDIX B

Regionally per capita total gasoline consumption in the United States varies by as much as 52 percent. The Middle Atlantic States of New York, New Jersey, and Pennsylvania together average only 397 gallons per capita while the Mountain region consisting of Montana, Idaho, Wyoming, Colorado, New Mexico, Arizona, Utah and Nevada, average over 600 gallons per capita. Table 1 gives total gasoline use and average per capita usage by region for 1972. Regional divisions of the United States are shown on the next page. Table 2 gives the ranked average per capita gasoline consumption by states.

TABLE 1.—1972 REGIONAL TOTAL AND PER CAPITA GASOLINE USE

Region	Total gasoline use (million barrels per day)	Population (10 ⁶)	Total gasoline use per capita (gallons/capita)
New England.....	0.34	12.11	429.55
Middle Atlantic.....	.97	37.62	369.61
East North Central.....	1.26	40.79	474.17
West North Central.....	.63	16.62	584.82
South Atlantic.....	1.07	31.92	512.47
East South Central.....	.44	13.15	515.58
West South Central.....	.76	19.98	580.03
Mountain.....	.35	8.88	601.32
Pacific.....	.87	27.16	492.11
Total, United States.....	6.69	208.23	492.80

TABLE 2.—RANKING OF STATES BY TOTAL GASOLINE CONSUMPTION PER CAPITA, 1972

[Gallons per capita]

State	Gasoline use	State	Gasoline use
Hawaii.....	327.15	Vermont.....	529.37
New York.....	369.20	North Carolina.....	530.07
Alaska.....	377.35	Mississippi.....	534.07
Massachusetts.....	395.15	Florida.....	538.47
West Virginia.....	410.46	Minnesota.....	544.21
Pennsylvania.....	415.83	Oregon.....	548.78
Maryland-District of Columbia.....	422.75	South Carolina.....	549.78
Rhode Island.....	426.64	Colorado.....	550.12
Illinois.....	431.53	Arkansas.....	560.00
Connecticut.....	433.78	Missouri.....	562.02
New Jersey.....	433.93	Arizona.....	563.21
Louisiana.....	455.86	Georgia.....	568.03
Ohio.....	464.67	Iowa.....	580.39
Wisconsin.....	476.14	Nebraska.....	600.27
Washington.....	482.36	Texas.....	611.32
Kentucky.....	494.11	Utah.....	611.38
California.....	496.23	Idaho.....	613.43
Virginia.....	505.63	New Mexico.....	613.98
New Hampshire.....	508.16	Oklahoma.....	633.02
Michigan.....	508.72	Montana.....	639.34
Maine.....	511.99	Kansas.....	639.61
Delaware.....	512.66	North Dakota.....	677.73
Alabama.....	514.52	South Dakota.....	691.94
Tennessee.....	523.46	Nevada.....	701.99
Indiana.....	523.46	Wyoming.....	835.00

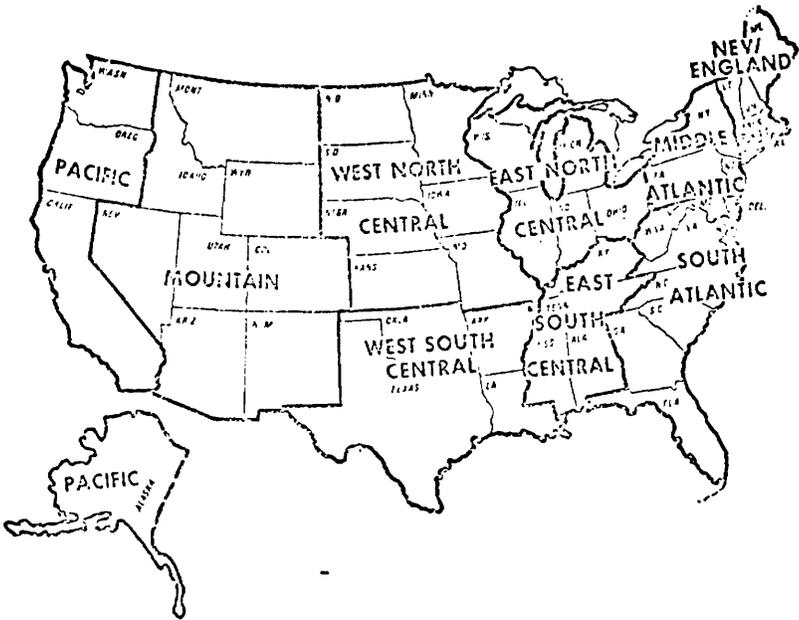
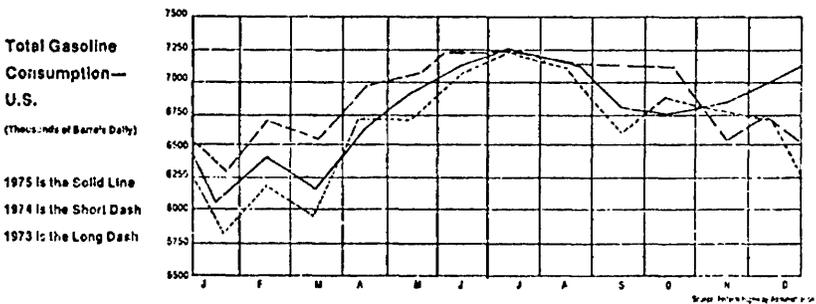


FIGURE 1.—Regional divisions of the United States.



APPENDIX C

The CHAIRMAN. Is Mr. Roger Billings here now?

The Senate is now calling the names of the absentees on a vote occurring on the floor. I would be glad to hear your statement after that time.

[A brief recess was taken.]

The CHAIRMAN. Mr. Roger Billings.

STATEMENT OF ROGER BILLINGS, PRESIDENT, BILLINGS ENERGY CORP.

Mr. BILLINGS. It is generally understood that things work very slow in Washington. This has not been my experience. This is the third time I have tried to make input to this bill. I have always been one step behind it.

I tried to catch it as it was being drafted in the executive branch. I chased it around the House just after the hearings; and it looks like I almost missed it today, due to a problem in the change in the order of the schedule.

At any rate, I would like to make a testimony on something that I consider to be very important and something which I also consider to be economically feasible.

Mr. Grey, the president of Standard Oil Co. earlier today testified that there are three major problems involved in switching over our energy-utilizing base to coal. The first is inadequate mining capability; the second is transportation, and the third is the environmental aspect.

We do have some very important difficulties with mining which will have to be addressed by many methods, but the proposal which I will make today I think helps address the second two problems in adjusting to a coal-derived energy base.

The Rocky Mountain States, from which I come, boast to having more energy in the form of coal than all of the OPEC nations have petroleum. I think there is good documentation about the amount of coal, but there is a difficulty in utilizing that coal consistent with these problems that have been described.

I represent today a group of scientists, businessmen, industries and others who feel that the hydrogen energy alternative deserves some careful consideration. I have been operating my personal automobile on hydrogen now since 1964. Since that time, we have converted a couple of dozen other vehicles. In the last year and a half, the Provo city bus has been operating on hydrogen and commercial mass transit.

Later this month we will be inaugurating our second hydrogen bus as part of the mass transport fleet in Riverside, Calif., under a contract from the California State Department of Transportation.

And, in October of this year, I will be moving into the world's first completely hydrogen-powered home, which is again a demonstration of the universal nature and application of hydrogen.

Hydrogen is not a source of energy, but rather it is a form of energy, and it is a form of energy which makes possible utilization of very vast energy resources that otherwise are unusable.

One example that illustrates this would be the utilization of coal. Many of the coal reserves that this country has been blessed with have been plagued with problems of high ash content or high sulfur content. As a result, it is generally considered that these large coal reserves are unusable.

The technology for gasifying even these very low grades of coal into hydrogen through a process of reacting the carbon with water is well documented and in fact has been built into commercial application since the 1930's.

Today, there are over 20 large, commercial scale coal gasification plants making hydrogen around the world, and doing so at prices which are competitive and, in fact, better than the price which we are paying, as consumers, for gasoline today.

When coal is converted to hydrogen at the mine site, the problems with transportation are greatly diminished. It is much easier to build an underground pipeline and transport energy in the form of hydrogen than it is, in fact, to transport the coal into a center of population. And also, I might add, easier than carrying high voltage power lines.

When the hydrogen is utilized in any of a number of industrial applications inside a center of population—of course, the environmental aspects are very pleasing since the only significant byproduct of hydrogen combustion is water vapor.

We are presently considering, with several U.S. industries, the possibilities of implementing hydrogen energy over the near term. It is a very new technology. It has not been commercially demonstrated on a large scale that the system will make sense. Consequently, we feel a need for the incentives that the proposed bill is offering to other alternate energy forms.

Specifically, we are looking for the industrial investment tax credit, and also the consumer tax credits, to apply to systems that would utilize hydrogen. It is my opinion that the hydrogen energy systems which have been developed, and which are now being developed, are more cost effective, more practical, and make more long-term sense, than the other energy alternatives that this legislation specifically proposes to accelerate.

It would therefore seem, in my opinion, to be in this country's best interests to include hydrogen as one of those alternate energies that will be given this special consideration.

Thank you.

The CHAIRMAN. Thank you.

I have been looking at the prepared statement you have, I think it would be well if we print this and the attachments along with it.

I would like to ask, in view of the chart you have here—assuming that is correct—that if one can get more mileage from a bus, let us say, by converting a ton of coal into hydrogen than you can be converting it into electricity or gasoline, why is it that the people in the administration seem to think you ought to be converting it into something other than hydrogen?

Mr. BILLINGS. I think there are two answers to that question, both of which are significant.

In the first place, the technology of using hydrogen inside a vehicle is very new. The safety problems associated with hydrogen storage are, or at least have been, overwhelming, and only recently, with the development of metal hydride storage has that storage been considered to be safe.

Second, I think that there are new kinds of problems which are encountered with this new kind of energy form, and it would appear easier on the surface to make some temporary, or some scotchtape solutions to our problems, rather than addressing the full magnitude of the problem, such as distribution of a new gaseous fuel, conversion of the engine, and the other problems which must be faced.

The CHAIRMAN. I want to assure you that I will take this statement of yours, together with the exhibits, and carefully study it. If it is as good as it appears to be, then I will try to see that the other members of the committee see it.

I believe that I have read some news coverage of what you have been doing with hydrogen with regard to the automobile. Is that correct?

I think you have had some publicity. Not a great deal, but some.

Mr. BILLINGS. Yes.

As far as credibility, this technology is very new, but it is starting to be accepted. Mercedes Benz recently announced that within 5 years they will offer hydrogen in mass transit vehicles in Germany. Most recently, Mr. George Romney, a person who is well-known by both Washington and the automobile industry, has joined our company's board of directors and will be working with us as a spokesman to show these people who have overlooked this alternative for so many years the potential that it does have.

I honestly believe that the free enterprise system in this great country can, and is, implementing this technology, and actually the legislation as now proposed will be a real setback to us, because it gives unfair advantage to the energy forms which it specifically mentions. If there were no legislation, then we would be OK. But if those advantages, those special incentives, are given to the other competing energy forms, well, then we will be at a great disadvantage, and it will be difficult for us to implement this without some assistance.

The CHAIRMAN. But on the other hand, if you can persuade the committee to take you seriously that hydrogen power has a potential, there is no reason why we could not write a tax credit, or some other advantage, to help put your new source of energy on at least as favorable a basis as anybody else.

If we provide a 20-percent tax credit for solar and a 20-percent tax credit for geothermal and some of the other things that we want to encourage, I do not know why we cannot do the same thing for hydrogen.

I think we ought to study it more so that we know what we are talking about. I have read a little about it in the press and I, for one, am just learning. But maybe you ought to bring that automobile of yours to Washington and let some of our Senators take a look at it. That might help to convince them.

Mr. BILLINGS. We certainly would be glad to do that. We brought the Provo City bus to Washington and we brought two automobiles, but unfortunately a company the size of mine is unable to maintain an adequate lobby to be able to obtain the attention of people and it is a little difficult sometimes to reach the individuals who are making the decisions. We would be happy to do that again.

The CHAIRMAN. You might have a little problem finding the hydrogen filling station to tank up with on the way here with it, but I should think you have found some way to beat that problem.

Mr. BILLINGS. We have an electrolyzer which we are marketing with our first 10 commercially for-sale hydrogen cars so that the consumer can recharge by plugging into an electrical wall outlet. We also have a hydrogen Cadillac which was part of the inaugural parade that we

would be very happy to bring again. It has a switch on the dash which converts the car from gasoline to hydrogen.

We think during early periods of implementation that this type of a vehicle makes good sense, because if a consumer were in an area where there was a coal gasification plant and he could buy that hydrogen more economically, he would be more inclined to operate it in the inner city without generating air pollution. But during those occasions when he went on vacation or were to travel out of that immediate radius, he would not be stranded; he could immediately convert to gasoline.

The CHAIRMAN. Now, you indicated that when hydrogen was made from coal it would give about 50 percent more mileage than if you made gasoline from coal.

Mr. BILLINGS. That is correct.

The CHAIRMAN. Can you tell us what is the cost that would equate with a gallon of gas if you made it today? In other words, let's assume that the gallon of gas would get you 15 miles per gallon in a given automobile. To move that automobile 15 miles using hydrogen, how much would it cost you?

Mr. BILLINGS. Let me first prepare a little background. The cost of hydrogen from coal gasification is dependent on several items. First of all, the cost of the electric utility in the area, especially the cost of the coal, and the type of financing method which is used to depreciate the capital investment or the construction of the plant.

In the two plants which we are now considering for construction with two separate industries, we are seeing prices of generated hydrogen in the range of about \$3 million per Btu. That will translate to a cost per gallon of gasoline price ranging from 30 to 70 cents per gallon of gasoline equivalent.

The hydrogen, however, when combusted inside the internal combustion engine, burns at a much higher efficiency than does conventional fuel, and that efficiency advantage which ranges from 98 percent during idle down to about 30 percent during wide-open throttle conditions, gives you an extra range advantage, which becomes very significant when you are evaluating the cost per mile of the fuel.

So we look at prices, if you leave off the taxes and so forth—which some States have now permitted because of the environmental problems, and removed the road tax from any pollution-free fuels, you can consider prices as low as 30 to 40 cents a gallon of gasoline equivalent, and that is projecting out 2 years when a plant could be built, and we are anticipating that prices of other fuels are going to continue to rise.

The retail prices then have to be added onto that cost, and it is our opinion that hydrogen will be competitive. It will not be a great savings and it will not cost a lot more. But we believe for many places in this country, it can be made a competitive enterprise with refined gasoline, and especially with imported gasoline.

The CHAIRMAN. Is there any limit to how much hydrogen you can make from the coal that is available in this country?

Mr. BILLINGS. Well, I believe—

The CHAIRMAN. Assuming you can build a plant.

Mr. BILLINGS. We are going to be limited by two things. One would be our ability in how fast we could build plants; and second, we are going to be limited by how fast we can mine the coal. But aside from that, we can move into very large, dormant reserves of coal—one of the companies we are working with is Winnebago in Bay City, Iowa, and also with the Forest City Commission. They were interested in putting in a coal gasification plant in their vicinity. When we got into the study of available coal, we found out that just 90 miles away in Iowa was a very low-grade coal reserve that was mined years ago but because of environmental considerations has died.

There are a lot of coal reserves like that available in this country that we can tap, if we use a process like coal gasification that is much more environmentally acceptable than direct combustion.

The CHAIRMAN. I would think you cannot just turn that coal into hydrogen right there in the mine. You have to build a big plant outside and take the coal out from wherever it is and put it in the plant. Is that correct?

Mr. BILLINGS. There are some problems on in situ coal gasification, but to date, I believe all of those are still far from being practical.

You would, in fact, have to mine the coal, run it through a gasification facility. There are about five different hydrogen producing schemes which are commercially perfected and are ready to go into construction by the large chemical construction companies today. There are hundreds of others which are being developed.

They all require the coal to be removed from the mine.

The CHAIRMAN. Thank you very much for your statement.

Mr. BILLINGS. Thank you very much for your time.

[The prepared statement and attachments follow.]

HYDROGEN, THE KEY TO ABUNDANT, CLEAN ENERGY

ROGER E. BILLINGS, PRESIDENT, BILLINGS ENERGY CORPORATION

Since the appearance of the first green plants on earth, storage of the sun's energy has been taking place for the eventual benefit of mankind. By the complex process known as photosynthesis, the sun's energy causes water and carbon dioxide molecules to combine to form carbohydrates with oxygen as a significant byproduct. The reverse process, combustion, releases the stored energy while breaking down the more complex molecules again into water and carbon dioxide. The complete process is known as the carbon cycle.

For millions of years, the photosynthesis half of the carbon cycle has been taking place faster than the combustion half. Tremendous quantities of energy have been chemically stored in organic matter that has been buried in the earth's crust by natural processes and gradually transformed into the reserves we know today as coal, crude oil, natural gas, oil shale, and tar sands.

As man became aware of these great reserves of chemical energy or hydrocarbon fuels and learned to harness them, an energy bonanza opened. Cheap, abundant energy became available to warm man's home, cook his food, power his machines and make his work lighter. Within just a few years, mankind started gnawing away at these enormous reserves at a rate much faster than the molecule by molecule storage process of the sun could replenish the supply. The result is that our hydrocarbon reserves are being depleted rapidly.

The energy crisis is the realization that these reserves must one day run out. To call it "just a fantasy of the large corporations", is fallacy. Our reliance on hydrocarbon fuels is transient, and we must awaken to the realization that either we find an energy substitute or eventually run short.

Fortunately, there are many alternatives to hydrocarbon fuels. Nuclear fusion, solar, geo-thermal, wind and tidal energy are just a few. However, as with most problems, enormous and complex in nature, there will not be one simple answer.

The solution, rather, will be a complex and intertwined combination of various energy supplies, with priority considerations. In this discussion, particular attention will be given to the hydrogen cycle because it is a clean and efficient cycle that can use both hydrocarbon and non-carbon containing energy sources as a feedstock for hydrogen. The hydrogen cycle can thus be used now as well as in the far future after our hydrocarbon fuels are gone.

Although 90 percent of our universe is made up of hydrogen, it is not found in large quantities in its free or unreacted form here on the earth. For this reason, it is necessary to synthesize hydrogen from its compounds, the most common of which is water. Presently, techniques are commercially available or are under development for the purpose of liberating hydrogen from water utilizing electricity, coal gasification, nuclear, solar, wind, hydro-electric or geo-thermal energy sources. In other words, hydrogen becomes the common uniting factor or the common denominator uniting the complex energy resources of the future.

In performing its role as an energy carrier, hydrogen forms the closed hydrogen cycle. One example is a large hydro-electric generation facility where hydrogen is generated, utilizing the process known as electrolysis. Electrolysis is the splitting up of water into its component parts—hydrogen and oxygen, utilizing electrical energy. The hydrogen is distributed from the electrolysis plant to the point of utilization where the hydrogen combines with oxygen from the air forming water vapor, while releasing the energy that was charged into it at the hydro-electric facility. The newly formed water vapor then rises into the atmosphere where it condenses as part of a cloud formation. As winds aloft carry the cloud formation over the tops of mountainous terrain, the temperature drops and the water once again falls to the earth in the form of rain. The rain waters empty into the same river that supplies the water for the electrolysis plant, thus completing the cycle. It is significant to note that in the hydrogen energy cycle, hydrogen is neither consumed nor made unavailable, but rather undergoes a simple process in which energy from otherwise unusable resources is transferred to the point of application and stored until required. Furthermore, the entire process is economical, safe, and pollution free.

Most energy experts agree that hydrogen will play a key role in the energy economy of the future. An appropriate question to consider is how can we most economically transit to the hydrogen cycle and why we should begin to do so immediately.

During initial implementation phases, the most economical method of large-scale hydrogen production will be coal gasification. The process of making hydrogen from coal is highly developed. Since the 1930's several processes of reacting water and coal, for the purpose of synthesizing industrial hydrogen, have been developed and commercially established. Over twenty large commercial hydrogen production plants, utilizing coal as a feedstock, are now in operation around the world. The technology of economically producing hydrogen from this source is not in question. Although no energy conversion process is 100 percent efficient, these coal conversion plants are efficient ways to extract energy from low-grade coal. Furthermore, due to the chemistry of coal gasification, they inherently produce only one-tenth of the air pollution that is associated with a direct combustion, coal-burning electrical generation plant.

Coal-burning, hydrogen generation plants can be built in this country today. They can have a substantial impact on the amount of foreign oil required to keep this country's economy healthy. Already, several companies are seriously considering the construction of private coal gasification plants as a means of providing the energy to their manufacturing facilities. These hydrogen-energy generation schemes are cost effective. With only small incentives from government, they can become a near-term reality.

The technology of utilizing hydrogen in vehicles is well documented. Since 1964, my private automobile has been hydrogen-powered. For the past year and a half, a hydrogen-powered bus has been operating in Provo, Utah. As part of the local mass transit system, the hydrogen bus demonstrated the technicality feasibility of operating mass transit systems utilizing this pollution-free vehicular fuel. The City of Riverside, California, plagued by serious environmental problems caused by gasoline-powered automobiles, will implement a second hydrogen bus. This vehicle will be part of the Riverside Special Transportation Program, and local residents hope that it will be the beginning of an extensive pollution-free, hydrogen, mass-transit system throughout the south coastal air basin.

The concept of non-polluting vehicles is beginning to receive strong public support. The recent announcement of plans to build ten prototype hydrogen cars has resulted in an overwhelming response by Americans.

A hydrogen-powered home will be inaugurated later this year to demonstrate the potential of hydrogen as a fuel for appliances in both domestic and industrial applications. An energy economy based on hydrogen is becoming a reality on a demonstration scale.

The great industries that make up the free enterprise system of this country will take the lead in further implementing hydrogen energy, and rightly so. Government, however, can and should play an important role in encouraging the widespread application of this technology. The role of the Government should be in removing obstacles and providing incentives as is outlined in the present energy plan. The implementation of hydrogen energy now—when we can, rather than later—when we must, will require a unified effort by industry, government, and the individual consumer. Specific suggestions for this committee to consider follow.

ORIGINAL ENERGY PROPOSAL

- I. Graduated rebates would be given for automobiles and light duty trucks whose fuel economy is better than the standard. Electric vehicles will be eligible for the maximum rebate.
- II. Industrial Conservation: Legislation will be proposed for a 5-year, 10 percent investment tax credit for investment in approved energy-saving industrial equipment, including solar energy equipment, that could be incorporated in exist-plants. This credit would be in addition to the present 10 percent tax credit.
- III. Industry would be eligible for either an additional 10 percent tax credit for conversion expenditures or a rebate of any natural gas or petroleum taxes paid, up to the amount of any expenditures incurred for conversion to coal or other fuels.
- IV. Solar Tax Credits: To stimulate the development of a large solar market, a tax credit of 40 percent of the first \$1,000 and 25 percent of the next \$6,400 (maximum \$2,000) paid for the installation of qualifying solar equipment would be provided.
- V. Business Investment Tax Credit: The solar industry will be aided further by the inclusion of investments in solar equipment for industrial and commercial purposes among the approved conservation measures eligible for the proposed 10 percent tax credit for energy-saving investments.

AMENDED POLICY ADJUSTED FOR HYDROGEN IMPLEMENTATION

- Maximum rebates should apply to hydrogen-powered automobiles because of their high efficiency and because they are using an alternate fuel that is non-polluting.
- Hydrogen energy equipment should be allowed the same 10 percent investment tax credit as is afforded solar and other energy devices.
- Hydrogen should be specifically mentioned.
- The same 40 percent on the first \$1,000 and 25 percent on the next \$6,400 tax credit should be allowed homeowners converting their homes or automobiles to hydrogen.
- Business investment tax credit should be allowed on investments in hydrogen-energy equipment.

- VI. **State Support:** States are urged to amend their property tax laws to exempt solar installation from assessments, to enact legislation to protect access to the sun, and to promote consumer education in the solar field.
- VII. **Solar Geothermal, and other Technologies:** The Government will provide increased funding for photovoltaic systems, solar buildings technologies, small wind energy conversion systems, and demonstration projects on wood-derived biomass. The Government will also fund programs for additional work on gas-fired heat pumps and small fuel cells for residential and commercial heating and cooling. Additional funding will be provided to identify new hydrothermal sources which could be tapped for near-term generation of electricity and for direct thermal use. The Government will also support demonstration of direct, non-electric uses of geo-thermal energy for residential space conditioning and industrial and agricultural process heat in areas where this resource has not previously been exploited.
- State support should be sought to provide incentives for hydrogen energy applications. Reduced road taxes for hydrogen cars, exempt installations, and consumer education programs are urgently needed.
- Of all energy alternatives considered, hydrogen has received the very least financial research support by ERDA and other federal energy agencies. Although industrial supporters have provided nearly \$2,000,000 for hydrogen energy research at Billings Energy Corporation, and although numerous proposals have been submitted, ERDA has to date, funded only one contract at Billings amounting to less than \$40,000. Members of the ERDA hydrogen energy committee recognize an urgent need for research, but congressional allocations and guidelines for energy research do not support work on hydrogen. Specific legislation is urgently required to support hydrogen energy research allocations.

The hydrogen energy concept is the most economically viable energy cycle yet proposed. Petroleum is a non-replaceable, vital resource. Petrochemicals, plastics, textiles, drugs and numerous other products discovered and many yet to be discovered, are derived from this rich feedstock. We cannot afford to destroy petroleum in our high performance automobiles. We must act and we must act promptly. While we are killing ourselves in our own noxious air pollution, we are carving for ourselves a place in future history books as the glutinous generation that consumed all of mankind's valuable petroleum resources. The supporters of clean abundant hydrogen energy propose a new way—a way of using vast dormant energy reserves—a way of harnessing nondepletable energy resources. With support, that new way will become a reality.

An Open Letter to President Jimmy Carter, The Congress And People of the United States

Is there an energy alternative? Is energy independence within our grasp? If so, at what price?

I compliment President Carter and his staff for their comprehensive energy plan. Conservation, which is highlighted in the new program, will have an immediate yet limited impact on this problem. At best, conservation alone is only a temporary solution.

Coal is our most abundant fossil energy resource in this country. Unless we are willing to sacrifice the standard of life which we have come to enjoy, we must harness this energy giant and do so immediately. The question is how, and what happens someday when the now, apparently inexhaustible coal supply runs short? We need a system of implementing coal into our modern energy utilization equipment. This system must be environmentally safe, and have the capability of switching to the energy resources of the future, when even coal supplies run short.

CONSIDER HYDROGEN—Hydrogen is the simplest and most abundant element in the universe. Of the large coal gasification plants in commercial operation today, over 80% have been built for the purpose of generating hydrogen. Furthermore, coal gasification plants which produce hydrogen, release 1,000 percent less pollution into the air than coal-burning, electrical generation plants of the same capacity. Hydrogen is capable of economical transportation via underground pipelines to population centers where it can be used in a variety of energy applications.

Recently, the City of Provo, Utah implemented the world's first hydrogen transit bus. For 25¢, passengers travelled in a mass transit vehicle, equivalent in every respect to conventional hydro-carbon fueled versions, except for one extremely important difference. The hydrogen bus generates no air pollution. When hydrogen and oxygen combine, the by-product, is water vapor. Even nitric oxide pollution, which was a problem with early hydrogen engines, has been eliminated by new techniques. Engine life is enhanced by the clean burning fuel, while engine operational efficiencies are increased by as much as fifty percent. Most significantly, hydrogen produced by present coal gasification processes costs less than 50¢ per gallon of gasoline equivalent. We now have a clean competitive alternative to gasoline that allows us to tap our enormous coal reserves. Furthermore, as these reserves are depleted

or as limitations in coal mining make necessary the development of other energy sources, hydrogen emerges in its most important role. Hydrogen is the common denominator or the "unifier" of the various energy sources of the future.

A Hydrogen-powered home is presently under construction which will utilize hydrogen generated from a solar collector, a wind turbine, and a hydro-electric generator, to heat, cool, air condition and even power the garden tractor. This home is indicative of hydrogen's future role. As cost effective methods of harnessing future energy sources become available, we need a unifier that will tie these energy forms to our energy applications. This is the role of hydrogen. Whether hydrogen be generated from a floating nuclear fusion plant, from a large geo-thermal reserve, a solar collector, or from coal gasification, it is all the same. Vehicles converted to hydrogen during coal supply years are immediately ready to receive hydrogen from fusion or other future sources. Hydrogen is hydrogen, regardless of its source. It can be generated from any form of energy and water. When hydrogen is combusted, the water is regenerated in the exact amount that was consumed for production. The only resource that is consumed in the hydrogen cycle is energy itself. Furthermore, the cycle of converting coal to hydrogen, and then utilizing hydrogen in vehicles, is the most energy efficient method of vehicular coal utilization yet developed.

Why then has hydrogen been so slow to emerge in view of crucial energy problems? The answer is simple. We have been lacking the technology to safely implement this energy form. Less than two years ago scientists for the first time, were able to refine the process of storing hydrogen in a powdered hydride form to the point that it could be implemented in vehicles. This first vehicular metal hydride storage container, although excessively heavy, was safe for public use. Since that first vehicle, metal hydride storage technology has moved forward at an impressive pace. Vehicles, such as the hydrogen bus operating in Provo, the 1977 Cadillac Seville which was featured as part of the President's Inaugural Parade and a new hydrogen-powered bus which has been ordered by the State of California for application in Riverside later this year—all have

contributed to the advancement of this new technology. The weight of hydride storage containers has dropped rapidly. Hydride tanks in their present form can propel a vehicle three times farther than electric battery systems of comparable weight. Hydrogen vehicle systems, employing safe metal hydride storage, are available now for commercial applications.

The next step is to obtain the commitment which will be necessary for the implementation of such an enormous project. The Billings Energy Corporation is dedicated to the development and commercialization of this clean energy form. We have received strong support from a broad spectrum of industry. I personally believe in the spirit of competition and the free enterprise system which has played such an important role in the development of this country. Industry, not government, should take the lead in making this important energy form available for the American public. I believe that American industry is ready to accept that challenge. Petroleum companies will become energy companies. Hydrogen pumps at service stations will begin to appear across the country just as the use of gasoline spread fifty years ago. The genius of America is her people and her system. Therein lies the solution to our critical energy problems. Certainly government also has its role. Assistance will be required in providing incentives and removing obstacles, as was outlined in the President's proposal. The implementation of hydrogen energy will require a unified effort by industry, government and the individual consumer. With that kind of support, this project can become a reality.

I sincerely hope that the President, the Congress, and the people of this great country will consider carefully this important energy alternative. Never before has this country been in greater need of permanent solutions to permanent problems. A hydrogen energy economy will someday be a reality. It cannot solve all of our problems, but it can put us on a course that will eventually lead to our energy independence. Let's plan permanently. Let's begin now to unify our energy resources. Let's make hydrogen part of our permanent energy policy.

Sincerely,
Roger E. Billings
President
Billings Energy Corporation

Hydrogen Questions & Answers

Q. Why choose hydrogen as a fuel?

- A.** (1) Crude oil and natural gas are in short supply. Hydrogen, which is found in water, is very abundant.
 (2) Hydrogen can be manufactured from domestic energy resources.
 (3) Hydrogen can be substituted for most fuels now in use.
 (4) The products of combustion are nonpolluting.
 (5) Projected production costs are competitive.

Q. How is hydrogen produced?

- A.** Hydrogen is not a primary fuel, it must be manufactured from water and either fossil or non-fossil energy sources.

The water can be split by electrolysis using electricity produced by a variety of means including conventional fossil, hydro-electric, nuclear fission, geothermal, tidal, wind, solar, ocean-thermal, and nuclear fusion.

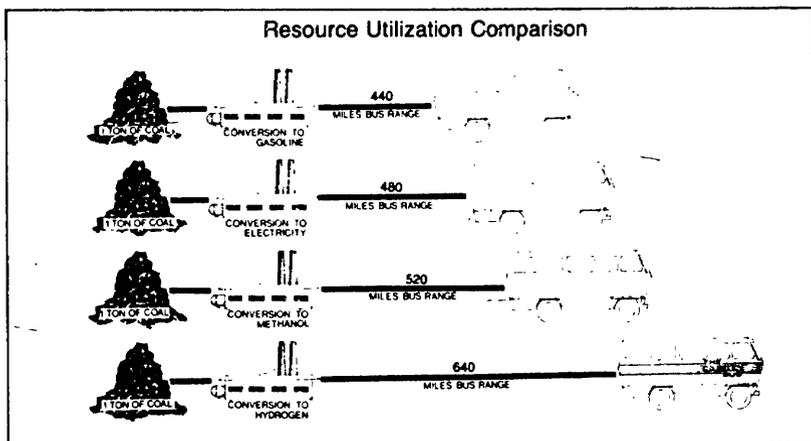
However, it is not necessary to use electricity. In 1973, only 1 percent of the hydrogen produced in the United States was made by electrolysis. The rest was obtained by the reaction of natural gas or light oils with steam at high temperature. This process is called reforming. In the near future, it will be necessary to use other fuel sources with a similar process—particularly coal gasification and gasification of solid wastes.

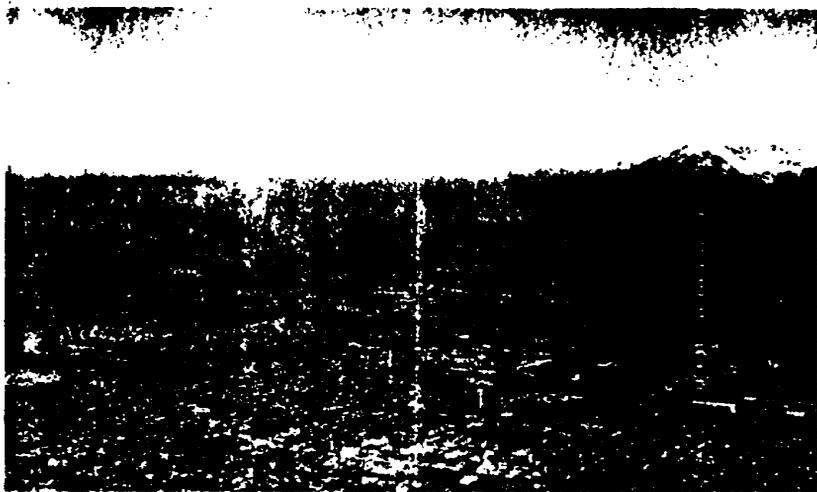
Q. How can coal be used to produce hydrogen?

- A.** Coal gasification technology is rapidly advancing and being placed into commercial use. The gasification process is attractive because pollutants, such as sulphur, are more easily removed. Synthesis gas made in this way can then be reformed to hydrogen.

Q. How can solid wastes be used to produce hydrogen?

- A.** Gasification of solid wastes is a recent innovation that is nearing market readiness. A synthesis gas is formed using air or oxygen. The synthesis gas may then be reformed to hydrogen. The solid waste concept is particularly





During the winter months, the Prouo-Orem, Utah, area suffers from a pollution problem because of an inversion layer that settles over the valley. In a pollution-free hydrogen economy, this problem would be alleviated

attractive because it has the potential to solve two problems:
 (1) Disposal of urban refuse, and
 (2) A hydrogen supply for pollution-free hydrogen-powered vehicles

Q. What fuels can hydrogen replace?

A. Hydrogen is frequently mentioned as a possible replacement for natural gas because it can be manufactured by coal gasification and piped in existing natural gas lines. Hydrogen can be used to replace gasoline and diesel fuel in aircraft and automobiles. It has also been used as a substitute for propane. In general, it is possible to burn hydrogen instead of any

of the fuel stocks now in use.

Q. Why is hydrogen combustion nonpolluting?

A. The product of combustion of hydrogen with air is only water vapor, provided the peak temperature is limited. Oxides of nitrogen are created whenever nitrogen in the air is heated to a high enough temperature. Fortunately, it's possible to obtain good combustion while limiting the temperature.

An internal combustion engine fueled by hydrogen can be adjusted so that the emission of NO_x is two-hundred times less than in present vehicles. A practical means for controlling the

temperature is to induct water into the hydrogen-air mixture. Hence, the exhaust of a hydrogen-driven vehicle is only water vapor returning to the atmosphere.

Q. In what ways is hydrogen better than other automotive fuels?

A. Hydrogen does not experience problems associated with liquid fuels such as vapor lock, cold wall quenching, inadequate vaporization, poor mixing, and so forth. Hydrogen combustion does not produce toxic products such as hydrocarbons, carbon monoxide, oxides of sulphur, and organic acids. Engine wear is

FUEL PRICE FORECAST ^(a)

FUEL TYPE	COST PER MILLION BTU - 1974 DOLLARS			
	1974	1980	1985	1990
Crude Oil (domestic plus imports)	1 55	2 40	2 70	2 70
Gasoline (to consumer)	3 75	4 25	4 35	4 35
(fleet price)	2 78	3 15	3 25	3 25
Diesel Fuel (to consumer)	2 80	3 76	2 85	2 85
Natural Gas (new. to consumer)	1 10	2 60	2 85	2 85
Coal (for steam generation, long-term contract)	0 62 (b)	1 34 (c)	1 52(d)	1 52(d)
Electrolytically Produced Hydrogen	11 00(e) (7 30)(f)	13 60(f) (9 03)	13 45(g) (9 96)	12 44(h) (8 30)
Coa. Gasification to Hydrogen	1 30(b) (0 85)	2 20(c) (1 45)	2 40(d) (1 60)	2 40(d) (1 60)

- (a) Exclusive of taxes (e) Based on electricity at 20 mills/kwh at 77 percent thermal efficiency
 (b) \$13 00 per ton (f) Based on electricity at 27 mills/kwh at 80 percent thermal efficiency
 (c) \$35 00 per ton (g) Based on electricity at 30 mills/kwh at 90 percent thermal efficiency
 (d) \$40 00 per ton (h) Based on electricity at 30 mills/kwh at 100 percent thermal efficiency
 (i) Values in parentheses are adjusted for a hydrogen fueling efficiency improvement of 50 percent

reduced.

Hydrogen has a high flame speed, wide flammability limits, and a high detonation temperature with lean burning resulting in improved engine efficiency. Hydrogen contains 2½ times as much energy as the same weight of gasoline.

Q. How much more efficient is a hydrogen engine than a gasoline engine?

A. As with any gasoline engine, efficiency depends on driving conditions. At freeway speed the hydrogen engine has demonstrated approximately a 20 percent efficiency increase. Under stop-go city driving conditions, where the throttled gasoline engine performs very poorly, the hydrogen engine is about 50

percent more efficient.

Q. Why is a hydrogen-powered engine more efficient?

A. The thermodynamic cycle for hydrogen is much closer to the ideal Otto cycle than for either a gasoline or a diesel engine. In addition, the compression ratio can be higher. Wide flammability limits make power regulation possible by throttling only the fuel rather than the fuel-air mixture. Hydrogen engines demonstrate efficient operation like a diesel, with the high rpm characteristics of the gasoline engine.

Q. What are the current problem areas for hydrogen as a transportation fuel?

A. Problem areas for hydrogen use include the weight of the storage

container (or the range for a given gross vehicle weight) and lower maximum horsepower due to displacement of air by hydrogen.

Q. What is being done to solve these problems, and can they be solved?

A. Extensive research is currently being conducted to develop a lighter storage container. The level of research funding in these areas has been very small in the past. The prospects for significant improvement is quite good. Already, hydride storage systems are available which meet vehicle design requirements for many applications such as city buses, trains, warehouse vehicles, and others.



Billings Energy Corporation is a progressive research organization. Here, Technician Barry Riggs runs tests on a one cylinder, 16-horsepower Kohler engine used in a two-passenger urban car.

Q. How is hydrogen stored in a vehicle?

A. Hydrogen gas is stored in a tank as a compound in metal alloy particles called "metal hydrides." The iron-titanium alloy acts as a sponge to absorb the hydrogen, thus becoming hydrides. Their physical appearance is like that of a fine silvery powder.

When the gas combines with the metal, an exothermic reaction occurs. The hydrogen is then stored in these particles until the necessary heat is used to release the hydrogen and build up the pressure in the tanks. This necessary heat is obtained from the engine exhaust, which is ordinarily wasted in a conventional engine. Hydrogen could also be stored in high pressure gas cylinders or as a liquid, but these are less desirable from a safety standpoint.

Q. In the hydrogen storage system, does the hydride need to be replaced each time it is used?



The safest method of hydrogen storage is the "metal hydride" system.

A. No. Charging and discharging of the hydride tanks is a process that can be repeated an indefinite number of times provided that the hydride material does not become contaminated. Should

contamination accidentally occur, the hydride can be reactivated by heating.

Q. How safe is metal hydride storage of hydrogen if the car is involved in a collision?

A. The metal hydride technique provides a safe method of fuel storage in hydrogen-powered vehicles. Since the hydrogen is chemically combined with the metal hydride, it can burn only after it is released from the metal. Liberation of the fuel requires heat of sufficient temperature either from the engine exhaust or from other sources.

The metal hydride tank is insulated with non-combustible material, and engine exhaust ceases in an accident. Thus, even if the tank itself is ruptured, most of the hydrogen will remain stored in the metal hydride. The hydrogen can evolve only very slowly as the tank is warmed. Safety demonstrations have been conducted in which a fire was placed under a hydride tank. Armor-piercing, incendiary bullets have also been fired into hydride containers. In these tests, the metal hydride system did not explode and proved to be much safer than gasoline storage.



Q. What about the Hindenburg mishap?

A. In this mishap, hydrogen, which was used to provide buoyancy in the Hindenburg, was in gaseous form rather than in the much safer powdered form. It's reasonable to expect problems using a fuel as a lifting gas. In view of the safety problems associated with such use, it's amazing that there were so few hydrogen fires in the airship industry. Of the 161 rigid airships built and flown between 1897-1940, nearly all of which used hydrogen for lift, only 20 were destroyed by accidental fires, and 17 of these were military incidents during World War I.

Q. Does hydrogen as a fuel have anything in common with the hydrogen bomb?

A. No! The only similarity between hydrogen as a fuel and the hydrogen bomb is the word hydrogen. Hydrogen used as a fuel involves a chemical reaction, while the hydrogen bomb is a nuclear fusion reaction. When controlled nuclear fusion plants become operational in the future, they will be an excellent energy source to use in hydrogen manufacture.

Q. What is the projected cost of hydrogen?

A. Presently, by-product hydrogen gas is available from a number of processes such as chlorine production at extremely low prices. This supply, however, will be immediately exhausted when hydrogen is implemented as an energy resource. The major source of hydrogen available in the immediate future is coal gasification. A recent study

indicates that hydrogen generated in large quantities from this source will cost 17.5 cents per gallon of gasoline equivalent.

With the advent of controlled nuclear fusion as an energy source, it has been estimated that hydrogen could be produced by splitting water on large floating platforms in the ocean for 6 cents per gallon of gasoline equivalent.

It should be noted, however, that these estimates do not include distribution and retailing costs, nor federal, state and local taxes.

Though future cost is not well established, there is good reason to believe that the cost of hydrogen will be competitive with gasoline long before petroleum stocks near depletion.

Q. Can my car be converted to operate on hydrogen?

A. Yes, in fact an engine can be converted or modified for hydrogen combustion by increasing the compression ratio, adding a gaseous carburetor, changing the timing and plug gap, and making provisions for water induction. However, widespread production and distribution of the fuel must be established before use by the general public becomes practical. Conversion can be accomplished now, but the costs are high since components are not in mass production. The prospect for introduction of commercial kits for cars within the next five years is very probable.

Q. Where would I get hydrogen for my car in the future?

A. Owners of small urban vehicles could manufacture their own hydrogen by electrolysis. Commuter cars of this type would

be comparable in size with electric cars. Cars refueled with hydrogen made by electrolysis will most likely be recharged overnight. In a total hydrogen economy, owners of all sizes of cars would refuel at "service stations." The entire refueling or recharging of the metal hydride tank can be designed to take place in less than fifteen minutes.

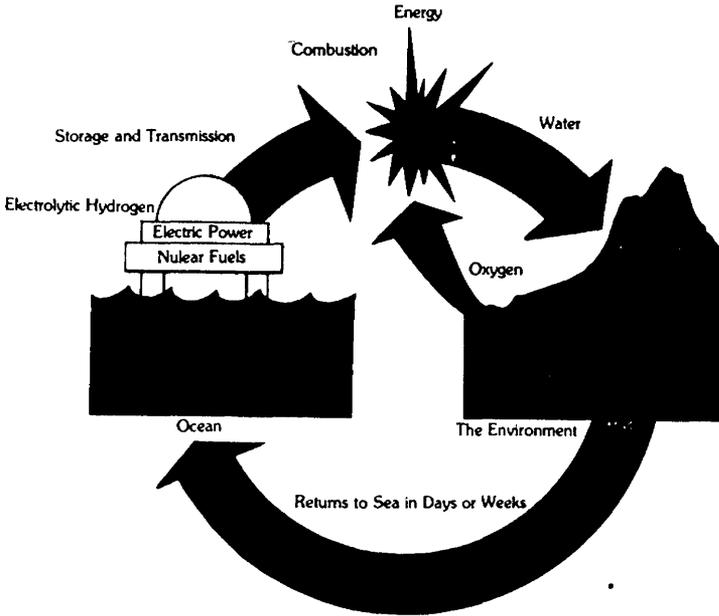
Q. Where will hydrogen be used in transportation in the near future?

A. At the present time, hydrogen distribution is not widely available. Thus, the most economical use in transportation is by fleet operators who can maintain central refueling facilities. Examples of fleet operations include delivery vans, taxis, bus systems, trains, ships, warehouse vehicles, airplanes, and commuter vehicles.

Q. Since hydrogen is made from other energy sources, how will its use help us in our present energy situation?

A. (1) All primary energy sources can be used in the hydrogen-producing process.
(2) Adoption of hydrogen fuel will reduce our dependence on foreign oil. The United States has large reserves of coal. Energy from combustion or urban refuse can also be used to produce hydrogen.
(3) Adoption of hydrogen will help us to become energy independent for the 100-200 years that our coal reserves last. After that time, hydrogen can be made from non-depleting energy sources such as solar or fusion.
(4) Hydrogen combustion is nonpolluting.

Envisioning the Future



The Hydrogen Cycle

Fossil fuels—oil, natural gas, and coal—are found in limited supply. The advent of their depletion is looming over the earth as a real threat to mankind's continued standard of living—unless, of course, an alternative source of power can be found. This fuel of the future must be relatively cheap, abundant, and entirely clean.

The solution was predicted back in 1874 by science fiction writer Jules Verne. In *THE MYSTERIOUS ISLAND*, an engineer replies to a query as to what men will burn when coal and other fuels are exhausted: "Water," he says. "Yes, my friends, I believe that water will one day be employed as fuel, that hydrogen and oxygen which constitute it, used singly or together, will furnish an inexhaustible source of heat and light."

And now, over a century later, scientists and engineers are working with a feasible, proven fuel derived from water—hydrogen. A clean, colorless, odorless gas, hydrogen is abundant and absolutely pollution free.

The vision of the hydrogen economy is exciting and the realization is rapidly approaching. Soon floating platforms in the oceans will house a series of non-radioactive nuclear fusion plants. The turbine-generated electricity would not be transmitted to the mainland, but would be used to electrolyze sea water into the gaseous elements—hydrogen and oxygen.

From the inexhaustible seas, hydrogen would flow continuously onshore into a coordinated network of underground pipelines. Based on current pipeline transmission costs (beyond 250 miles) these underground lines could carry energy in the form of a gas to the point of use at about one-eighth the cost of sending an equivalent amount of electricity through high-voltage

overhead cables.

A shift to the underground pipeline system would also alleviate the long-distance transmission cables which presently mar the visual beauty of the environment. Moreover, unlike electricity, which cannot be economically stored but must be used as it is generated, hydrogen gas can be stored in underground cavities, as a highly compressed liquid in insulated tanks, or in metal hydrides to meet fluctuating daily and seasonal variations in power demands.

Of these storage methods, the hydride system has the most practical storage application. Small particles of iron-titanium alloy are used in large underground or vehicular tanks. The tank then hooks up to a hydrogen supply and the particles will be charged with hydrogen to become hydrides and create a hydrogen reservoir. Thus, for home, industrial, or automotive applications, hydrogen can be safely stored and used whatever the energy demand.

If the hydrogen is not stored, it can be used directly like natural gas. At underground distribution points, the stream of hydrogen from the sea would be channeled to different uses. It can be used as a gas in the home to heat, cool, or power appliances with only minor adjustments or redesigning. It can also be used in a wide range of industrial processes from blast furnaces to glazing. Then, too, the gas can be used to generate electricity in local power plants, either through conventional steam turbines, gas turbines, or large fuel cells. The most efficient of these methods is fuel cells, which are devices that produce electric current directly from the simple catalytic reaction of hydrogen with oxygen or air. With a range of large and small fuel cells available, homes and industries would have the option of generating their own electrical power on the premises.

In a hydrogen economy buses, trucks,

ships, trains, aircraft, and even private automobiles would operate on hydrogen. With some mechanical modifications, all types of internal combustion engines can burn hydrogen cleanly. A person would refuel at his favorite "hydro" station where the hydrogen gas would be pumped into the safe metal hydride storage tanks in his car.

In aircraft, liquid hydrogen, which is presently used in the U.S. Space Program for rockets and spaceships, would make it possible to nearly double the operating range of jet aircraft on the same weight of fuel.

Of great importance to all these applications is the fact that the only major by-product of hydrogen combustion is water vapor, which goes into the atmosphere, then returns to the sea to become again the source of hydrogen. Thus, a hydrogen economy would revolve on a completely renewable, nonpolluting fuel cycle—one of the great natural cycles of the biosphere.

This vision of the future hydrogen economy is very convenient, but the practical individual wonders, "Where do we start?"

At the present time, hydrogen can be produced most cheaply from coal gasification. Using current technology, hydrogen can be produced from coal for one-half gasoline refinement costs. It has been estimated that the earth has enough coal supplies to last for another 200 years. So, until nuclear fusion is perfected, man can obtain his hydrogen from coal gasification.

Its first obvious point of entry into the economy is in present natural gas lines, eventually replacing natural gas, which happens to be the fossil fuel projected to be depleted first.

The transition period would use hybrid gas mixtures to "stretch" natural gas supplies; it also may begin to appear in mixed synthetic gases produced by new coal-gasification

processes. The technology for the construction and operation of natural gas pipelines which could use this hybrid gas has been well developed and proved. Tests are underway now to determine what, if any, modification to existing pipelines is necessary to pipe hydrogen over short and long distances. Eventually a point would be reached where gas lines would be completely converted to straight hydrogen. The

big cross-country pipelines will need additional compressors to move the lighter hydrogen gas. But since hydrogen's lightness enables it to move faster than natural gas, its flow volume will be some two and a half times greater, thereby nearly compensating for its lower unit heat value. Already most of the industries and about 80 percent of U.S. residences are tied into gas lines, and

and about 80 percent of the U.S. residences are tied into gas lines, and while hydrogen will require tighter, more diligently maintained piping systems, the same lines can be used. In home and industry, hydrogen's hotter, more intense flame will need more finely regulated burners, opening the way to smaller, simpler heating systems and to such developments as flat, ceramic,



This 1975 Grande Ville prototype uses the latest hydride storage technology and tests have shown that this storage method will soon be practical and economical in all passenger vehicles.

catalytic 'burners' that heat without flame

In the transition period most appliances and furnaces can be converted to hydrogen with simple conversion kits. Operating appliances and vehicles on gaseous hydrogen using advanced hydride technology has already been demonstrated by the Billings Energy Corporation. An interesting fact is that in test runs in some cities, Billings has found that the air coming from the exhaust of their vehicles is cleaner than the air going

in

Ultimately, hydrogen's prospects are closely tied to those of some other energy forms. Since immense amounts of power will eventually be needed to produce hydrogen economically and in quantity, it can best be brought into being with a balanced development of other new low-or non-polluting sources of energy—geothermal, solar, and thermonuclear. However, with current coal gasification technology, the ability is now here to produce relatively

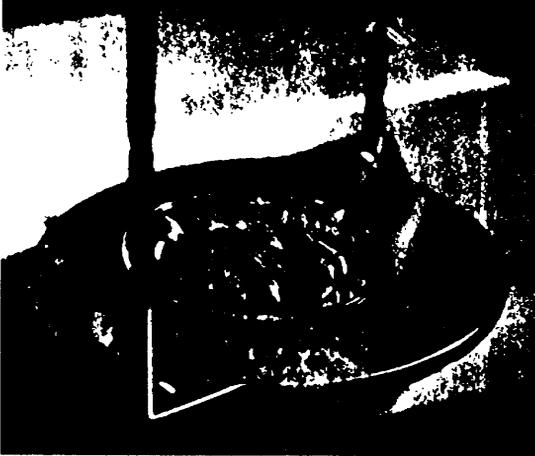
inexpensive hydrogen.

As far as fuel development and refinement, hydrogen is about where gasoline was 70 years ago. Intensive research is underway on many fronts by many people and institutions to more fully develop and refine hydrogen. Much of it is destined beyond all doubt to make hydrogen a more versatile and economical fuel within the next decade. The future of a hydrogen economy is bright and hydrogen futurists look forward to a highly efficient, pollution-free system.



In the above 1973 prototype, a Chevrolet Monte Carlo, a dual hydrogen storage/fuel system was installed to see how the new hydride storage system compared to the conventional cryogenic system. Based on this and other tests, hydrides have shown greater storage capabilities, safety, and economy

Hydrides... Applied TECHNOLOGY



These bits of iron-titanium alloy are processed and crushed into a silvery-gray powder, which will "soak up" hydrogen to form hydrides.

HYDRIDES: Tiny processed particles of iron-titanium alloy combined with hydrogen to form the safest, most compact method of hydrogen storage available today.

Featured on our cover are chunks of iron-titanium alloy. This alloy is processed and crushed into a silvery-gray powder, which will "soak up" hydrogen to form hydrides.

In a hydride storage system, the iron-titanium powder is placed in a stainless steel container or tank. The tank can be any size and operates similarly to a compressed gaseous cylinder except the pressures and flow rates are lower. Hydrogen may also be stored as a

high pressure gas, a cryogenic liquid, a chemical such as ammonia or methanol that is reformed to hydrogen, or a chemical that is dehydrogenated. However, none of these methods have the advantages of safety and increased volume capacity that the hydride system offers.

A hydride system is safer because (1) only low pressures are involved (500 psig or 35 atm), and (2) the void space within the storage tank is only 40 percent of the volume of the tank.

This means that if the tank is ruptured, there's only a small amount of hydrogen (2 percent) that will be released at the existing

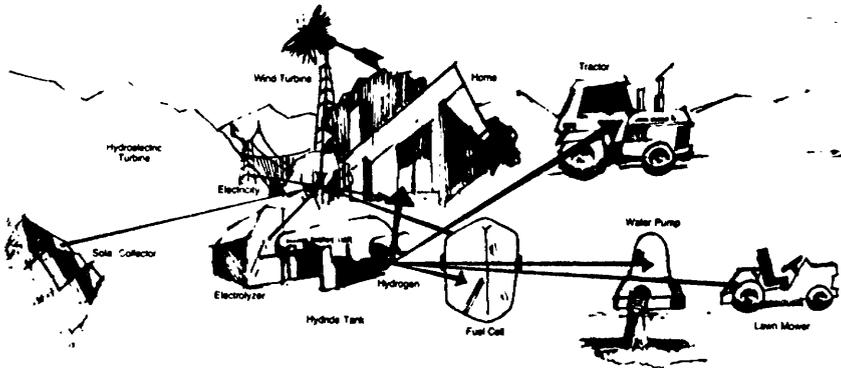
tank pressure. As the hydrogen is released from the hydride, an endothermic reaction occurs causing the hydride to reach cold temperatures. Thus, the hydride will only slowly give off hydrogen as it can absorb heat from the surroundings.

By utilizing a hydride, more hydrogen can be stored per given volume than any other conventional method. A hydride storage tank holds twelve times more hydrogen per volume than a gaseous tank of equal volume at 500 psig (35 atm).

The concept of hydrides is a relatively new one that opened a new field for research and discovery. The basic research and idea initially began at Brookhaven National Laboratory in New York. (See "Hydride Pioneers", p. 7.) Billings Energy Corporation realized the potential of Brookhaven's work and decided to implement hydride storage technology in their various prototype hydrogen projects.

Released early in 1974, BEC's first hydrogen prototype to utilize a hydride storage system was a 1973 Chevrolet Monte Carlo. Later BEC converted a Winnebago Motor Home in which the appliances (stove, oven, refrigerator) and engine motor operated on a hydride storage system. Since that time, Billings has converted a 1975 Pontiac Grand Ville, a Sebring-Vanguard Electric Car, and even a Winnebago Minibus.

It is interesting to note that the hydrogen vehicles are safer than gasoline operated vehicles. In tests at Tooele Army Depot, armor-piercing incendiary bullets were fired into a hydride tank and a



BEC's hydrogen farm will be completely energy self-sufficient.

gasoline tank. The gasoline tank burst into bright orange flames scattering burning gasoline and continued to burn for 30 minutes. On the other hand, the hydride tank burst into a yellowish fire flash that was smaller and contained lasting only a few seconds.

Billings' plans for the immediate future include converting a 19-passenger bus for the city of Riverside, California, and constructing a hydrogen-powered farm.

The farm project will consist of a small contemporary farmhouse with modern heating and cooking appliances, water heating, and electrical-power generation, tractor

and farm equipment; and even irrigation equipment—all powered with pollution-free hydrogen.

The hydrogen for the purpose of this prototype project will come initially from on site electrolysis of water, utilizing low cost hydro-electrical power with supplemental electricity from a solar collector and a wind turbine.

Later in the project, hydrogen will be generated by a small coal gasification facility.

The hydrogen will be delivered to the farm by a metal hydride truck tanker. From the tanker, hydrogen will be transferred in gaseous form to a stationary iron-titanium hydride tank, located adjacent to

the farmhouse. The stationary hydride tank will provide for the refueling of vehicles as well as supply hydrogen needed for domestic applications.

The purpose of the farm project is to demonstrate the feasibility of hydrogen and the hydride storage system for widespread application. As fossil fuels such as natural gas diminish, hydrogen will increase in importance. Unlike electricity, hydrogen can be stored. In addition, it can easily reach the consumer through underground pipeline systems much as natural gas does today.

There are so many benefits in storing hydrogen in a metal



In an earlier project, BEC converted this Coleman Stove to run on hydrogen. Similar technology will be used to convert the appliances for the home in the Hydrogen Farm Project.

hydride that Billings has designed the AHT-5—a small portable hydride tank which can be of great value and practical use to research and industrial firms. It is based on the same hydride technology that was used for the custom-designed tanks in the previously mentioned prototype projects. BEC also manufactures commercial quantities of iron-titanium alloy, which is specially formulated for hydriding.

Besides the volume and safety advantages, hydrides in tanks can be used as a hydrogen purifier and with low pressure capabilities. In normal use, BEC recommends that 99.99 percent hydrogen be used to avoid contaminating the tanks. However, the user can be assured that the purity coming out of a tank will be 99.99 percent pure even if a



The first hydrogen-powered bus, developed by BEC, utilizes a hydride storage system.

lower grade of hydrogen is used.

When using a tank as a hydrogen purifier, the hydride will slowly deteriorate and will occasionally have to be reactivated. However, utilizing the tank as a purifier is economically advantageous even with the occasional reactivation.

Another real advantage in smaller hydride tanks like the BEC AHT-5 is that they can be charged with pressures as low as 250 psig (17.5 atm). However, BEC's engineers recommend 500 psig (35 atm) because they charge faster at a higher pressure. This means lower pressure sources such as electrolysis of hydrogen can be used to charge smaller tanks. Tanks like the AHT-5 reduce or eliminate the costs of compressing hydrogen.

Since iron-titanium hydride is such

a new area of scientific investigation, BEC has developed an extensive research program to explore the hydrogen-storage possibilities of this metal alloy.

An example of the technology being investigated is the rapid charging and discharging of hydrogen into and from the hydride. BEC's research team is presently gathering data on the various physical, chemical, and thermochemical properties of hydrides in order to allow for more accurate modeling and engineering designs of economical and efficient hydride storage vessels.

The future of this new and exciting investigation of hydrides is promising and will hopefully lead to more widely accepted and applied technology for modern man.

The pioneers in iron-titanium hydride discovery, Dr. J. J. Healy, Jr. (left) and Dr. R. H. Wiewell (right), examine a Wenzel engine.

2



Brookhaven National Laboratory

An interview with the researchers who discovered the hydrogen storage capabilities of iron-titanium hydrides.

Hydride PIONEERS

Many involved in hydrogen storage technology, including Billings Energy Corporation, maintain that a metal hydride is the safest, most practical method of hydrogen storage today. Hydrogen is combined with an iron-titanium alloy to form iron-titanium hydride, a compound originally discovered at the Energy Research and Development Administration's Brookhaven National Laboratory in New York by Dr. J. J. Reilly, Jr. and Dr. R. H. Wiswall, Jr. Since the initial BNL discovery, BEC has continued further research and used this hydride technology in numerous automotive applications. Home and industrial applications utilizing hydrogen fuel will soon be tested.

The following interview between HYDROGEN PROGRESS and BNL lends understanding to the "Hydride Story."

Q: Why did BNL first start the project of looking for a material to store hydrogen for energy storage purposes?

A: Dr. Warren Winsche, BNL Associate Director for Energy—I first suggested that metal hydrides might store hydrogen and pushed the search at BNL. In 1965, scientists had accumulated a great amount of knowledge about hydrogen but not about its reaction with metal. The reason others might have missed it is because they were looking at stable hydrides instead of an unstable one which takes special conditions to study as it decomposes at room temperature. We were looking for hydrides that others had not found and wanted them to be unstable so that the hydrogen could be released easily. We believed they were there if we just looked. The

primary researchers involved in this project were Dr. James J. Reilly, Jr. and Dr. Richard H. Wiswall, Jr.

Q: How did you initiate the research?

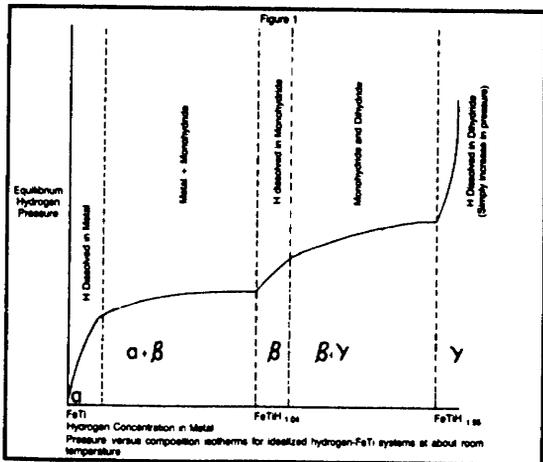
A: Dr. J. J. Reilly, Jr.—At Dr. Winsche's suggestion, we started a small effort to look at classes of materials that might form metal hydrides with properties that might be attractive for energy storage purposes. The known hydrides in 1965 did not meet these requirements.

We first examined magnesium alloy hydrides, but they had to be heated to high temperatures to decompose. Then, through a combination of elimination and intuition, Dr. Wiswall and myself discovered that an alloy of iron and titanium would react directly with hydrogen to

form iron-titanium hydride, a compound which had some very interesting properties.

Q: What reaction occurs to form a hydride?

A: Certain metals or alloys will react with hydrogen directly and incorporate it into the metal lattice. The most attractive material from both an economic and applications viewpoint is iron-titanium hydride. It can be formed by contacting hydrogen, at a moderate pressure, with an iron-titanium (FeTi) alloy. Usually the behavior of a metal-hydrogen system can readily be described by examining the way the equilibrium pressure of hydrogen in the system varies with the hydrogen concentration in the metal at a given temperature. Such a graph is shown in Figure 1 for an



Brookhaven National Laboratory



Dr. Reilly (left) and Dr. Wiswall (right) analyze data in a laboratory at Brookhaven

idealized FeTi-H system

In the graph the shape of the curve (or isotherm) can be interpreted as follows: on the left where the isotherm rises steeply as the hydrogen content of the solid increases, is the region of solid solution of hydrogen in the FeTi metal lattice. This solid solubility region may be designated as the α phase of the FeTi-H system. As the hydrogen content of the solid is further increased the equilibrium pressure remains constant and forms, so to speak, a plateau. The composition at which the plateau begins marks the point at which a new phase appears and also marks the maximum solubility of hydrogen in the α phase. At room temperature that composition corresponds to FeTiH_{0.10}. The new phase is the monohydride or β phase of the FeTiH system. Both the α and β phases coexist until the solid composition corresponds to FeTiH_{1.04} where the isotherm begins a steep ascent. At this point the α phase has disappeared. As the hydrogen content of the β phase is increased, another new phase

appears, the γ or dihydride phase. As a consequence, another higher pressure plateau appears and persists until the monohydride is converted to the dihydride after which the pressure again rises steeply. The maximum hydrogen content so far achieved at high pressures corresponds to a composition of FeTiH_{1.10}.

Q: In the iron-titanium alloy, is titanium a rare material?

A: Titanium can be made from ilmenite ore, of which abundant deposits exist in North America. In this regard it should be noted that titanium is the ninth and iron is the fourth most abundant element of the earth's crust.

Q: What is the life of the iron-titanium hydride?

A: The life of the iron-titanium hydride is indefinite. We have recycled materials to 20,000 times. This means that hydrogen gas has been stored and released from the same hydrides 20,000 times and they are still useable. As long as the hydrogen is pure the material

can be used indefinitely.

Q: What are the advantages of iron-titanium hydride for storing hydrogen?

A: Currently, hydrogen may be stored as a compressed gas or as a cryogenic liquid. Neither method appears to be practical for many applications where hydrogen use would otherwise be attractive. For example, gaseous storage of hydrogen for use as a common mobile or stationary fuel is not feasible because of the large volume and/or weight of the storage vessels. Liquid hydrogen could find extensive use as an aircraft fuel, but would involve difficult handling problems in everyday applications. In addition, the liquefaction process is relatively expensive. On the other hand, iron-titanium hydride, which has a higher density of hydrogen per unit volume, is relatively easy to handle. It is much safer than any volatile fuel, such as gasoline, and tends to be inactivated by air. In practical situations if a hydride storage tank is ruptured, only a small fraction (-15-20%) of its hydrogen content will be immediately released; the remainder would leak out slowly over a relatively long period. The main disadvantage of the iron-titanium hydride is its weight. We are continuing our research in metal hydrides with the hope of finding a lighter material with similar properties.

Q: Do you think you will find a lighter hydride material?

A: There are lighter hydrides available, but their properties are not as good from a practical viewpoint. In the beginning a large number of alloys (100 or so) were examined, and since the discovery

of iron-titanium, we've looked at several hundred more and still haven't come up with anything better.

Presently, we are starting a program in which we will, hopefully, find something with a greater storage capacity than iron-titanium. It is possible that some new magnesium or titanium alloy may work out.

Dr. Winsche—Our research continues because there are probably many metal hydrides yet undiscovered that would be light and cheap, that would absorb hydrogen at around room temperature and release it at room temperature.

Q: If BNL discovers the lighter hydride, will others be able to use this technology in their projects?

A: Dr. Reilly—Yes, BNL is under government contract. Therefore, any discoveries or advances that we make are in the public domain.

Q: What are the possible applications of hydride technology?

A: The most attractive application of hydrides at the present time is in the automotive area, particularly in heavy fleet vehicles such as Billings' Hydrogen Bus. As Billings Energy Corporation has already demonstrated, hydride storage of hydrogen fuel for internal combustion engines is completely safe, efficient and environmentally attractive. In fact, it compares quite favorably to another alternative to gasoline, i.e., electric vehicles. Other possible applications are the storage of electricity through the production, storage and reconversion of hydrogen; heat pumps; heat storage; process storage of hydrogen in chemical plants; and fusion reactor blankets.



(Left to right) Richard Hartley (BEC) and BNL leaders Richard Wiswall, R. Christian Anderson, (seated in car), Warren Winsche, and Jim Reilly met at the Brookhaven Energy Fair held in May 1976. The Billings Urban Car utilizes a hydride hydrogen storage system.

I think the present potential of hydrides for practical application is large and will increase dramatically as research and development work continues.

Q: Has BNL ever been involved in the actual application of the hydrides that it developed?

A: Yes, we designed and built a hydride storage system for the Public Service Electric & Gas Co. of New Jersey (PSE & G). It is being used as part of a PSE & G experimental program designed to demonstrate the feasibility of energy storage through the medium of hydrogen. This could be accomplished by producing hydrogen electrolytically using off-peak power, storing the hydrogen as iron-titanium hydride and finally decomposing the hydride to supply hydrogen to a fuel cell which would then generate power for on-peak loads. The hydride storage system has undergone approximately 40 hydride-dehydriding cycles and is working fine. However, despite the successful technical demonstration of the

concept, it does not appear to be economical at this time primarily because of the high costs of the conventional electrolytic and fuel cells. This is a problem area which is currently receiving attention and it appears possible that dual electrolytic-fuel cells of an advanced design may reduce costs to an attractive level.

In this connection it should be pointed out that as our reserves of fossil fuel diminish, such fuels will become more expensive and alternative energy sources and conservation measures which are not presently competitive will become more and more attractive. Eventually, of course, oil and coal will be too expensive to use as a fuel and will be used rather as a source of chemical raw materials. At that point, a hydrogen economy seems inevitable.

A HYDROGEN-POWERED HOMESTEAD

R. E. Billings
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EXTENDED ABSTRACT:

CONCEPT

For years researchers have considered the technical feasibility of hydrogen-powered communities. Recent demonstration projects have successfully shown the technical as well as financial feasibility of hydrogen's application to vehicular systems. To date, however, only limited experimental work has been performed regarding the conversion of domestic appliances to hydrogen. [1] Previous work performed at Billings Energy Corporation under a contract from Mountain Fuel Supply resulted in a commercially feasible method of reducing nitric oxide formation associated with open hydrogen combustion. [2] The purpose of the present project is to test the feasibility of hydrogen by implementation in an actual residence on a permanent basis.

During the initial phase of the hydrogen homestead project, special design considerations were taken into account. Due to the rising energy costs predicted for future years, modern techniques of insulation were employed. Hydrogen for the homestead project is provided through a Billings solid polymer type electrolyzer device. The solid polymer electrolysis technique allows the elimination of caustic electrolyte materials along with the associated maintenance and reliability problems. Hydrogen from the electrolyzer is generated at 500 lbs pressure by an electrolyzer internal high pressure cell. Hydrogen flows through-purification equipment prior to entering into the metal hydride storage containers. During the initial phase of the project, electricity for the electrolysis cell will be provided by the local electric utility. Later electrical energy will be supplied by a solar collection array, a wind turbine and by a hydroelectric generator to be installed on the site.

DESIGN

Hydrogen appliances have been fabricated by retrofitting natural gas equipment which is being supplied to the project by Tappan Appliance Company. Natural burner conversion is accomplished by blocking completely the primary air inlet and by the installation of a hydrogen diffusion air mixing system. Since hydrogen combustion takes place at a laminar flame speed approximately ten times faster than methane, small areas of elevated temperature have been observed in uncontrolled hydrogen burners. Since these temperatures typically exceed the threshold

REB

of 240° F for nitric oxide formation, nitrogen and oxygen from air react generating nitric oxide emission levels in excess of 200 parts per million. This problem is more than adequately controlled utilizing the Billings catalyst technique described earlier. In this method, a stainless steel porous catalytic material is arranged in direct contact with lean hydrogen mixtures. At elevated temperatures the catalyst causes the lean mixtures to begin oxidation at equivalents ratio values of 2 to 4. (This is based on stoichiometry being equal to an equivalence ratio of 1.) [3] Utilizing the catalytic combustion technique, nitric oxide formation levels are reduced to between 2 and 5 parts per million as compared to 15 to 30 parts per million for typical natural gas combustion.

The hydrogen appliances included in the homestead project are the kitchen range and oven, a hydrogen boiler for heating of air, a hydrogen water heater, a hydrogen fireplace log and an outside hydrogen barbecue. In keeping with the universal nature of the project, a hydrogen-powered lawn and garden tractor and the hydrogen Cadillac will also be part of the homestead project. Figure 1 describes the relative energy requirements of the homestead project. The hydrogen-powered Cadillac requirement will not be supplied by the homestead electrolyzer and will be refueled external to this project.

Fig. 1 HYDROGEN HOMESTEAD - USE OF HYDROGEN

<u>Device</u>	<u>Hydrogen Consumption Annual Average Rate, BTU/hr.</u>
Range	469
Hot water heater	3,127
Gas boiler	6,750
Gas fireplace log	30
Gas barbecue	10
Lawn and garden tractor	700
<hr/>	
Total Consumption	11,086 BTU/hr.
Hydrogen Cadillac Seville	175,000 BTU/day

REB

FUTURE

After correcting minor technical difficulties during the first two years of operation of the hydrogen homestead, an additional 37 homes are scheduled for conversion to hydrogen forming a small, experimental, hydrogen village. To supply the hydrogen requirement of the village, a coal gasification facility is being planned. The additional homes are presently under construction and will operate during the interim period with a conventional natural gas supply. It is anticipated that more exotic catalytic devices will be developed and tested as part of the hydrogen village project.

On the long-term, the future of hydrogen in residential applications looks good. As natural gas supplies continue to run short, the alternative of gasified coal to hydrogen looks increasingly better. Due to its low viscosity, hydrogen can be pipelined at the same energy velocity as natural gas. Due to its very clean combustion properties, hydrogen can be utilized in more highly efficient applications than those presently possible with hydrocarbon fuels. It is anticipated that synthetic natural gas from coal will be utilized to supplement dwindling natural gas supplies in the near future. However, the higher energy efficiency of hydrogen production from coal, along with better utilization efficiencies, will soon create strong incentives for conversion of population centers to hydrogen. During the interim, the concept of metal hydride truck, hydrogen delivery to remote residence hydride tanks, and then the implementation of hydrogen in place of domestic propane applications appears to have real potential. Such a system is presently under very serious consideration in certain parts of Japan.

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NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
REPORT OF THE NASA HYDROGEN ENERGY SYSTEMS TECHNOLOGY STUDY

HYDROGEN TOMORROW ***DEMANDS & TECHNOLOGY REQUIREMENTS***

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DECEMBER 1975

ABSTRACT

Results of the NASA 1975 Hydrogen Energy Systems Technology (HEST) Study are reported. The Study projected national needs for hydrogen, evaluated technologies of production, handling, and utilization, and determined the critical research and technology activities required to meet the needs. It adopted an approach of seeking the broadest available spectrum of information and insights from NASA and other government agencies, from universities and from industry, and of assessing, validating, and integrating the results of other hydrogen-related studies in order to form specific conclusions.

The HEST Study found current U.S. hydrogen utilization to be dominated by chemical-industry and petroleum-processing applications, and to represent 3% of total energy consumption. The Study's projections of hydrogen use show growth in the remainder of this century by at least a factor of five, and perhaps a factor of twenty. New applications in the manufacture of synthetic fuels from coal and directly as an energy storage medium and fuel are expected to emerge later this century. Of these new uses, electric utility energy storage for peak-shaving, supplements to the natural gas supply, and special purpose transportation fuel such as aircraft, show promise.

The Study concludes that the development and implementation of new means of supplying hydrogen, replacing the use of natural gas and petroleum feedstocks, are imperative. New production technology is essential to support even the lowest growth estimate. Methods based on alternative fossil feedstocks, such as coal and heavy oils, which are less expensive and nearer to technical maturity than non-fossil production systems, should be made operational while these feedstocks are abundant. Concurrently, the long-term tasks of advancing electrolysis technology, researching other water-splitting techniques, and integrating these with developing nuclear and emerging solar primary-energy systems, must be carried on, together with work on hydrogen combustion systems and research in materials and safety engineering. Systems studies and assessments of the economic, social, and environmental impacts of hydrogen technology are also called for.

EXECUTIVE SUMMARY

Hydrogen, the most abundant element in the universe, has been known to man for about two centuries. It was initially used as a buoyant gas, then as a synthetic-fuel constituent. At present, hydrogen is used almost entirely as a unique industrial chemical in petroleum processing and in the synthesis of ammonia and methanol. New uses are expected to appear, such as in the gasification and liquefaction of coal and as a direct special-purpose fuel.

Hydrogen is not, however, a primary energy source — it must be manufactured. Practically all the hydrogen now produced in this country is manufactured from natural gas and light oils. With the availability of these resources seriously declining, it will be essential that hydrogen be produced from other energy sources if the projected demands are to be met.

The National Aeronautics and Space Administration (NASA) is the major U.S. user of pure hydrogen as fuel. NASA has conducted extensive research into the use of hydrogen for space and aeronautical applications. This work and other related research has established NASA as a major source of experience in hydrogen combustion, handling, storage, materials compatibility, and in thermochemistry and electrochemistry which could be of considerable value in the development of hydrogen applications and advanced production techniques. As part of a continuing effort to assure that the significant Federal investment in NASA's aeronautics and space technologies is effectively and efficiently applied to energy-related problems, a Hydrogen Energy Systems Technology (HEST) study was initiated.

The purpose of this study is to appraise the research and technology needs for hydrogen production and use, and to identify and properly relate NASA experience to meeting these needs. Preliminary plans which define and evaluate approaches to meeting these technology needs will be formulated while assessing the applicability of NASA technology. This effort could serve as a basis of NASA support in the establishment of detailed technology plans to facilitate an economical supply of hydrogen to meet future national demands.

A.- Objectives and Approach

The specific objectives of the first phase of the study were:

1. To determine the future demand for hydrogen based on current trends and anticipated new uses.
2. To identify the critical research and technology advancements required to meet this need considering, to the extent possible, raw material limitations, economics, and environmental effects.

The purpose of this report is to document the results of Phase I. In Phase II, preliminary program plans will be formulated from which an assessment of the applicability of NASA experience and technology will be made.

The study was conducted by a team at the Jet Propulsion Laboratory, supported through a Working Panel by personnel from six NASA Centers. A Review Group, composed of representatives from federal agencies, universities and industry-supported institutions, was formed to review and critique the study. A position of inquiry rather than advocacy was maintained by the team throughout the study. To avoid duplication of effort, existing information and expertise were utilized as available. In addition to reviews of literature and the conduct of analyses, extensive contacts were made with industry and with university and government researchers to obtain up-to-date data and relevant information on hydrogen requirements and current programs.

B. Present Hydrogen Uses

The worldwide production and use of hydrogen has increased by more than three orders of magnitude in the last four decades. In 1938 approximately 70 million cubic meters (2.5 billion standard cubic feet) of hydrogen were produced world-wide. By 1973 the world total was estimated at over 250 billion cubic meters (9000 billion standard cubic feet). About a third of it was produced and used in the United States, requiring 3% of the U.S. energy consumption for hydrogen production. Production in this country has grown by a factor of more than 40 since 1945, and tripled in the past decade. The distribution of hydrogen among the major consumers in the United States in 1973 is shown in Figure 1. Here the estimates of hydrogen quantities include hydrogen produced and used within a chemical plant (captive hydrogen) as well as hydrogen delivered to users (merchant hydrogen).

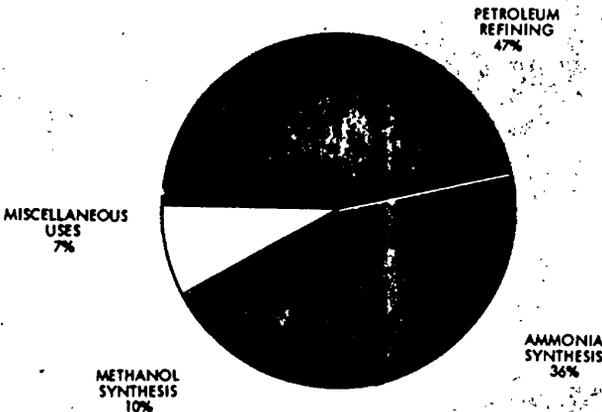


Fig. 1. Distribution of the 8×10^{10} cubic meters (3000 billion cubic feet) of hydrogen consumed in the U.S. in 1973

In addition to the dominating applications in petroleum refining, ammonia synthesis for fertilizer production, and methanol manufacturing, hydrogen has a broad spectrum of miscellaneous and special uses. Hydrogen is used in the production of foodstuffs, including margarines and cooking fats, and in the manufacture of soap. It serves in the refining of certain metals, in semiconductor manufacture, and for the annealing of metals. It is employed in uranium extraction and processing, and for corrosion control in nuclear reactors. Hydrogen cools electrical generators in utility power stations. It is a feedstock in organic chemical synthesis leading to production of nylon and polyurethane. It is used in the manufacture of float glass. It is a high-energy rocket fuel, and an experimental aviation and automotive fuel.

Hydrogen was a major constituent of the illuminating coal gas and the industrial producer gas of the nineteenth and early twentieth centuries. In those forms hydrogen was successfully transported by pipeline and stored. In modern times when pure hydrogen has been handled at relatively high pressure and in the cryogenic liquid state, embrittlement and other problems in materials have sometimes resulted but have been overcome with applied research and technology. Safety was once considered a serious problem for hydrogen utilization because of its high flammability, but in modern applications the hydrogen safety record has been excellent.

Most of the hydrogen currently produced in the United States is obtained by the reaction of natural gas or light oils with steam at high temperature. The petroleum-refining industry, which accounts for about 47% of the hydrogen demand, uses both oil and natural gas as feedstocks for its hydrogen. Almost all others obtain their hydrogen by natural-gas reforming. Very small quantities of high-purity hydrogen are also derived from the electrolysis of water. Current distribution of energy resources for hydrogen in the U.S. are shown in Figure 2.

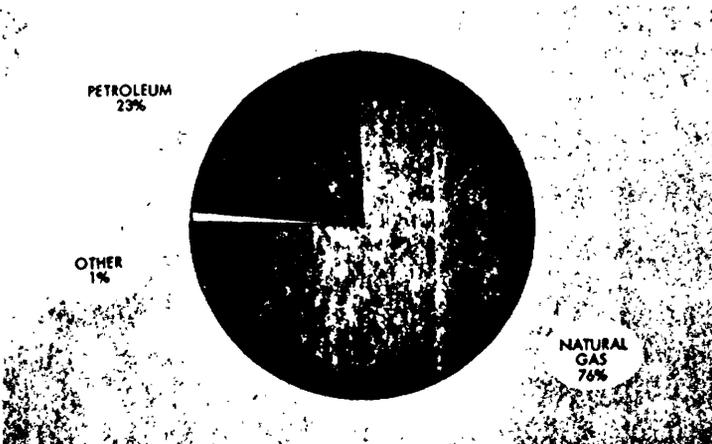


Fig. 2. Distribution of energy/feedstock resources for the hydrogen produced in the U.S. in 1973

C. Hydrogen Use Projections

Hydrogen use projections were developed, based upon historical relationships between hydrogen and energy use and upon documented projections of energy use. Two recent projections of national energy use were selected as a basis for estimates of future hydrogen needs. The two projections were selected because of their depth of technical documentation and because they represent diverse views of future national energy requirements. The first projection is based upon one of the scenarios developed by the Ford Foundation Energy Policy Project. Referred to as the Ford Technical Fix Baseline (FTFB) projection, it projects relatively conservative energy demands on natural gas, oil and coal to the year 2000, with a continued supply of natural gas and oil through this time period. In contrast, the Nuclear Electric Economy (NEE), as proposed by the Westinghouse Electric Corporation, makes higher energy use projections to the year 2000 based on electricity derived from nuclear and coal energy sources.

Two concepts of hydrogen use, called the Reference and Expanded Hydrogen Use Scenarios, were developed to bracket the range of probable hydrogen futures. The Reference Hydrogen Use Scenario assumes continued historic uses of hydrogen with the addition of some new uses in coal gasification and liquefaction consistent with the FTFB energy projection. The Expanded Scenario used the NEE energy projection to establish an Expanded Use Projection. The Expanded Scenario adds limited new uses such as experimental hydrogen-fueled aircraft, some mixing with natural gas, and energy storage by utilities, and assumes higher growth rates of traditional uses than does the Reference Scenario. The Reference and Expanded projections are charted by use category in Figure 3 for the years 1985 and 2000. Figure 4 shows the hydrogen growth history and the projections plotted from 1950 to 2000 on a logarithmic scale. The Reference projection shows an increase by 1985 to 1.7 times current usage; by the year 2000 to 5.5 times. Growth factors for the expanded projection are 3.4 by 1985 and more than 20 by the year 2000. This illustrates that projected growth rates are consistent with historical growth; the nation's use of hydrogen has increased by a factor of 3 in the past decade and by a factor of 20 in the past 25 years.

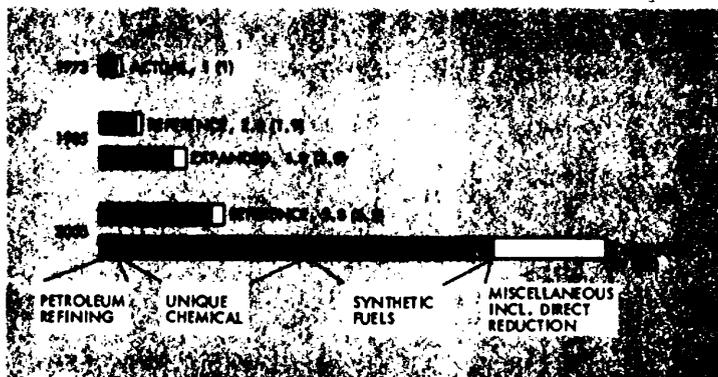


Fig. 3. Hydrogen projections by use sector, 10^{18} J (10^{15} Btu)

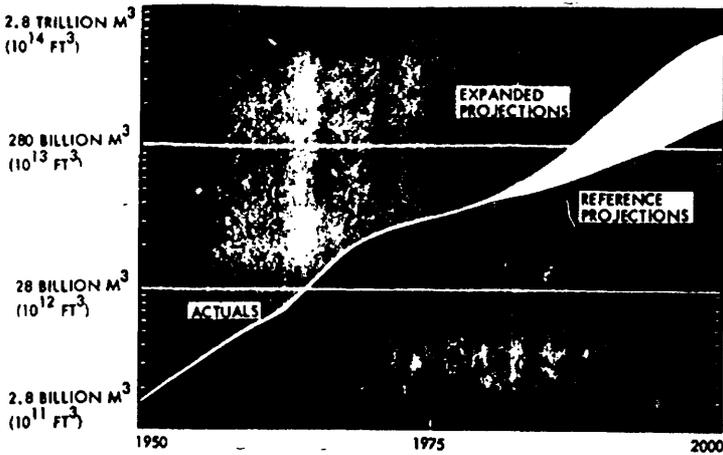


Fig. 4. Growth in hydrogen demand in the U.S., 1950 - 2000 (logarithmic plot)

D. Resource Implications

The Ford Technical Fix Baseline (FTFB) energy projection suggests that the continued primary dependence on natural gas and oil permits a viable economic climate through the year 2000. Many other recent energy projections indicate that at least by the year 2000 these resources will be significantly depleted. If hydrogen use in the future falls between the lowest and the highest projections which have been given, there will be a continuously increasing demand for the depleting fossil feedstocks, natural gas and oil. This widening gap between domestic supply and demand will continue to increase the demand for expensive import oil and liquefied natural gas. This demand pressure will lead to shortages and increased costs and, ultimately, to the piecemeal search for alternative resources and supply modes.

Alternate resources are available for making hydrogen, but they are not now as economic or as energy-efficient as natural gas. Before natural gas was widely available, hydrogen was made from coal. Low natural-gas prices caused coal to be displaced, but coal could again be used to produce hydrogen. In each fossil-fuel-based hydrogen production process, water provides a significant portion of the hydrogen produced. The natural gas, oil and coal provide some of the hydrogen and in addition provide the energy to drive the reactions. Other energy sources, such as nuclear and solar, can also be combined with water to produce hydrogen through water-splitting reactions. The relative energy requirements and costs for producing hydrogen from alternative energy sources are compared to those for hydrogen production from natural gas in Table 1. Minimum and maximum process efficiencies and feedstock costs are used to provide the values given.

Table 1. Relative efficiency and cost of hydrogen production methods

Primary Resource	Cost Range \$/GJ	Relative Cost	Relative Energy Requirements
Natural Gas (baseline)	0.82 - 6.59	1.0	1.0
Oil (partial oxidation)	1.55 - 7.76	1.1 - 1.9	1.1 - 1.2
Coal (gasification)	1.26 - 4.90	0.8 - 1.5	1.1 - 1.2
Nuclear (electrolysis)	2.69 - 32.13	3.3 - 4.9	2.3 - 4.8
Solar (20% collection efficiency)	4.76 - 209	5.8 - 32	4 - 6

The availabilities of these alternative energy resources vary. The United States has abundant quantities of coal. This fact, taken with the more favorable relative energy requirement and relative cost shown in the table, favors coal as the first alternative to natural gas and oil as the source for future hydrogen production.

Hydrogen produced from nuclear and solar energy sources is not expected to be competitive until after the turn of the century. Nuclear energy has been confronted by difficulties for years and cannot keep up with its demand for electrical power. Until these difficulties are overcome, producing hydrogen in a dedicated nuclear plant which could be producing prime-rate electricity may not be practicable. Solar energy, though abundant, is geographically diffuse, intermittently available, and relatively expensive to collect. These factors tend to place it at a distinct capital-cost disadvantage with respect to the other alternatives.

E. Production and Distribution Implications

At present, less than 7% of the hydrogen produced is delivered to users as "merchant" hydrogen. The balance is produced and used within a process system as "captive" hydrogen. Several of the newer hydrogen production methods using coal feedstocks require large facilities to achieve economies of scale. The facilities will necessarily produce large quantities of hydrogen, not all of which would be consumed by a single process. In fact, the more efficient processes could produce mixed products such as methane, hydrogen, liquid fuels, and chemicals. For these facilities to be effective, multiple customers for their output will be necessary and some of those customers will be industries, which now use only captive hydrogen. Thus, a shift in the ratio of captive to merchant hydrogen users can be expected to take place. Based on our analyses, by the year 2000 merchant hydrogen could supply as much as 75% of the total hydrogen demand.

B. PROSPECTS FOR HYDROGEN-FUELED AIRCRAFT

Robert D. Witcofski, NASA

PERFORMANCE AND ENERGY CONSUMPTION

NASA studies show that the use of liquid hydrogen fuel in aircraft improves their efficiency and reduces the energy consumed in flight. The performance advantage is illustrated in Figure 1, which indicates that for a given total takeoff weight, greater ranges are achieved by hydrogen-fueled subsonic ($M=.85$) and supersonic ($M=3$) aircraft than by their conventionally fueled counterparts. Alternatively, this performance advantage could be used to reduce the overall airplane weight and so reduce the fuel consumed for a given range and payload. For example, had the subsonic hydrogen-fueled airplane of Figure 1 been designed for the same range as the JP-fueled version, it would have a 30 percent smaller gross weight and would consume 22 percent less fuel energy. Similar trades could be made for SSTs (supersonic transports). The still faster hypersonic transports (HSTs) of the more distant future can only be powered with hydrogen; conventional fuels lack the energy and hydrogen provides attractive solutions to the heating problems associated with very high-speed flight. As indicated in the figure, hypersonic ($M=6$) transports could carry the specified payload at twice the speed and over a greater range than the SSTs.

Figure 1 shows that the subsonic $M=.85$ airplane achieves the greatest range of all, from which it may be correctly inferred that the subsonic airplane is also the most conservative of energy. Speed has always been a major attraction of air travel, however, and future aircraft fleets are expected to include SSTs and HSTs because of their speed advantages.

Figures 2 through 5 show some additional features of these aircraft. Figure 2 presents a comparison of payload fractions for JP and hydrogen-fueled subsonic aircraft. Comparisons are given for current technology aircraft (that is, designs based on today's knowledge of aerodynamics, structures, and propulsion) and assuming

reasonable advances in technology that might be expected to occur in the next two to three decades. The study from which these data are taken also indicates that with advanced technology applied to both aircraft, the hydrogen-fueled version will require approximately one-third less energy per ton-mile than a JP airplane of the same technology level.

Figures 3 and 4 depict some additional features of hydrogen-fueled SSTs. Figure 3 shows one hydrogen-fueled SST concept that carries all of the fuel in the body. The structure is more complex than for the JP aircraft and although lighter, the hydrogen aircraft is larger and fatter. The greater thickness of the fuselage is necessitated by the larger volume required by the hydrogen fuel. Although the greater thickness is in itself an aerodynamic disadvantage, the overall aircraft performance is superior. Figure 4 shows a different arrangement wherein a portion of the fuel is carried in the wings. Potentially, performance gains could be made by such an arrangement. Much work remains to be done, however, on lightweight, cryogenic, pressurized tankage before it will be known if the wing tanks are feasible and light enough to be advantageous.

An aerodynamic optimization study of a M=2.7 hydrogen-fueled SST (Figure 4) is currently underway at Langley. Through the use of subsonic leading edges, 21 percent of the fuel could be carried in the wings. Further aerodynamic optimization through the use of twist and camber indicates that a range of 3800 n.mi. could be achieved and the configuration could meet most current noise and reserve fuel requirements. Achievement of transatlantic range (3150 n.mi.) capability has been the goal of the current JP-fueled SSTs.

Through reasonable increases in the size of hydrogen-fueled SSTs, transpacific ranges appear achievable, making time-consuming refueling stops unnecessary. This would increase the economic viability of SSTs and perhaps make the difference between a marginal or a highly successful SST program.

Liquid-hydrogen fuel is essential to the hypersonic transport (Figure 5). Here, the heat-sink capacity of the fuel could make

possible the active cooling of the airframe of a M-6 transport and permit the use of conventional lightweight aircraft construction materials in place of heavier, high-temperature materials associated with a hot structure. This would also give designers more freedom to shape the airplane for aerodynamic excellence and the aerodynamic heat transferred to the fuel would also improve engine performance slightly. Calculations indicate that these structural insulation weight savings, when combined with increased engine performance, could yield a 70 percent increase in payload fraction for the actively cooled airplane, compared to a hot structure airplane.

ENVIRONMENTAL ASPECTS

The lower gross weight of hydrogen-fueled aircraft tends to reduce their adverse environmental effect. Less thrust is required for takeoff, leading to reduced noise and/or runway length required. For SSTs the weight reduction leads directly to a slight reduction in sonic boom and may permit reconfiguring the aircraft for substantial boom reductions while retaining performance equal to that of JP-fueled SSTs.¹ Possibly sufficient reduction in sonic boom could be achieved to allow overland flight for H₂-fueled SSTs and thus greatly increase their economic viability.

As for exhaust emissions, those of hydrogen-burning aircraft would contain less of the NO_x compounds than those of conventionally fueled aircraft and, of course, none of the carbon-based pollutants. Thus, for the subsonic aircraft operating below the tropopause, it is expected that hydrogen fuel will be advantageous environmentally as well. SSTs and HSTs will operate at much higher altitudes where the atmospheric residence times are comparatively long and there has been concern over the accumulation of water vapors that are the principal constituent of the exhaust of hydrogen combustion. These concerns are based on the absence of information rather than on concrete indications of detrimental effects. Caution is, of course, in order until more information is developed, but the

¹ A. L. Nagel and J. V. Becker, "Key Technology for Airbreathing Hypersonic Aircraft," AIAA paper 73-58, January 8-10, 1973.

Concorde experience has been encouraging.²

EXPERIENCE IN DESIGN AND OPERATION OF HYDROGEN-FUELED AIRCRAFT

In 1957 the NASA operated a B-57 aircraft with hydrogen fuel. Minor modifications to the engine were made to accommodate the use of hydrogen. Tanks were attached to the wing tips, one to carry the hydrogen and the other to carry helium which was used for pressurizing the fuel system. The airplane was operated on conventional fuel for takeoff after which the engines were switched to hydrogen fuel. This flight experiment was completely successful and, though measured only in ground-based facilities, the theoretical performance benefits of hydrogen were actually attained.

In the same time period, an Air Force-sponsored study of a hydrogen-fueled supersonic airplane was conducted by Lockheed. This program was described at the recent Langley Working Symposium on Liquid Hydrogen-Fueled Aircraft (May 15-16, 1973) by Mr. Ben Rich. The work began in 1956, when Lockheed received a contract for six liquid-hydrogen-fueled Mach 2.5, 100,000-foot reconnaissance vehicles. The initial contract called for two prototypes, with a range of 2,200 nautical miles. The airplane was known as the CL-400 and is shown in Figure 6. Pratt and Whitney actually built a new engine known as the P&W 304 hydrogen-expander engine, one of which would be located on each wing tip to provide propulsion for the aircraft. Cryogenic fuel tanks and transfer lines were developed and tested under the thermal environment expected at Mach 2.5. Much effort was devoted to safety and handling aspects of hydrogen use, with the conclusion that hydrogen can be used as safely as gasoline. Major pieces of structure were built and tested, including oven tests of the cryogenic fuel tank. The project was terminated, however, before an airplane was built, partly because of the logistics problems associated with

² "Concorde Tests Blunt Atmospheric Impact Fears," Aviation Week and Space Technology, July 16, 1973, p. 33.

liquid hydrogen (this was prior to the space program). Mr. Rich concluded with the comment that there should be no basic problems in developing hydrogen aircraft.

FUTURE POSSIBILITIES

What course will aviation take in the field of future aircraft fuels? This question is yet to be answered. We must continue to make a rational assessment of all possible candidate fuels and the technology associated with their production and use.

Insofar as hydrogen-fueled aircraft are concerned, a subsonic hydrogen-fueled demonstrator aircraft would provide operational experience and would better define any potential technological problem areas. One possibility would be to convert a medium-size airplane, such as the Boeing 373 (Figure 7), to hydrogen fuel by installing a liquid-hydrogen fuel tank in the passenger compartment. The airplane could carry sufficient hydrogen fuel to permit two hours of cruise plus 20 percent reserves.

Application of hydrogen fuel to supersonic and hypersonic aircraft can most realistically be investigated and demonstrated by means of a high-speed research airplane (Figure 8). This configuration, which has evolved at Langley, would be air launched from a B-52 and propelled by existing rocket engines. By using off-the-shelf hardware where possible, minimal research and development would be required. The vehicle would be used to conduct flight research in the Mach 3 to 10 speed range. The payload bay could enclose a liquid-hydrogen tank and provide an opportunity for testing of active cooling systems and advanced airbreathing engine concepts.

Along with the development of hydrogen-fueled aircraft, a parallel effort in hydrogen production and transmission methods would be required. As to the timing of these events, Ben R. Rich noted that, "If we want to fly hydrogen aircraft in 1990, we had better get going right now on demonstration projects in order to identify the practical problems and their solutions in the commercial aircraft environment."

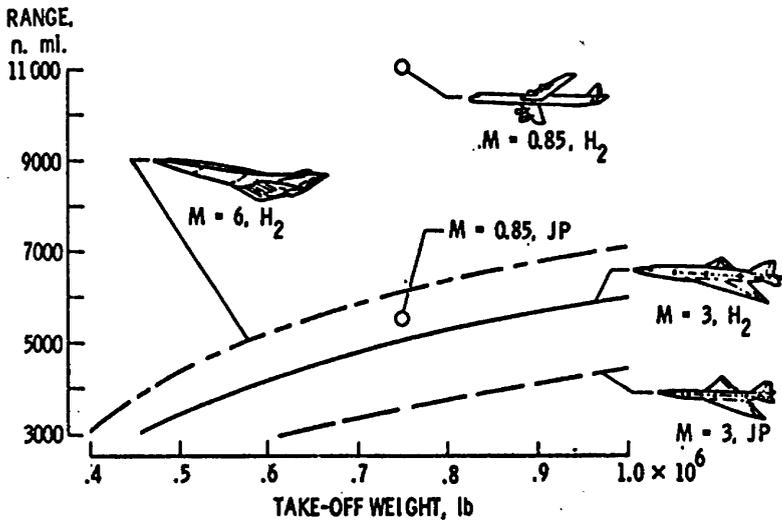


Figure 1. Projected Aircraft Performance
(300 passengers)

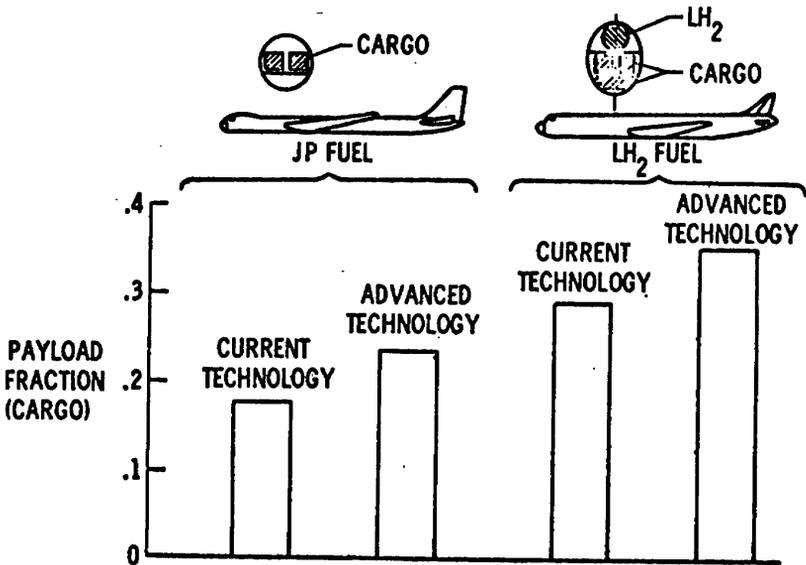


Figure 2. Subsonic Cargo Aircraft
(5,070 n.mi range, 265,000 lb. payload)

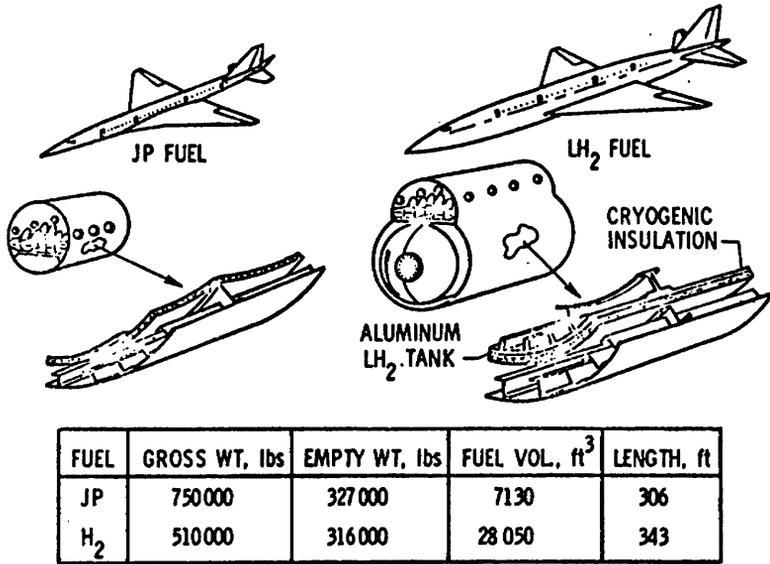


Figure 3. Comparative JP/LH₂ Aircraft Characteristics
(M=3, 3,500 n.mi range, 300 passengers)

- CONFIGURATION OPTIMIZATION
SUBSONIC LEADING EDGE,
WING TWIST AND CAMBER

- 21% FUEL IN WING

LENGTH	▪ 350 ft
GROSS WEIGHT	▪ 471 130 lbs
PAYLOAD	▪ 61 000 lbs
RANGE	▪ 3800 n. mi

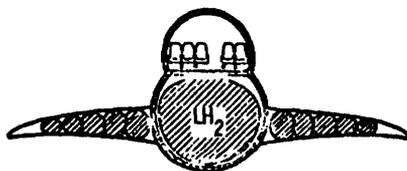
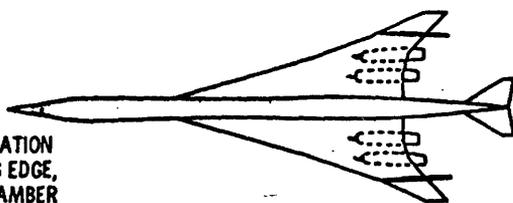
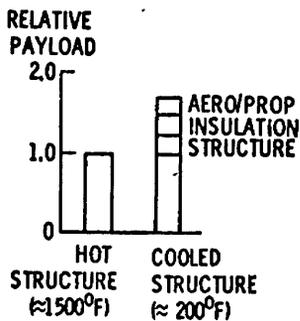
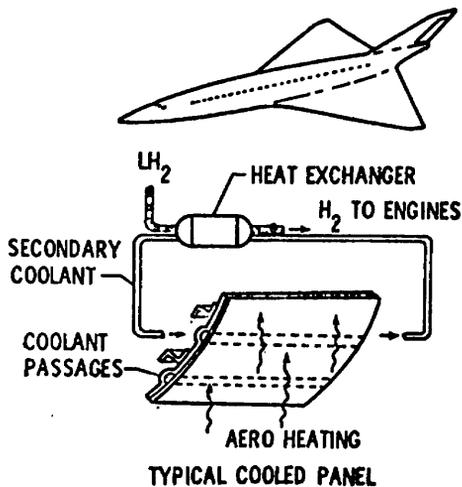


Figure 4. Potential Performance Improvements
(N=2.7)



- HIGH SPEED (4000-6000 MPH)
- LONG RANGE (3000-8000 mi)
- LOW SONIC BOOM

Figure 5. Hypersonic Transport

T.O.G.W. 69,955 LB.
ZERO F.W. 48,515 LB.
FUEL LOAD 21,440 LB.
PAYLOAD 1,500 LB.
CREW 2
WING AREA 2,400 SQ. FT.
ASPECT RATIO 2.5
304-2 ENGINES TWO

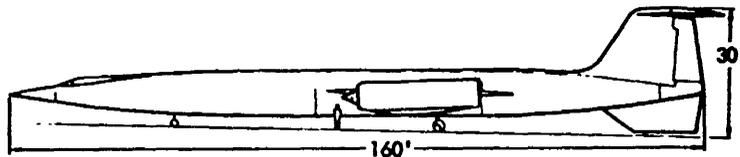
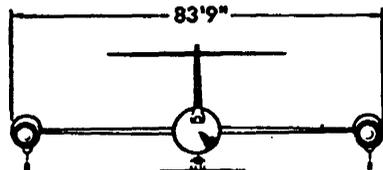
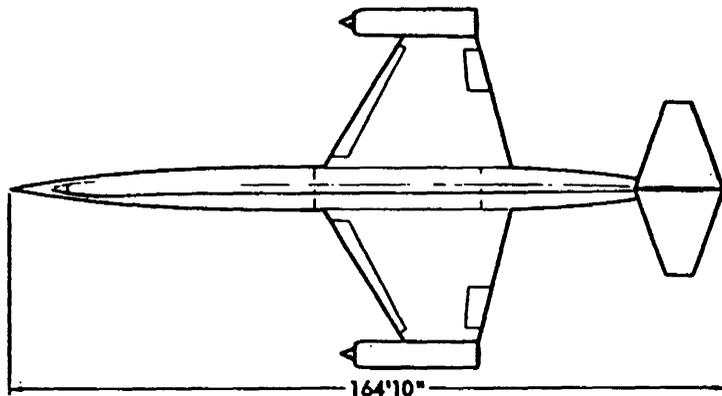
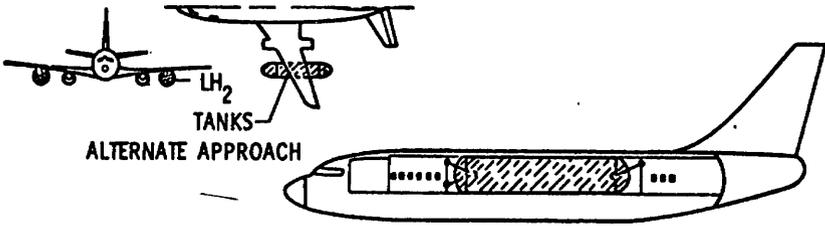


Figure 6. The CL-400

EXISTING AIRCRAFT MODIFICATION



- TECHNOLOGY DEMONSTRATION
 - CRYOGENIC TANK, INSULATION, AND PURGE SYSTEMS
 - OPERATIONAL EXPERIENCE
 - REFUELING
 - INSPECTION
 - SYSTEM TURN-AROUND
- PUBLIC ACCEPTANCE

Figure 7. Subsonic LH₂ Demonstrator

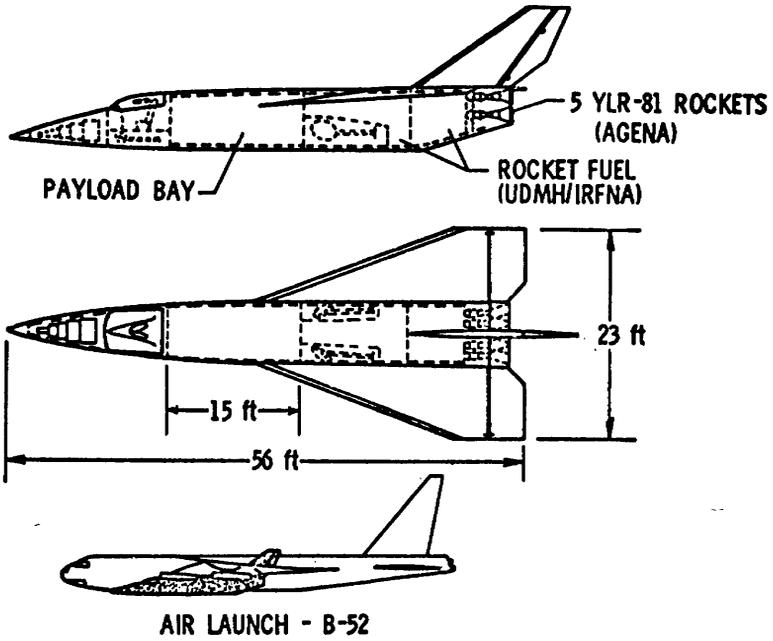


Figure 8. High-speed Research Airplane

[Thereupon, at 2:15 p.m. the committee recessed, to reconvene Monday, September 12, 1977.]

ENERGY TAX ACT OF 1977

MONDAY, SEPTEMBER 12, 1977

U.S. SENATE,
COMMITTEE ON FINANCE,
Washington, D.C.

The committee met, pursuant to recess at 9 a.m., in room 2221, Dirksen Senate Office Building, Hon. Russell B. Long (chairman of the committee) presiding.

Present: Senators Long, Talmadge, Harry F. Byrd, Jr., of Virginia, Bentsen, Moynihan, Curtis, Hansen, and Dole.

The CHAIRMAN. This hearing will come to order, please.

Our first witness this morning will be the Honorable Dan Glickman, Congressman from Kansas.

Mr. Glickman?

STATEMENT OF HON. DAN GLICKMAN, A U.S. REPRESENTATIVE FROM THE STATE OF KANSAS

Mr. GLICKMAN. I will not attempt to read my statement. I ask that it be included in the record, and I will summarize it.

It may be strange, Mr. Chairman, that a Member of the House would come here, particularly a freshman Member who has never testified before this body before, to discuss an issue that was not dealt with in the House energy package. I feel so strongly about this issue, and feel so strongly that the House did not give adequate consideration to this issue, that I felt, let us try it again. That concerns the issue of alcohol-based fuels, and methods to create incentives to develop alcohol-based fuels.

For over 40 years, we have had the technology to utilize blends of gasoline and alcohol called "gasohol" to fuel motor vehicles in this country. In fact, the technology was used by Midwestern farmers during the depression and used by the Germans during the Second World War, and used by Brazilians today, out of sugarcane and sugar beets. It is used by the State of Nebraska in a blend in State vehicles.

Why has not that technology been made available today? Actually, the technology is here, why is it not being utilized?

One reason, I believe, is that the oil companies have restricted development of fuels using alcohol because they themselves do not control the resources used to produce alcohol. Those are primarily ethanol, made from growing crops—any growing crop will suffice; as I said, from wheat, corn, sugar beets, garbage, and methanol, which is primarily from coal and natural gas.

This is changing. I wrote all the oil companies, major oil companies. I also wrote all the major automobile companies and several have expressed some interest in the gasohol idea, although they remain generally hesitant to act.

Second, gasoline made from petroleum is generally less expensive than alcohol, even under present conditions, making pure alcohol from methanol is more expensive than gasoline.

As we know, the economics of energy is changing. Petroleum prices have skyrocketed. Agricultural commodities have dropped. The price differential between gasohol and gasoline on a per gallon basis, depending of course on the blend, is now fairly nominal.

I might mention another factor, too. This was indicated in the letters I received from many of the major oil companies. We believe the economics of alcohol-based fuels are not here today. No one can be sure, because we have never engaged in marketing of alcohol-based fuel on a major basis.

All the technology is here. The marketing is not, for several reasons, as I indicated before.

I think the time is right. I have a specific suggestion for how it can be incorporated in this bill.

Let me talk about a couple of things. No. 1, the President, the chairmen of various committees in the Senate and the House, all talk about the need to quickly reduce petroleum consumption by 10 percent. The use of gasohol rather than gasoline in a minimum 5-percent blend and a maximum of 10-percent blend, which is feasible under current technology, without major modification to existing automobiles could shift a significant proportion of our energy reliance from nonrenewable foreign resources to renewable resources, growing resources, things that are already there.

We have large surpluses of farm crops which could be further developed in terms of the existing plan to produce additional alcohol-based fuels.

Likewise, the cities and farms produce a considerable amount of waste daily. In short, these items—agricultural surpluses and solid wastes—could be turned into producing fuel.

Auto manufacturers whose comments I solicited this summer agreed that gasohol blends on the order of 10-percent alcohol/90-percent gasoline could fuel cars now on the road with only minor adjustments. In fact, Chrysler said you could go with a 10-percent alcohol blend with no adjustments whatsoever.

The most incredible thing in my mind is this. I am sure that the bill that will come out of the Senate, like the House bill, will create incentives for fuel economy. But by 1985, I doubt that many Americans are going to be able to afford to buy these expensive new cars, even the smaller new cars, with the increased fuel economies. Our aim, the automobile companies' aim, the oil companies' aim, should be to find fuels that will operate in existing motor vehicles: automobiles, trucks, whatever we are talking about.

We basically have a method that can do that. My statement indicates the savings that would result. I do not claim this as a panacea to our energy crisis; it is not. But blending alcohol is the only environmentally acceptable method of improving octane ratings, and there is proof of significant improvements in mileage.

Senator Curtis knows; the State of Nebraska has done more in this regard than anyplace else in the United States. I talked in my statement about cleaner fuels, a reduction of hydrocarbons with even minor reductions, in automobile emissions. I would also like to point out that utilization of gasohol, alcohol-based fuels, will stabilize and stimulate sectors of our economy which desperately need it.

American agriculture is one obvious example. The opportunities are absolutely endless.

Of course, we have a surplus now of crops in my district such as wheat that could be used, but imagine the possibilities if we could plant crops for fuel production, double crops, triple crops. It is all feasible, if the incentives are there.

Of course, the opportunities for job creation and the lack of importation are great. In 1938, the Department of Agriculture issued a report concluding that blends of alcohol and gasoline, at a blend of 10 percent, could satisfy fuel internal combustion engines.

In May of 1939, this very committee held 4 days of hearings, and I have the report in my office. The Senate Finance Committee considered exempting gasoline mixes with 7 percent of methyl-alcohol from Federal excise taxes. At that time, the economics just were not there. It was not pushed, but times have changed.

Therefore, I am suggesting today that as a possibility to cause some incentives for development of this industry, that we may want to except alcohol-based fuels, ethanol or methanol, depending upon the blend, from Federal gasoline taxes, whether they are existing taxes or future taxes. The House rejected future taxes, additional taxes, but an exemption is an idea to encourage development of gasohol.

Let me tell you what I did in the House so you do not think I am just coming here out of nowhere. In addition to joining 20 House colleagues in sponsoring legislation to amend the IRS code to affect this change—and it was bipartisan. Incidentally, Senator Curtis, I had Mrs. Smith and Mr. Thone on that with me.

I asked Chairman Ashley of the House Ad Hoc Committee on Energy to exempt gasoline taxes with 8-percent alcohol from the proposed tax on the gasoline tax.

In the interest of expediency, I was not able to bring this action to a vote on the floor. This Rules Committee action was not based on any aversion to the idea of alcohol-based fuels, but based on the fact it had not been explored by the ad hoc committee.

In fact, I went to the Rules Committee. There were seven Members of the House, bipartisan. They were all nodding. Afterwards, they came up to me and commented that they had not thought about that idea before.

This is one example that, with all of its good points, the President's energy package and the House bill do not deal comprehensively with our energy problem. I can appreciate the desire to move quickly. However, I cannot accept the argument that expediency is more important than confronting the problem straight on.

Annual energy savings—a conservative estimate is in the range of 10 billion gallons of gasoline, and they would not impose hardships on Americans. This is perhaps the most incredible thing.

Here, we have the chance of developing an alternative energy proposal that does not impose a hardship on Americans. It seems as if, in

our development of energy proposals, we are doing everything we can to select ones which have a hardship.

Conservation may do this, but here is one that does not impose a hardship.

Therefore, I urge this committee to fill the void left by the House, and include an exemption from existing or future gasoline taxes to encourage production and utilization of the gasoline-alcohol blended fuels with at least a 5-percent alcohol content, currently available under existing technology. You may want to go with the partial exemption or the whole exemption.

Somehow, this Government must go on record as encouraging alcohol-based fuel development. There are also other methods to do it that may not be in the jurisdiction of this committee, perhaps a mandate that a certain percentage of automobile or industrial fuels be alcohol by 1985.

I will continue to explore this legislatively. In addition, we may want to explore other incentives such as loan guarantees and accelerated depreciation for the building of alcohol distilleries with a capacity for mass production.

All I can tell you is this, that if we ran out of gasoline tomorrow, we would do what the Germans did in 1942; we would start to make alcohol out of potatoes.

I am saying, let us develop that technology now. That technology cannot be developed fully until the economics are there. Therefore—I have told people in the administration; they say talk to ERDA. ERDA will tell you, it is not an economical technology.

I said, I do not need ERDA to tell me it is an uneconomic technology. It is not ERDA's business. I think we have the technology, we can develop, that will help every agricultural part of this country. It has great potential for regional fuels, industrial fuels. It can reduce consumption. Let us move on it.

And so, I think it is important enough. I do not want to wait 2½, 3, or 4 more years. It is important enough now that it should be considered in this package. That is why I came here today.

The CHAIRMAN. First, let me say, we have a surplus of sugar on our hands right now. Our sugarcane farmers are suffering. You may know that in Kansas, and indeed, we know that in Louisiana. A lot of them are losing their homes now because of the depression in the sugarcane industry. I think there is a parallel situation in beets.

They tell me that in Brazil people pay \$1.75 per gallon for gasoline. With a price of \$2 it would be economical to do just what you are talking about, to use alcohol rather than gasoline—at least, to use as much alcohol in the mix that you can, one way or another.

At what price would you estimate that gasoline has to sell in order to make it economical to use alcohol made from farm products, or from anything?

Mr. GLICKMAN. That is difficult to project. I would say right now, it depends on how serious we think our crisis is. If we do not think we are going to run out for another 100 years, then any increase is probably not worth it.

My opinion is, from the figures I have seen, it is probably worth paying 15 to 20 percent more for a gasohol blend at today's marketing

level, to start getting into the market, in terms of the fact that you would be saving maybe 5 to 10 percent of motor fuel.

Senator, I want to tell you right now, I do not have any way to estimate what that savings or increase would be, because we have done everything we can in terms of the major oil companies, in terms of this Government. I am not scapegoating anybody; I understand why Exxon or Texaco has not developed gasohol for marketing.

I do not know what that cost would be with mass marketing, with the creation of distilleries. While the cost may be somewhat higher early on, I think that we will find, as we get the shortages and the shortages are going to come closer together; to answer your question, I think it would cost—we are talking about a 15-percent increase over existing prices with a 10-percent blend.

My God, if we run out of energy, what choice do we have?

The CHAIRMAN. Well, now understand, I am thoroughly sympathetic to what you would like to do. If we can justify using alcohol made from farm products for energy, I am all for it. That would help solve some of my worst headaches—perhaps some of yours, too.

Mr. GLICKMAN. If I may interrupt, my staff tells me that alcohol for blending from methanol, growing crops, can be made in a range of 82 to 85 cents a gallon.

The CHAIRMAN. 82 to 85 cents?

Mr. GLICKMAN. Yes. Nobody, again, has done the mass kind of a marketing to determine what if you had 1,500 distilleries, or even 15 distilleries, capable of mass producing in the major refineries, how much that would actually cost. Again, there is another thing.

Methanol made from coal, natural gas, alcohol from ethanol I believe is cheaper than alcohol from methanol, which is from growing crops. As a matter of fact, I am told that alcohol from ethanol can be produced for about half the price of alcohol from methanol.

That may not make any sense, taking coal and natural gas and making alcohol out of it when we need those precious commodities themselves. There is a range of possibilities where you can blend the two alcohols together, to perhaps decrease the price.

The CHAIRMAN. You mentioned needing those precious commodities, we have enough coal to last us 300 years.

Mr. GLICKMAN. I do not know exactly how much energy it takes to convert the methanol from coal into the alcohol content. The possibilities are fantastic.

Imagine, in agricultural areas where farmers—one of the biggest consumers of petroleum products—there would be job activity. Distilleries could be located in agricultural areas so you can make the alcohol from methanol right there and utilize it.

It may not have mass implications for New York City or Wichita, Kans., but it may for Scott's Bluff, Nebr.

The CHAIRMAN. Senator Hansen?

Senator HANSEN. I do not have any questions, Mr. Chairman. I am very much interested in what Congressman Glickman proposed. I certainly think when we anticipate the possibility of shutoff of foreign supplies, we would be well-advised to see that one of our research agencies did some further work on this, instead of just summarily brushing it aside, thinking that it was of little importance.

I saw in yesterday's paper that the Saudis are talking about cutting back on their oil production, hopefully to bring some pressure on the other nations to reach a peace settlement in the Middle East. It does not take much of that to remind us of the oil embargo several years ago, and I should think we would be well-advised to see what we can do.

Mr. GLICKMAN. If I may comment, Senator, there has been some added to the ERDA budget this year, about \$1.5 billion was added. In addition, I think Senator Curtis on the Senate side and people on the House side, Congressman Thone, are responsible for adding money in the agricultural research budget, but I think that the key is not just research now. I think we have reached the point where we have got the technology, but the economics are getting to a point where we are in a "Catch-22."

We could spend \$500 million on technology, but we need to provide some economic incentive for people to start moving into this area.

That is why I propose even a minor reduction in Federal gasoline taxes.

Senator Curtis, has Nebraska done that on a State basis?

Senator CURTIS. No; they have not.

Senator HANSEN. Thank you.

The CHAIRMAN. Senator Curtis?

Senator CURTIS. Congressman, I am very much interested in what you have said. This is something that I have been interested in for years. Back in 1955, the Congress passed a resolution of mine that called upon the President to appoint a commission to recommend the industrial uses of farm products.

It was a distinguished commission. At that time, gasoline was so very, very cheap, alternative fuels were not competitive. I think probably they are competitive right now, without a subsidy.

The provision in the agricultural bill—and one of the cosponsors was the chairman of the Agriculture Committee and a member of this committee, Senator Talmadge—calls upon the Rural Development Administration to grant loans for four pilot projects. That act itself does not say where they should be.

I think it is assumed that one ought to be in the Green Belt, one ought to be in the area of the forests, because you can make alcohol from limbes, trees, any wood product.

Another thing, the Department of Agriculture will have a great deal of grain in storage that will have spoiled. You can make alcohol out of spoiling grain just as easily as you can good grain, and you can produce a type of crop that there is not a market for at this time of any great value, and acres can be planted in.

This cannot only be used to relieve our need for fuel, but actually to make the primary solution to the whole question of surplus of farm products.

I think that one of these pilot plans ought to be in the sugar area. Not only the excess sugar, but the sugarcane itself can be used.

I agree with you that what we need right now is not more research. Research is just to put papers on the shelf. It is not going to do any good; they have enough research on it.

Have you done any work on how many countries use this alcohol in their motor fuel?

Mr. GLICKMAN. Right now, the only country that I know that is actively using it is Brazil.

Senator CURTIS. I think you will find that most of the countries of Europe have, at some time.

Mr. GLICKMAN. Right.

Senator CURTIS. A few weeks ago I rode in a car fired entirely by alcohol. It was a little bit different method, but they could switch from gasoline to alcohol, and it would run just as well, and it eliminated all the pollution problems.

That probably is a little expensive. I think what this committee needs to do is give some consideration to weighting the tax, but also I find that local areas are ready to move on this, but the taxing of alcohol is a very complex thing.

We have written our tax on alcohol in a way to prevent violations in the distilleries, making whisky, and it is very expensive to install that type of security system.

There are communities which would put up a crude distillery that admittedly is not in a position to do something for human consumption, and they would find a ready sale for it, for that alcohol-based fuel.

One community in Nebraska has been selling an alcohol blend of gasoline. Regrettably, they could not make the alcohol out of farm crops. They were buying alcohol out of a forest product.

But I do commend you for your statement.

The CHAIRMAN. Senator Talmadge?

Senator TALMADGE. I congratulate you also.

Senator Curtis has informed you of what we have put into the farm bill to carry out some of the suggestions that you have made.

I was in Japan in 1939 and saw automobiles operating on alcohol at that time. I do not know what the source of that alcohol was, but alcohol can be made from many products, as Senator Curtis pointed out, farm products, wood products, and others.

I think what we must do is experiment with every possible alternative to become sufficient in energy in this country. We cannot continue to afford to spend \$42 billion importing energy; if we can subsidize it for a fourth that price and become energy sufficient, I think we should do so.

Mr. GLICKMAN. Thank you.

The CHAIRMAN. Thank you very much, sir.

Mr. GLICKMAN. One closing statement, and that is we have got a lot of these alternative fuel sources that are feasible short-term, and a lot such as the sophisticated solar programs which will not be feasible for 50 years. This is one that we can do right now.

I thank you, Senator, for listening to me.

The CHAIRMAN. Thank you.

[The prepared statement of Representative Glickman follows:]

STATEMENT OF REPRESENTATIVE DAN GLICKMAN

Mr. Chairman, I requested this opportunity to testify before your Committee to urge that you in the Senate act to fill a void in the national energy package as it was approved by the House of Representatives. For over forty years, we have had the technology to utilize blends of gasoline and alcohol, "gasohol," to fuel motor vehicles in this country. In fact, the technology was used by Midwestern farmers during the Depression. But generally the technology has not been made

available commercially in years past. There are two main reasons. First, the oil companies have restricted development of fuels using alcohol because they themselves do not control the resources used to produce alcohol. This is changing; in response to a recent letter which I sent to a considerable number of oil companies, several have expressed some interest in the gasohol idea though they generally remain hesitant to act. Second, gasoline has traditionally been considerably less expensive in the market place than gasohol. As we all know, the economics of energy is also changing rapidly. Petroleum prices have skyrocketed. At the same time, prices of the agricultural commodities from which alcohol can be produced have fallen drastically. The price differential between gasohol and gasoline on a per gallon basis, depending of course on the blend, is now less than five cents.

There are several factors which should motivate us in the Congress to take steps to stimulate the use of gasohol. First, and obviously of foremost concern in these hearings, the use of gasohol rather than gasoline could shift a significant proportion of our energy reliance from nonrenewable foreign resources to renewable resources plentifully available right here in the United States. The facts are that we have over 400 million acres of forested land in this country; we have surpluses of corn and wheat which are projected to reach nearly 1.3 billion bushels for each of those crops in the 1978 crop year; we also produce sugar beets, sugar cane, potatoes and a whole range of other crops which can readily be distilled into forms of alcohol suitable as a gasoline additive. Likewise, the cities and farms of this Nation produce over 350 thousand tons of solid wastes daily which present severe disposal and environmental problems; fermentation of those wastes can also yield alcohol suitable for blending with gasoline. In short, our solid waste problem can be turned into an energy asset by putting this technology to work.

Auto manufacturers whose comments I solicited this summer agreed that gasohol blends on the order of 10 percent alcohol/90 percent gasoline could fuel cars now on the road with only minor adjustments. The Chrysler Corporation went so far as to contend that an engine could operate on a 10 percent/90 percent blend with no modification whatsoever. Others indicated that with blends containing more than 5 percent alcohol, some changes would likely be necessary in the plastic and rubber used by auto manufacturers in fuel systems. In light of the fact that we as a Nation consume approximately 100 billion gallons of gasoline yearly, the replacement of even 5 percent of that quantity with alcohol from renewable resources will result in a 5 billion gallon annual savings. And this can be done with a technology we already have.

Blending alcohol into gasoline is the only environmentally acceptable means of increasing octane ratings, and there are indications of significant improvements in automobile mileage. A demonstration project of gasohol-fueled vehicles operated by the State of Nebraska has produced preliminary results indicating fuel efficiencies 5 percent greater than those of similar cars operating on unleaded gasoline. If such results hold up, savings would obviously be even greater than those brought about merely by substitution. Regardless, at a minimum "... If ethanol were properly handled and blended with gasoline specifically prepared for it, drivers of present day cars would notice little difference in driveability or performance," according to Mobil officials.

A further benefit of gasohol-fueled vehicles is that they are cleaner. According to the Nebraska test, they emitted lesser amounts of pollutants determined to be hazardous by the Environmental Protection Agency than do traditional gasoline-fueled vehicles: carbon monoxide, hydrocarbons, nitrogen oxides, and polynuclear aromates. It seems hard to believe that we can afford to overlook an opportunity to develop an alternative energy technology which has the added advantages of both improving air quality and reducing our solid waste disposal problem.

Finally, utilization of gasohol will stabilize and stimulate sectors of our economy which desperately need it. American agriculture has been in economic chaos in the past few years and the cost-price squeeze in which farmers are caught today is driving more and more of them to give up farming every year. If we would promote gasohol production, there would be a market for products of which we now have excess supplies: wheat, corn, and so forth. We would no longer have to induce farmers not to produce and they would no longer need to worry about receiving a fair return on their hard work and investments in the market place. Likewise, American cities now spending sizable amounts to dispose of solid wastes would be able to turn that expense into a source of revenue to help bolster overburdened municipal budgets.

Beyond the benefits to producers of the alcohol sources, expansion of gasohol use into the commercial market would require development of a sizable alcohol-for-fuel distilling industry. Jobs would be created, and the capital investment necessary is not nearly of the magnitude needed for petroleum refineries.

As I noted early in these remarks, this is not a new technology. During the Depression of the 1930's Midwestern farmers used a gasohol-type blended motor fuel. Similarly, during World War II, the Germans utilized synthetic fuel technology extensively, including dramatic use of alcohol based from growing crops, coal and natural gas.

In December 1938, the U.S. Department of Agriculture issued a report concluding that blends of alcohol and gasoline—ideally comprised of 10 percent alcohol—could satisfactorily fuel internal combustion engines then in use. The study further concluded that "replacement fuels to supplement future decrease in petroleum production . . . should be provided for in advance of any price increase in present fuels."

Then, in May of 1939, this very Committee held four days of hearings on legislation to exempt gasoline mixed with 7 percent and 10 percent ethyl alcohol from federal excise taxes. At that time, it seems unlikely to me that exemption from the Federal taxes would have been sufficient to stimulate commercial use of gasoline-alcohol blends.

But times have changed. Exemption of gasohol from the present 4 cents per gallon federal excise tax on gasoline would put it on par with unblended gasoline. Similarly, should you decide to increase the federal excise tax on gasoline as proposed by the President, an exemption therefrom for gasohol would significantly improve its competitive position relative to gasoline. My request to you is to include such an exemption in the Senate version of the energy bill.

I have been attempting to secure House action to encourage development of gasohol by exempting it from relevant taxes. In addition to joining twenty House colleagues in sponsoring legislation to amend the IRS code to effect this change, I asked Chairman Ashley of the House Ad Hoc Committee on Energy to exempt gasoline-alcohol blends with 8 percent or more alcohol from the proposed increase in gasoline tax. In the interest of expediency, I was not granted a rule to bring this issue to a vote on the House floor. The House Rules Committee action was not based on any aversion toward the idea of alcohol-based fuels, but because it had not been explored by the Ad Hoc Committee on Energy. This, as a sidelight, is one example of the fact that, with all their good points, the President's energy package and the House bill do not deal "comprehensively" with our energy problem.

I can appreciate the desire to act promptly to deal with this serious energy problem; however, I can not accept the argument that expedience is more important than confronting the problem straight on. Annual energy savings potentially in the range of 10 billion gallons of gasoline which do not impose hardships on any Americans and which will have positive economic and environmental impacts would undeniably contribute to the solutions of several problems.

Hence, I urge this Committee to act to fill the void, to provide the necessary tax incentives, including an exemption from existing or future gasoline taxes, to encourage production and utilization of gasoline-alcohol blended fuels with at least 5 percent alcohol content. The technology will not solve the problem alone, but it will take us a long way.

I also believe other methods to encourage alcohol use for a broad range of activities may be warranted, including perhaps a mandate that a certain percentage of automobile or industrial fuel (e.g. 1 percent to 5 percent) be alcohol by 1985. I will continue to explore this legislatively. In addition, we may need to explore incentives, such as loan guarantees, for the building of alcohol distilleries with the capacity for mass production.

You can count on my cooperation in securing concurrence in the House for the type of amendment I am proposing.

Thank you.

The CHAIRMAN. Next, we will have a panel consisting of Mr. Arthur D. Lewis, president, National Association of Motor Bus Owners; Mr. Peter Picknelly, president, Peter Pan Bus Lines, Inc.; Mr. Larry Stanton, vice president, Continental Trailways; Mr. John E. Adkins, group vice president for transportation, Greyhound.

We would like to have your suggestions.

STATEMENT OF ARTHUR D. LEWIS, PRESIDENT, AMERICAN BUS ASSOCIATION; PETER PICKNELLY, PRESIDENT, PETER PAN BUS LINES, INC.; LAURENCE STANTON, VICE PRESIDENT, CONTINENTAL TRAILWAYS; AND JOHN E. ADKINS, GROUP VICE PRESIDENT, TRANSPORTATION, GREYHOUND CORP.

Mr. LEWIS. Thank you, Mr. Chairman. We appreciate this opportunity to appear before this committee and discuss the problems of the intercity bus industry and the degree that the interstate bus industry can make a real contribution to saving energy in the United States by more intensive use of bus service.

I am president of the American Bus Association, which is the national trade organization for the intercity bus industry. Collectively, our 450 members provide over 90 percent of the country's intercity bus transportation.

In doing so, we play a far greater role in the Nation's total intercity passenger transportation process than is generally realized.

Of all the passenger modes, intercity bus is the most frequented and the most comprehensive. But intercity bus is also the most economical, the most environmentally compatible—and the most energy efficient.

Because of these inherent strengths, the industry could be a vital force for attaining national energy conservation and air quality objectives.

Unfortunately, the degree to which the industry can help achieve these goals is dependent on its financial condition—and the outlook is not good.

The industry's operating income has declined sharply in recent years, and today the situation is serious. In fact, if the trend continues, the industry may have to curtail services severely, thereby confronting the country with a major passenger transportation crisis.

With me today are three intercity bus industry representatives who will testify on behalf of the industry. Our purpose in being here today is to present a Federal program for encouraging energy conservation through increased usage of intercity bus.

Our first witness will be Mr. Peter Picknelly, who is president of Peter Pan Bus Lines, which operates in New England. Mr. Picknelly will explain why intercity bus is America's most essential passenger common carrier system.

Following him will be Mr. John Adkins, the Greyhound Corp.'s group vice president for transportation. He will discuss the industry's role in energy conservation and environmental protection, as well as its current financial condition.

Finally, Mr. Laurence Stanton, who is a vice president of Continental Trailways, will explain how the proposed refundable tax credit program addresses both the industry's needs and the objectives of the national energy plan.

I want to thank you for this opportunity to appear here today. I also want to leave for inclusion in the record a statement regarding repeal of the excise taxes and motor fuel taxes, as recommended by

the President and already passed by the House of Representatives in H.R. 8444.¹

Now, we will hear from Mr. Picknelly.

Mr. PICKNELLY. Gentlemen, I am going to explain why the intercity bus industry is essential.

Buses serve more people and places than other public modes of travel. The intercity bus industry plays a far greater role in the Nation's passenger transportation process than is generally realized. Bus transportation derives its most significant public service characteristics from the fact that it is accessible both geographically and economically to the vast majority of our population.

Cities and towns served: In terms of geographical coverage, intercity bus serves more places than any other public passenger mode. For example, the industry serves 16,000 points—compared to only 670 by air and 500 by train.

In more specific terms, intercity bus serves 96 percent of communities with 2,500–5,000 residents and all those with over 5,000 residents.

Thus, bus service penetrates both densely populated urban complexes and sparsely inhabited rural areas. The bus industry serves a greater cross section of America's geography than any other mode of common carrier transportation.

Who rides the bus? The primary users of the intercity bus are those who do not have access to or cannot afford to use other travel modes.

In many communities, intercity bus is the only public transportation option. For example, persons living in our smaller communities—that is, in small towns and rural areas—depend heavily on buses. This is clearly reflected in the fact that less than 25 percent of bus passengers reside in the large metro areas, whereas over 45 percent of air passengers do so.

However, America's transportation disadvantaged—the poor, the handicapped, the young, the elderly—also depend heavily on bus. For them, intercity bus is at the very heart of their capacity to live independently and to participate fully in our society.

Reflecting this, nearly a third of all bus passengers are persons in the very lowest income groups, earning under \$5,000 per year. By way of contrast, persons in this income category make up only 13 percent of passengers traveling between cities by auto, and only 8 percent of air passengers.

Interestingly, while a third of the bus passengers have family incomes under \$5,000, a corresponding proportion of the auto passengers are in the \$15,000 to \$25,000 income bracket, and a third of air passengers indicate incomes of \$25,000 or above.

Buses also are important to our senior citizen population. About 44 percent of bus trips made during 1976 were by persons 55 years old and over. This age group accounts for only about one-fifth of persons traveling by other modes.

As a consequence of its geographical coverage and economy, intercity bus last year carried 354 million persons—more than planes or trains.

In brief, intercity bus is the Nation's most frequented, most ubiquitous and most economical passenger mode. For these reasons alone, action must be taken to preserve and enhance the industry.

¹ See p. 960.

But as Mr. Adkins will now explain, there are several additional compelling reasons to address the industry's financial plight.

Mr. ADKINS. Mr. Chairman, you gentlemen face the tough task of solving this Nation's energy problem, without inflicting undue hardship on any of our citizens. Concurrently, there is an urgent need to assist the energy efficient intercity bus industry.

In my view, the program we are presenting today can be a practical and forceful part of the solution you seek. If implemented, this program could:

One. Help achieve national energy conservation goals.

Two. Directly assist persons on low or fixed incomes and those hurt severely by rising energy costs.

Three. And provide financial relief to America's essential, but financially troubled, intercity bus industry.

Bus, the most fuel efficient mode: With respect to national energy goals, intercity buses must be a part of any realistic energy conservation strategy, since it is the most energy efficient form of travel.

A fully-loaded bus, for example, can obtain 280 passenger miles per gallon or far more than other modes. A study by Boeing, the aircraft manufacturers, indicates that at actual current load levels intercity buses achieve 162 passenger miles per gallon. By contrast, trains attain only 64 passenger miles per gallon, cars 41 and airplanes just 28.

Approximately 25 percent of the gasoline used by automobiles is for intercity travel. So, attracting automobile travelers to bus could save considerable fuel, even if the number of persons switching to bus is very modest.

For example, diverting only 1 percent of the auto traffic to bus would save 120 million gallons of fuel annually, enough to operate all intercity buses for over a year; if the airlines and Amtrak were as energy efficient as the intercity bus, we would save 6 billion gallons of fuel each year.

Given these facts, preserving and improving intercity bus service is consistent with national energy and clean air objectives.

Bus plan would help the elderly and poor: Preserving the industry's viability is also consistent with the national policy to assist those who are hurt most by rising energy costs.

As Mr. Picknelly noted earlier, intercity bus is the most economical way to travel. Consequently, it is patronized heavily by America's transportation disadvantaged, especially the elderly, the poor and others with low or fixed incomes.

If they are to continue participating fully in our society, widespread availability of intercity bus service must be assured. Concurrently, they must also have the financial means to travel.

In fact, America's transportation disadvantaged are already traveling less. This has been evident ever since the Arab oil embargo ended and energy costs began pushing up the cost of living.

Their decreased travel is one reason for the intercity bus industry's current financial plight with which I will now acquaint you.

The industry's financial condition is critical. Simply put, bus industry profits are now at dangerously low levels.

Last year, net operating revenue for major bus companies was \$44 million, down almost 50 percent from \$85 million just 5 years ago. During the period 1972-76, gross operating revenues rose 28 percent

to \$1 billion. Unfortunately, expenses increased 38 percent, amounting to \$952 million last year.

A useful and commonly accepted measure of the industry's financial health is the "operating ratio." It expresses as a percentage the relationship between operating expenses and revenues. Prior to 1973, the ratio was usually 85 to 90 percent, suggesting a healthy industry. But the ratio has been climbing, along with energy costs, and has reached 95.5 percent in 1976.

Consequently, the industry's margin or difference between revenues and expenses is a slim 4.5 percent. If trends continue, the margin will disappear by 1980, and so will significant amounts of bus service as the industry plunges into the red.

Expenses are outpacing revenue. The industry's profit erosion is the result of increasing expenses outpacing revenue gains, especially from 1973 onward. One way to turn the tide is to trim costs or hold them at current levels while increasing revenues. The industry has already taken steps to cut costs, although there are severe limitations.

Cost inflation in most instances is outside industry control. Wages, for example, are tied to cost-of-living increases and wages account for nearly two-thirds of total expenses. The bus industry mostly provides service to people, so it is capital intensive.

More significantly, the cost of replacement buses has nearly doubled in the last 10 years, from about \$48,000 to over \$90,000. Keeping buses beyond the normal 8 to 10 years would not help, since maintenance costs increase sharply as bus age rises.

Regular service drains profits: A better prospect for improving the profit situation is to increase revenues, especially from regular route services.

Back in 1968-72, these services generated about 71 percent of total revenues and covered about 95 percent of the industry's total operating expenses. Presently, regular route services contribute less revenue, about 65 percent, and cover only about 85 percent of total operating expenses.

In other words, regular route service is a persistent drain on profits. Only revenues from charters, tours, package express and other services have kept the industry profitable.

The industry has carried out aggressive marketing programs to increase ridership. Among these, promotional pricing, especially economy fares, has been very prominent. Nevertheless, there are limits to pricing strategies.

After all, service quality improvements demanded by the public and needed to meet competitive pressures are costly. Accordingly, the industry has sought to raise fares periodically to economic levels. Unlike other industries in the public transportation sector which receive ample subsidies to underwrite uneconomic fares, intercity bus must survive on farebox revenues. However, there is a wrinkle.

The industry's fares are subject to ICC approval, and since 1972 several rate adjustments have gone into effect which represented something less than the industry needed. Through the end of 1976, about 71 percent of the industry's proposed increases were awarded. The resulting 29 percent gap translates into a revenue loss of \$38.3 million.

Thus, failure to win timely and complete approval of well researched and conservative rate increases has contributed to the industry's financial plight.

Bus at a crossroads. Looking ahead, it is now apparent that unless conditions improve, the national intercity bus network will begin to deteriorate. This must not be allowed to happen—too much is at stake.

The industry services more people and places than any other mode. It provides mobility for America's transportation disadvantaged. The industry contributes over \$1 billion annually to the gross national product; it employs 46,000 people and pays over \$130 million yearly in various taxes to Federal, State, and local governments.

And now, intercity bus can be a major factor in reaching national energy and air quality goals.

For these reasons, I urge you to give deep consideration to the proposed Federal program to encourage energy conservation through increased use of intercity bus.

Mr. Stanton of Continental Trailways will now explain the program for you.

Mr. STANTON. Previous witnesses described the industry's financial plight and the outstanding fuel efficiency of intercity buses.—

We believe the refundable tax credit provides an opportunity to give the industry financial relief while helping the Nation divert travelers from autos to energy efficient buses.

Moreover, it is our belief that revenues generated from the crude oil and natural gas liquids equalization taxes should be used in an active way—not passively, as in the form of a rebate—as incentives to encourage energy conservation and/or increase energy efficiency.

Higher costs of energy, coupled with rebates—as suggested by the administration—to mitigate the impact of energy price increases, work at cross purposes. However, motivation to conserve, or to use more energy efficient products or services, can result from allowing costs to increase on the less efficient products or services and using incentives to decrease the cost of energy efficient products or services.

Accordingly, it is in light of the above that we offer for your consideration the goal of increased usage of intercity buses. It is our suggestion that this is best achieved through the use of refundable tax credits.

We have developed a refundable tax credit formula that can be used by all intercity bus operators. The refundable tax credit is the product of a volume factor times a conservation factor times a revenue coefficient. Inherent in the formula are incentives for the bus operator to maximize ridership while at the same time obtaining the highest possible passenger miles per gallon.

The total refundable tax credits will be earmarked as follows: 20 percent for terminals; 30 percent for equipment; and 50 percent for fare reductions.

As Mr. Adkins pointed out, our earnings today do not allow sufficient revenue to modernize our terminals. If we are to increase ridership, then the intercity bus industry must have clean and well located terminals.

At this point, the industry does not have the capital to modernize those terminals or build new ones where they are needed. The same is true with equipment. Although our equipment is up to date, clean and safe, we are at a point where it is becoming more and more difficult to replace this equipment on a timely basis.

We are suggesting that a portion—and the percentage of the credit is not fixed—but a portion of the tax credits be available to the operators to meet its capital needs.

Indeed, this type of program would be an investment in the future of an industry that is essential to many people of the United States. Then, the other part of the tax credits would be used to decrease fares, and it would address two specific points of the national energy plan.

One is to alleviate the disproportionate burden of increased energy costs to the elderly, the poor and those on fixed incomes, consistent with the objectives of the National Energy Plan and the fifth principle thereof.

Second, to stimulate the use of more energy efficient modes of transportation, consistent with the national energy plan and the sixth principle thereof.

If we are able to use refundable tax credits to reduce our fares, thereby allowing fixed income people to use our buses because of the reduced fares, we believe we could stimulate bus traffic. Not only would we be diverting people from the car, but we would be enabling people who now have a smaller amount of discretionary income to spend on transportation to travel.

So our program is to address both of these needs.

That briefly summarizes our proposed refundable tax credit program. To some, it addresses the tough task of solving the Nation's energy problems without inflicting hardships on any of our citizens. Concurrently, it provides financial relief for America's financially troubled intercity bus system.

I have not spoken in detail of the plan itself. I thought I would leave that for questions.

The CHAIRMAN. Thank you.

As you know, I have had the opportunity to examine this suggestion, as a member of the Commerce Committee. I want to talk about the efficiency, or at least the practicability, of administering this proposal.

In order to make this plan work, we would have to be able to determine what the passenger miles figure is. Would that be the passenger miles as an industry, or passenger miles of each carrier?

Mr. STANTON. It would be both, sir.

The CHAIRMAN. How are you going to determine the passenger miles of an individual carrier? How would you go about assuring that that is the correct figure?

Suppose the Government wants to audit that. How would you satisfy the Government that the passenger-miles figure you have is correct?

Mr. ADKINS. In our report to the Interstate Commerce Commission, the figure is shown every year in the ICC report. They can audit our records. Our records actually will show that our revenues are based on passenger miles, and we have a sampling procedure to arrive at our revenues for passenger miles. It satisfies the Internal Revenue Service.

Since the system we have today is satisfactory, both to the ICC and the IRS, I think we can do that without any problem.

The CHAIRMAN. When you determine what your fuel efficiency coefficient is, in current bus passenger miles per gallon, on an index basis, how would you do that?

Mr. ADKINS. Again, I do not think that is a problem. We actually know the number of gallons of fuel that we use. We know the number of passenger miles we are handling with people in our service. We can arrive at the revenue passenger miles per gallon of fuel.

On the other hand; then, you have to know what the automotive industry is.

The CHAIRMAN. Then you need to know the auto coefficient, its current average passenger mile per gallon. You first determine the fuel efficiency coefficient of your particular case, is that right?

Mr. ADKINS. That is right.

The CHAIRMAN. You would subtract from that the current auto passenger miles per gallon. How would you determine that figure? Unpublished sources somewhere?

Mr. STANTON. I do not think that is available. We have our information from the Department of Transportation. I do not know if it is a number that is actually arrived at annually, but we did get a number from that source.

The CHAIRMAN. You would call upon the Department of Transportation to provide that?

Mr. STANTON. Yes, sir.

In other words, both of these coefficients were used as incentives to the operator to mix the passenger miles, but, at the same time, be attuned to the fact that he also has to maximize his use of energy. He cannot increase passenger miles and foresake his concern for keeping as many people on the bus.

The CHAIRMAN. The more people he can attract to the bus, the more efficient the bus and the greater tax break he would get.

Mr. ADKINS. By good bus maintenance and keeping after the manufacturer of engines to provide a good product, the more miles you can get to the gallon. In addition, by using radial tires, we can increase our fuel efficiency.

The CHAIRMAN. Let us talk about the complexity aspect of this proposal. The only people who would have to concern themselves with the complexity involved are the intercity bus operators; is that correct?

Mr. STANTON. That is correct.

The CHAIRMAN. Nobody else, just operators of intercity buses. They would be the only ones who would have to worry about this?

Mr. STANTON. That is correct.

The CHAIRMAN. In years gone by, this Nation has spent what in current dollars would be billions subsidizing the railroads to get them in a position to provide a service to the country. We have spent billions subsidizing the airlines to get them in a position where they can provide a service which is not an energy efficient service at all.

We have had a lot of complaint about the fact that we spent a lot of money, perhaps billions, helping develop our waterways so the barges can use it. That is a very energy-efficient operation, by the way, to move cargo.

It seems to me the time has come when we ought to try to do the same for the intercity bus and perhaps even something along that line to help with the buses on the city streets.

If we can do something along this line, and I certainly hope we can, what do you feel that the cost of this would be? Have you estimated the cost of this proposal?

Mr. STANTON. \$200 million.

Mr. ADKINS. Under our present proposals, Senator, of course, we are not set in concrete on this, half of that would go right back to the people that would purchase tickets at a lesser fare. It would not be going to the industry. It would be giving people an incentive to ride the bus.

The CHAIRMAN. You are suggesting that half of that \$200 million would result in direct rate reductions to the public for bus service?

Mr. LEWIS. A direct passthrough.

The CHAIRMAN. A direct passthrough; 50 percent of it would be a direct passthrough to encourage people to use the most energy efficient means of transportation presently available, and the other part would be used to help improve equipment and also help to modernize the bus terminals.

Mr. STANTON. Yes, sir.

The CHAIRMAN. Can you tell us a little bit about the bus terminal problem?

Mr. ADKINS. Let me mention this to you, Senator. Greyhound itself has been spending about \$8 to \$10 million a year in our terminal and garage facility programs. For example, since 1966 it has spent \$7 to \$8 million. During that same period of time, we have purchased buses of over \$280 million.

That, together, is \$354 million and our net income after tax was only \$320 million. As you can see, we have been working on this to develop it.

Our economic condition has reached the point where during the last 2 or 3 years we have been slowing down our terminal construction program. The dollars simply were not there.

This year, we have actually had to stop. We have had to say, we cannot invest any more in innovation or in construction of new terminals until our financial situation improves. I think the same thing has been true of other people in the industry.

We have been able to convince our board to hang on a little longer on our bus replacement program, because if you do not spend the money on new buses, you are going to spend it on maintenance.

We know that people are riding the buses. They want them to be modern and up to date, so here we are in a situation where we have actually had to just stop our terminal construction program because we simply do not have the economic resources to pay for it.

For example, last year our net income after tax was \$18 million. We spent \$41 million on buses and \$5 million on structures. The year before, we had spent \$8 million on terminals. We have slowed it down.

Starting this year we are going to complete what is already underway, but we are not starting anything new.

The CHAIRMAN. Insofar, I take it, that we can make the industry more profitable, you can borrow more money to invest in improvements.

Mr. STANTON. I may add on this terminal situation, we are the last mode of public transportation that has to bear the full cost of terminals. The trains do not, the airlines do not. Yet, we are left with the complete burden of providing modern terminals and renovating our terminals.

The cost is such that now, from a business point of view, we do not get the return on the capital invested from the terminal, let alone not having the money to do it. We cannot come out ahead on that game.

The CHAIRMAN. You are suggesting that this help should be in the form of a refundable tax credit. I take it that one reason that you are suggesting it is that some intercity buslines are not making enough money, and a tax credit would do much good.

Mr. STANTON. The cash flow is not there to make something like this of value as a straight tax credit.

The CHAIRMAN. If we want to do something for these buslines, we ought to consider the tax credit we provide as a subsidy, as something we fully intend to do for them, whether they are making a profit or not.

To limit it to just a credit against taxes means that you might get it, you might not. For a lot of the companies who are trying to provide a service, against very difficult circumstances, as a practical matter, they would not get it.

Mr. ADKINS. Another thing, we are talking about cutting the fares back and using half of these funds to cut the fares back to people who are on low incomes, fixed incomes, et cetera; if we do that, if those funds come through, then we have to be assured that those funds continue to come through. If they do not, we automatically have to knock them back up and then those people are really knocked out of the box, you might say, as far as public transportation.

We need to have the assurance. Through this way, we can have the assurance, I think—the refundable tax program.

The CHAIRMAN. This tax credit and these fare reductions you are talking about is something you would like to do? Would they be ways that would benefit the poor, the aged, and the disabled?

Mr. ADKINS. Yes, sir. Take the \$50 fare plan we have this year—to go any where in America for \$50. We did attract a lot of long-distance travel back to the bus that had not been utilizing the bus, but the fare was too low.

In other words, what it did, it caused us to add people and add schedules to handle the people and we simply did not get enough money out of it to be able to pay the costs.

We would like to do that kind of thing and give people an incentive to ride the bus, but we cannot afford to set fares at that kind of level with the present economic situation.

Mr. LEWIS. I would like to add this point. We have supported the waterway industry because it provided means to develop important new transportation methods over the water. We have supported the airlines for a purpose of principally getting people through the air at a very high speed, and the like.

Intercity buses serve 16,000 communities in the United States, over 15,000 of which are served by no other public transportation, so that the support suggested would be really small, \$200 million a year, in relation to total Federal outlay moving into transportation in support of other modes. Such support would be very small, but the real impact, probably more than anyplace else, would be to the heart of rural America, the 15,000 cities that only receive public transportation through the bus.

The CHAIRMAN. Senator Hansen?

Senator HANSEN. Mr. Chairman, I am going to have to run in just a minute to attend a markup on natural gas deregulation. If I may, with your indulgence, I would like to make a couple of points.

First, I would like to ask Mr. Lewis, prior to joining the bus industry, you were involved with trying to solve the problems of the Northeast railroads. Do you see a parallel between the problems of the Northeast railroads and the bus industry?

Mr. LEWIS. Senator, there is no question but that there is a direct parallel between the basic, fundamental, underlying problems facing the bus industry today and the condition that faced the Northeast railroads in the period 1960, 1965, and 1970. One difference, however, is that today we are telling you this before the industry goes bankrupt. Congress did not have the opportunity to deal directly with the Northeast railroads until bankruptcy had occurred, and you were faced with literally a termination of service.

I do think that many of the basic factors of the Northeast railroads and bus industry are very similar and are subject to the same inexorable conclusion without Government aid. We are facing similar problems.

Senator HANSEN. I appreciate your observation on that.

Mr. Chairman, let me say that later on this morning you will be hearing from witnesses who will be discussing the geothermal resources of this country, as we are trying to take every conceivable step we can to alleviate or eliminate the energy crisis.

It seems to me, when we make a comparison between further and further outlays in capital, in the balance of payments to foreign countries, that the wisdom in trying to encourage the use of geothermal steam as a way of contributing to our energy dilemma solution in this country, it becomes very meaningful and clear.

I would hope that this committee can give some serious consideration to the possibility of the depletion allowance or something that will provide greater incentive than we now have. We do have a resource that can make a significant contribution, in my opinion, but yet, unless it has some greater advantage than it now has, it will go unused.

I think the arguments are strongly persuasive on this fact that we ought to take some steps to do something more than we are doing.

The CHAIRMAN. Senator, I will certainly consider that. It would be all right with me if you would divert that flow from Old Faithful for about 9 months out of the year to keep things warm out there in Wyoming. Then you can just turn it on for the 3 months that we need it. At that point, you would not be needing the heat out there.

Senator HANSEN. If I would suggest doing anything with Old Faithful, I would wind up at the bottom of a hole, Mr. Chairman.

Thank you, sir.

The CHAIRMAN. Senator Curtis?

Senator CURTIS. I am very much interested in your proposal. I need a little more information.

What does a new bus cost?

Mr. ADKINS. Today, \$104,000.

Senator CURTIS. \$104,000. So \$1 million would buy 10 buses?

Mr. ADKINS. Ten buses; yes, sir.

Senator CURTIS. If only half of your \$200 million subsidy was used to get buses it would only give you 1,000 buses. You envision it as not the Government buying the buses, but as a help toward operators buying the buses?

Mr. STANTON. We are concerned. We would like to be the owners of the bus and not the Federal Government. Our plan was to provide a refundable tax credit, or to use the refundable tax credit as an incentive to have the bus operators buy the buses.

Senator CURTIS. This would be a tax credit on the purchase of new buses?

Mr. STANTON. Yes, sir.

Senator CURTIS. A tax credit on the building of terminals?

Mr. STANTON. Yes, sir.

Senator CURTIS. So if you did not purchase any new buses, you would not get the credit?

Mr. STANTON. That is right.

Senator CURTIS. How much of a tax credit would it take, percentage-wise?

Mr. STANTON. We have not—

Senator CURTIS. Is it 10 percent now?

Mr. STANTON. The investment tax credit is 10 percent. We would like to get a refundable tax credit of 30 percent on the equipment, which would provide a total credit of 40 percent.

Senator CURTIS. How much tax do you have to pay on a new bus when you buy it?

Mr. ADKINS. Ten percent, but that is one of the things, Senator, that is already in the House bill. That would eliminate the excise tax on buses, and we certainly hope that that will be maintained in this bill before the Senate.

Senator CURTIS. That is 10 percent?

Mr. ADKINS. Yes, sir. That is the manufacturers tax added to it.

Senator CURTIS. Do you think this tax credit, if enacted for a period of 3 or 5 years, would be of material help, or would it have to be permanent?

Mr. STANTON. I think the credit that relates to the fare reduction would have to be permanent, because if we reduce the fares for 3 or 4 years and then had to increase it again because we lost the credit, that would be disastrous to the development of traffic.

Senator CURTIS. Do you see any complications in computing the fare so that that part of the public who wanted to be fair in their inquiry would be satisfied that it has resulted in an equitable reduction?

Mr. ADKINS. I do not think there is going to be any problem, Senator.

Senator CURTIS. Your fares are fixed now, are they not?

Mr. ADKINS. Yes; they are fixed. It is up to the individual carriers, of course, to file fares with the Interstate Commerce Commission and various State commissions. What we have suggested at the outset here is legislation providing that we can use the 6-year refundable tax credit to reduce fares for this particular group of people, the senior citizens, for example, or any others, and ask, What is the most feasible, practical way of doing it?

We will certainly be most happy to work with your staff in order to develop this further.

Senator CURTIS. Have you given consideration to reduced fares for all passengers?

Mr. ADKINS. We have talked about that in our discussions. We have studied that, Senator. Of course, it depends on how much funds you

have available for that purpose, you know? If you have a limited amount of funds and you spread it all the way across the spectrum, it amounts to very little for each one.

When it is that way, it would have less impact in affecting traffic. If it is to a lesser group, you can have a greater reduction in fares to that particular spectrum and we feel we can attract more traffic, get more people of that particular kind on a bus.

Senator CURTIS. I realize no plan is perfect. The fact remains, not everyone over 65 is a low-income person, by any means, and there may be someone driving their car, a salesman or otherwise, with just a little bit more inconvenience could handle his job by riding on the bus. He is not a one-time passenger.

Mr. ADKINS. I understand that.

Senator CURTIS. It seems to me that if the Congress passes this, we ought to at least give some thought to seeing how it could be handled to attract the people to the buses who are going to travel anyway.

Mr. STANTON. Yes, sir.

Senator CURTIS. Some of these other classes—I am certainly for helping them—are probably people to whom the question is not which mode of travel is used, but rather it is a question of reduced bus fare or no travel.

So we really do not save any energy until we cut into that group of travelers who are going to travel anyway.

Mr. LEWIS. We can say very clearly that we would be amenable to the idea of sitting down and discussing the way in which money would flow directly to the public or to the industry and work out something that meets your ideas and goals and objectives to be set, and we can do that.

Senator CURTIS. What I am saying, if we go into this, it ought to be done in a way whereby we are relieving other modes of transportation and diverting it to the bus. I think that it is splendid to help the people of low income and I am for that, and that will add to your business, but it does not lessen the use of other energy that is being used, because many of those, unless it is a bargain fare, and they can—

Mr. STANTON. If we were to look at it as an across-the-board fare reduction, then the credit that would be needed would be larger than the \$200 million. If you are going to cut fares, you are going to have to cut it to the extent where it is going to make it attractive for the person to get on the bus.

Senator CURTIS. You could give some thought to a reduced fare for continuous travel, or repeated trips and the like, to appeal to that class of business travelers who do travel with regularity.

Mr. STANTON. Yes, sir.

The CHAIRMAN. Senator Talmadge?

Senator TALMADGE. I have no questions. I compliment you gentlemen on an excellent presentation.

The CHAIRMAN. Let me make another point. It seems to me that your industry has not protested while the Government has benefited your competitors. We have done a lot to help the airlines; we have done a lot to help the railroads.

I am chairman of the Transportation Subcommittee of the Commerce Committee, and I would like the Government to do more to

help intercity buses. The time has come, it seems to me, when we ought to do something for the intercity buses. I think we ought to do something for mass transit generally, but that is a different matter.

It seems to me what you are asking for in terms of cost is very modest. It gives Congress a chance to see how the program would work.

Frankly, if it works very well—and I hope it does—I think we might want to do more along these lines. It has a great potential for energy savings.

It seems to me, frankly, we would be justified in imposing a tax if it means that a person is going to have to pay more to move his gas guzzler down the highway than it does to travel another way. Similar to the gas guzzler tax which would make it more expensive for people to use a fuel-inefficient method and make it less expensive to use a less fuel-inefficient method, that will move us in the right direction. I hope we can persuade the Congress to do something along the lines that you are suggesting, gentleman.

Mr. LEWIS. At least half of what we have proposed so far would go directly to the passengers. Second, to the extent that the terminals and new buses are provided subsidy, you provide a basis for continued service for those 15,000 rural communities that depend on intercity buses.

I would note the local service airlines receive \$70-odd million a year just to serve a few score cities in the rural areas by air, as contrasted to our being able to continue to serve 15,000 by bus if we had this kind of help.

The CHAIRMAN. I have made the statement that I am going to vote to increase the gas-guzzler tax, that I fully intend to buy a gas-guzzler and pay the tax on it. I am not going to try to chisel on that for a second.

I just hope that when we pay the gas-guzzler tax, we will put it to work for the kind of purpose we are talking about that will provide better bus terminals—goodness knows, they need to be improved—and better equipment for people who ride on the bus, and better rates for the poor souls who really do not have any choice about whether they are going to ride the bus or not.

Thank you, gentleman.

[The prepared statement of the preceding panel follows:]

STATEMENT OF THE NATIONAL ASSOCIATION OF MOTOR BUS OWNERS (NAMBO)

Mr. Chairman and members of the committee, my name is Arthur D. Lewis. I am president of the National Association of Motor Bus Owners, which is the national trade organization for the intercity bus industry. Collectively, our 450 members provide over 90 percent of the country's intercity bus transportation.

In doing so, we play a far greater role in the nation's total intercity passenger transportation process than is generally realized.

Of all the passenger modes, intercity bus is the most frequented and the most comprehensive. But intercity bus is also the most economical, the most environmentally compatible—and the most energy efficient.

Because of these inherent strengths, the industry could be a vital force for attaining national energy conservation and air quality objectives.

Unfortunately, the degree to which the industry can help achieve them is dependent on its financial condition—and the outlook is not good.

The industry's operating income has declined sharply in recent years, and today the situation is serious. In fact, if the trend continues, the industry may

have to curtail services severely, thereby confronting the country with a major passenger transportation crisis.

With me today are three intercity bus industry representatives who will testify on behalf of the industry. Our purpose in being here today is to present a federal program for encouraging energy conservation through increased usage of intercity bus.

Our first witness will be Mr. Peter Picknelly, who is president of Peter Pan Bus Lines, which operates in New England. Mr. Picknelly will explain why intercity bus is America's most essential passenger common carrier system.

Following him will be Mr. John Adkins, the Greyhound Corporation's Group Vice President for Transportation. He will discuss the industry's role in energy conservation, environmental protection, as well as its current financial condition.

Finally, Mr. Laurence Stanton, who is chairman of the board for Continental Trailways, will explain how the proposed refundable tax credit program addresses both the industry's needs and the objectives of the national energy plan.

I want to thank you for this opportunity to appear here today. I also want to leave for inclusion in the record a statement regarding repeal of the excise taxes and motor fuel taxes, as recommended by the President and already passed by the House of Representatives in H.R. 8444. Now we will hear from Mr. Picknelly:

Gentlemen, I am going to explain why the industry is essential.

BUSES SERVE MORE PEOPLE AND PLACES

The intercity bus industry plays a far greater role in the Nation's passenger transportation process than is generally realized. But transportation derives its most significant public service characteristics from the fact that it is accessible both geographically and economically to the vast majority of our population.

a. Cities and towns served

In terms of geographical coverage, intercity bus serves more places than any other public passenger mode. For example, the industry serves 16,000 points—compared to only 670 by air and 500 by train.

In more specific terms, intercity bus serves 96 percent of communities with 2,500–5,000 residents and all those with over 5,000 residents.

Thus, bus service penetrates both densely populated urban complexes and sparsely inhabited rural areas. The bus industry serves a greater cross-section of America's geography than any other mode of common carrier transportation.

b. Who rides the bus

The primary users of intercity bus are those who don't have access to or cannot afford to use other travel modes.

In many communities, intercity bus is the only public transportation option. For example, persons living in our smaller communities (i.e., in small towns and rural areas) depend heavily on buses. This is clearly reflected in the fact that less than 25 percent of bus passengers reside in the large metro areas, whereas over 45 percent of air passengers do so.

However, America's transportation disadvantaged—the poor, the handicapped, the young, the elderly—also depend heavily on bus. For them, intercity bus is at the very heart of their capacity to live independently and to participate fully in our society.

Reflecting this, nearly a third of all bus passengers are persons in the very lowest income groups, earning under \$5,000 per year. By way of contrast, persons in this income category make up only 13 percent of passengers traveling between cities by auto, and only 8 percent of air passengers. Interestingly, while a third of the bus passengers have family incomes under \$5,000, a corresponding proportion of the auto passengers are in the \$15,000 to \$25,000 income bracket, and a third of air passengers indicate incomes of \$25,000 or above.

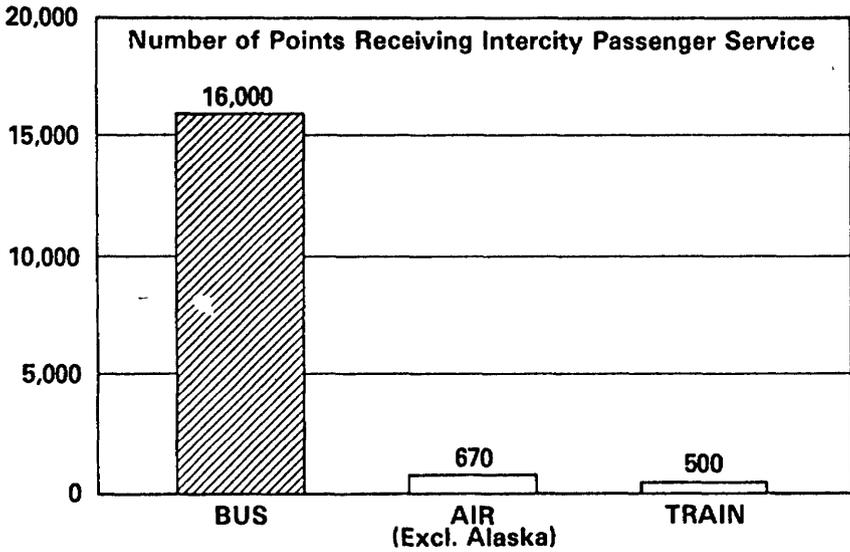
Buses also are important to our senior citizen population. About 44 percent of bus trips made during 1976 were by persons 65 years old and over. This age group accounts for only about one-fifth of persons traveling by other modes.

As a consequence of its geographical coverage and economy, intercity bus last year carried 354 million persons—more than planes or trains.

In brief, intercity bus is the Nation's most frequented, most ubiquitous and most economical passenger mode. For these reasons alone, action must be taken to preserve and enhance the industry.

But as Mr. Adkins will now explain, there are several additional compelling reasons to address the industry's financial plight :

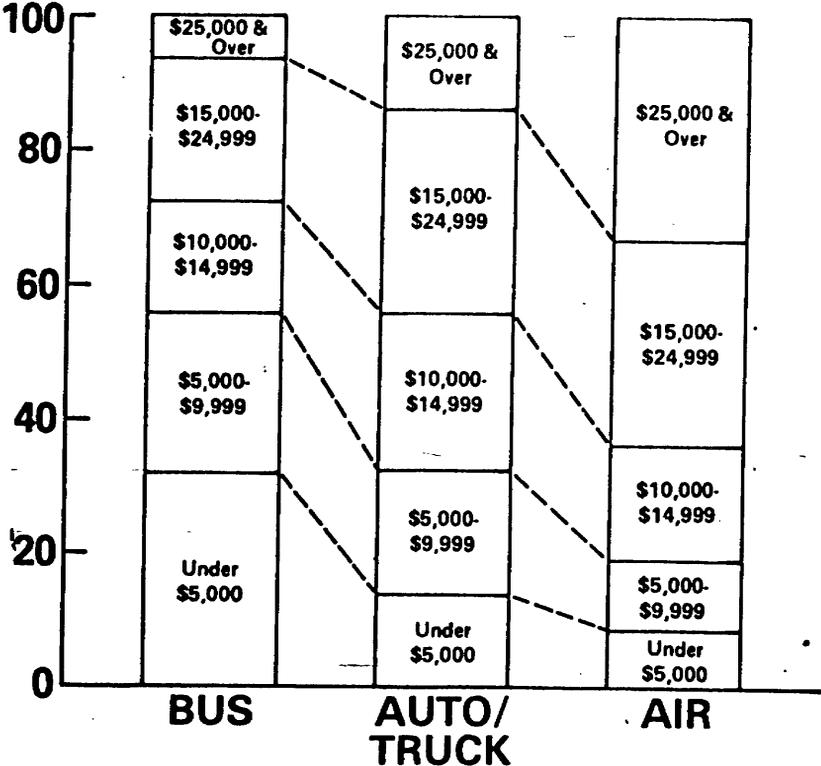
BUSES SERVE MANY MORE POINTS THAN OTHER CARRIERS



INTERCITY BUS RIDERS ARE PREDOMINANTLY IN THE LOWER INCOME BRACKETS

Percentages of Intercity Person-Trips, in Various Modes, by Family Income —

Percent



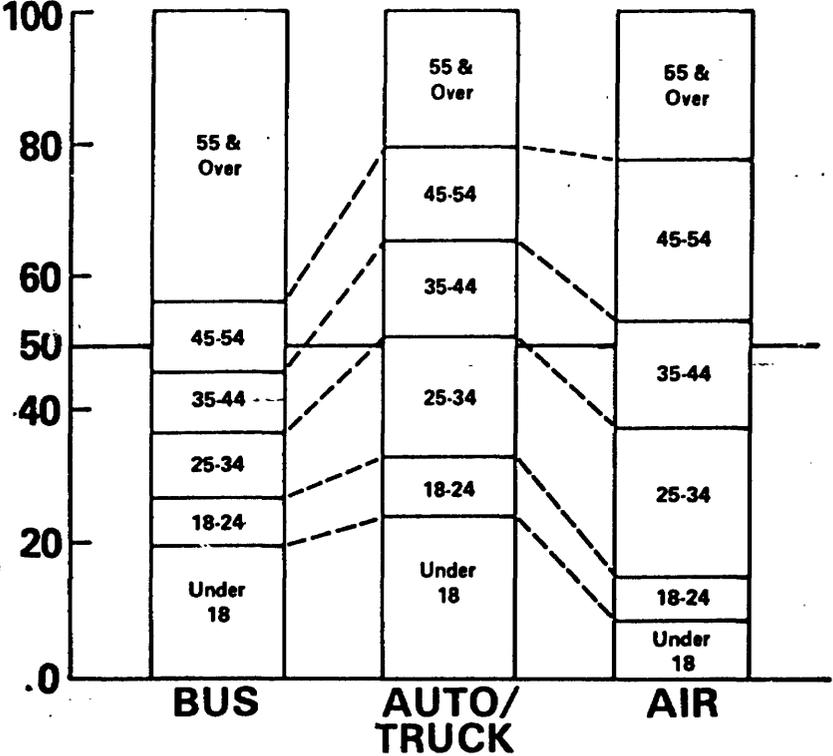
Trips of 100 miles or more in each direction.

Source: U.S. Travel Data Center, 1976 National Travel Survey.

BUSES ATTRACT RIDERS IN THE OLDER AGE BRACKETS

Age Breakdown of Intercity Person-trips made
by Bus, Auto/Truck and Air in 1976

Percent



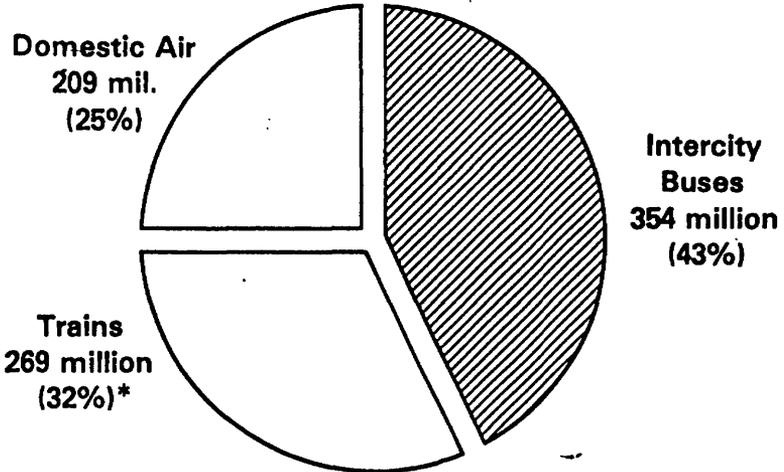
Trips of 100 miles or more in each direction

Source: U.S. Travel Data Center, 1976 National Travel Survey

- Buses Lead the Way:

**INTERCITY BUSES CARRY MORE PASSENGERS
THAN EITHER TRAINS OR AIRLINES - - -**

Intercity Bus, Train and Air Passengers 1975



* AMTRAK — 2%; other train 30%.

It is a privilege for me to be here today to acquaint you first hand with two other important aspects of intercity bus—its energy efficiency and its environmental compatibility.

At the same time, I will explain to you the industry's financial plight, its causes, and how the problem hinders our ability to help meet national energy conservation and clean air goals.

INTERCITY BUS IS ENVIRONMENTALLY CLEAN

With regard to the environment, two points should be noted:

1. Intercity buses are the most environmentally compatible for most intercity transportation.
2. Improved intercity bus service can help reduce auto use—leading to a substantial reduction in pollution caused mainly by the automobile.

1. Intercity buses are cleanest mode

There are three major transportation-related air pollutants (carbon monoxide, nitrogen oxides and hydrocarbons), and intercity buses emit fewer of them per passenger mile than any other form of intercity transportation. Simply put, intercity buses are the most environmentally compatible form of intercity travel.¹

2. Specific environmental benefits

Looking at the clean air bottom line, intercity bus has the potential to considerably reduce auto-related pollution. Quantitatively, calculations based on U.S. DOT figures suggest intercity buses:

- Emit 90 percent fewer carbon monoxide products per passenger mile than cars, and
- 84 percent fewer hydrocarbons, which cause smog.

¹ Source: Boeing Commercial Airplane Co., "Intercity Passenger Transportation Data: Emission Comparisons, 1975."

Projected to the entire nation, the reduction in auto pollutants will amount to several millions tons—even if intercity bus only increases its share of all intercity trips by 1 percent.

Thus, a healthy intercity bus industry is essential to meet and maintain national air quality standards. It is also essential if we are to meet our energy conservation objectives.

BUS—THE MOST FUEL EFFICIENT MODE

Intercity buses clearly are the most fuel efficient form of travel.

Estimates about their efficiency, for example, vary, but ultimately they all indicate intercity buses get more travel miles from a gallon of fuel than any other mode.

A study done for the Highway Users Federation reveals, for example, that intercity buses average 108 passenger miles per gallon of fuel, and practically speaking, this could be raised up to 162 passenger miles per gallon with improved loads. Standard autos, in contrast, average about 37.4 passenger miles per gallon. The average and practical maximum for intercity trains, according to the study, respectively are 72 and 108 passenger miles per gallon. Comparable figures for commercial aircraft are 17.3 and 23.6.

The Boeing Airplane Company has also studied the problem and has produced what are probably more refined estimates of intermodal fuel efficiency. Many of the estimates made of modal fuel efficiency ignore or gloss over operational characteristics that significantly affect results. Various modal systems do not compete in an identical pattern and to use simply the gross traffic and fuel-use statistics distorts comparisons. Train data, for example, reflect short range operations and equipment, although long distance trains have much lower efficiency. Also, most data reported for ground modes ignore various circuitry, the actual distance the equipment has to traverse to serve a city-pair. The comprehensive study by the Boeing Company corrected these deficiencies in estimating procedures and the results show that on the most accurate and comparable basis, buses are markedly more efficient than other modes, when examinations are made of system averages, or of individual city-pair markets.

According to the Boeing measures, intercity buses range between 90 and 162 passenger miles per gallon at present loads. The range for autos was 25-41 passenger miles; for trains, 14-64; and 18-28 for airplanes. This implies that intercity buses are at least four times as fuel efficient as autos, five times more efficient than airplanes, and 3-6 times more fuel efficient than trains.

Accordingly, the experts also agree that intercity buses are by far the most efficient users of energy among all the present day modes of land or air passenger transportation. Logic would have it, therefore, that more use should be made of intercity buses.

For our part, the intercity bus industry has been doing all it can to induce would-be travelers to use bus instead of energy wasteful modes. However, our capability to do so is severely constrained by the financial crisis we now face.

RECOVERY BYPASSING BUS

The feature article in a recent U.S. Department of Commerce publication noted that corporate profits in the United States soared to record levels in 1976, having "substantially exceeded their levels before the onset of the 1973-75 recession."³ This was good news for the economy and a reliable signal that American industry has pulled away from the mire of "stagflation." The incentive and the wherewithal to reinvest in American economic growth are present again. America is on the move.

Like most good news, however, this information about our economy does not tell the full story. It does not reveal, for a variety of reasons, that some sectors are still struggling for economic survival. Such is the plight of the intercity bus industry.

While America's industries, in total, were chalking up new financial gains in 1976, the intercity bus industry again felt the pinch of fiscal erosion, as profits dipped for the fifth consecutive year, to dangerously low levels.

The corrosive impacts of recession/inflation obviously have not run their full course in the intercity bus industry. Nor is it certain that the situation will take

³ "The Business Situation," U.S. Department of Commerce, *Survey of Current Business*, March 1977.

a turn for the better without some direct action to neutralize the destructive forces that are weakening, and threatening to destroy the foundations of one of America's great, and essential industries. The peril, without exaggeration, is dire, and the following point will show just how serious are the economic troubles that persist in the intercity bus industry.

EXPENSES OUTPACING REVENUES

The erosion of profits in the intercity bus industry is the result of increasing expenses outpacing gains in revenues, especially from 1973 onward. The Class I intercity motor bus industry—a group of 81 carriers so designated by the ICC based on company revenues—earned in the aggregate just under \$1 billion in operating revenues in 1976. The figure represented a 28.5 percent increase over the amount posted in 1972. Expenses over the same period, however, have increased 38.1 percent, amounting to \$952.1 million in 1976. Net operating revenue was cut nearly in half, plunging from \$85.7 million in 1972 to \$44.9 million in 1976.

Longer term trends in revenues and expenses, for the intercity bus industry, show clearly that the revenue lag is becoming progressively worse. From 1968 through 1972, revenues and expenses were changing at approximately the same rate. The spread between revenues and expenses, net operating revenue, increased gradually. The revenue lag actually made its appearance in 1972 when expenses increased nearly 4 percent in contrast to a 2.2 percent gain in revenues, and similar differences have occurred each year to the present. Even in 1972, when gasoline shortages helped to boost bus ridership, temporarily, a 14.5 percent increase in revenues was overshadowed by a 16.4 percent hike in expenses. In the latest year, 1976, revenues were up 4.4 percent, and were again outpaced by a 6.6 percent increase in expenses.

Fiscal performance is conventionally measured by the "operating ratio," which is the percent that operating expenses are of operating revenues. Under stable, and relatively healthy, conditions—as was the case prior to 1973—the intercity bus industry consistently had an operating ratio in the range of 85–90 percent, leaving a modest, but steady operating profit margin of about 10–15 percent. But the operating ratio has been on a steep climb, reaching 95.5 percent in 1976. Thus the margin between revenues and expenses has shrunk to a mere 4.5 percent. If the trends continue, this margin will disappear altogether before 1980. In this case, it is not idle to speculate that service likewise will be forced to disappear as losses mount.

SERVICE QUALITY MAINTAINED SO FAR

It has been the policy of the intercity bus industry to maintain high service levels. Despite eroding profits, cutbacks in service have been minor. Bus miles operated by the Class I carriers have decreased only about 5 percent over the past 9 years. The huge intercity network of services to 16,000 cities, towns, villages and hamlets has been maintained. The industry has kept faith with its riders. But it has been expensive and unprofitable. As late as 1971, the industry earned a profit of about 11 cents per bus mile operated. Quickly and steadily, this has plunged to 5.4 cents per mile in 1976. It requires no stretch of the imagination to foresee how vulnerable this slim margin is, for example, to inevitable wage increases, or to further increases in fuel prices. Since 1973, cost of living increases granted yearly to employees of my company, Greyhound, have averaged in the range of 1.05 to 1.35 cents per mile. A similar industry-wide increase in 1977 could thus have the effect of reducing per-mile profits by as much as 25 percent.

OPERATING MARGINS DOWN SHARPLY

Up to this point, the discussion concerning profits has dealt in "current" dollar values. When these "current" dollars are adjusted for inflation, the collapse of bus industry profits is even more dramatic. In "current"-dollar terms, the industry's net operating revenue (i.e., operating profit margin) dropped 42 percent from \$77.5 million in 1968 to \$44.9 million in 1976. But in terms of real purchasing power value, the drop amounted to 64 percent. The adjusted value of the 1976 net operating profits is only \$27.8 million, in terms of constant 1968 dollars. Thus, in real terms, net operating profits are little more than one-third of the levels achieved during 1968-1971.

It is well to note that while operating margins in the bus industry have declined sharply, margins in the trucking industry have been relatively stable. Presently, bus industry margins have fallen below the average for trucking, whereas normally, this bus margin should be about twice the amount truckers earn—12 percent v. 6 percent. The bus industry, which provides mostly service to people, is much more capital intensive, and therefore requires a larger operating margin than trucks which move property exclusively. The bus industry in order to earn a dollar must invest 40 cents. Truckers, in contrast, need only invest 21 cents per dollar earned.

OUTSIDE FACTORS DRIVING UP COSTS

The profit drain in the intercity bus industry must be stemmed—more than that, the trend must be reversed if the industry is to survive and function in accordance with its public responsibility. Obviously this can be accomplished by trimming expenses, or holding them current, while increasing revenues. The industry has already taken steps to lower expenses through other economy moves where feasible. But, there are severe limitations. Cost inflation in most instances is outside the control of the industry. Wages, as noted above, are tied to cost-of-living increases; and, wages account for nearly two-thirds of total expenses.

Most significantly, the cost of bus replacements has nearly doubled in the last 10 years, from about \$48,000 to about \$90,000. With profits steadily declining, the ability to meet these costs drops proportionally.

The question of bus replacements poses a particular dilemma for the industry. With replacement costs increasing at a rate of more than 6 percent per year, the conventional 10-year depreciation write-off covers only a fraction of the cost when it comes time to re-equip. Depreciation allowances in 1976, for example, covered only slightly less than half the amount needed to replace a 1966 model with a new bus. Even with funds received from the sale of the old bus, the shortage per bus was about \$34,000. If the industry was replacing 1,000 buses in 1976 (a reasonable guess for the full fleet of 10,000 buses), there was an obvious need for about \$34 million to achieve these replacements. This alone amounts to about 70 percent of the industry's net operating revenue.

It is reasonable to inquire as to whether it might not be worthwhile to delay replacement—to stretch the normal bus use life beyond the conventional 8-10 years. The answer is "no." It is not worthwhile from both a financial view and from the aspect of the industry's obligation to the public to maintain efficient and modern, comfortable services. Maintenance costs increase sharply as bus age increases. A 1968 model bus, operating in 1976, ran up a maintenance bill of about 9.3 cents per bus mile. A 1972 model bus that year averaged 6.9 cents per mile in maintenance costs, while a current year's model averaged 2.0 cents per mile.

INCREASED RIDERSHIP VITAL TO RECOVERY

The better prospect for improving the profit situation is to increase revenues. There is a particularly critical need for increasing revenues earned in regular route service. This service constitutes a persistent drain on industry profits. Back in 1968-72, revenues earned from regular route service constituted about 71 percent of total revenues and were enough to cover about 95 percent of the industry's total operating expenses. Presently these regular route services are contributing somewhat less to total revenues—about 65 percent—but at the same time these revenues are covering only about 85 percent of total operating expenses—96¢ per mile revenues versus \$1.14 per mile of operating expenses. In other words, regular route services are not maintaining their share of the cost burden, and other services, package express for example, are helping to prevent a complete disappearance of profits.

The industry has carried out aggressive and imaginative marketing programs to attract increased ridership. Promotional pricing has been prominent in these programs which the industry hopes will strengthen its competitive posture. But, there are limits to the promotional pricing. Buses are, by far, the least expensive mode of intercity travel, as they have been over the years. Increases in fares over time have barely kept up with inflation. Measured in "real" dollars, bus fares actually have not increased in 10 years. This achievement is especially noteworthy in light of the capital improvements in which the industry has invested over the past decade in order to improve customer comfort and convenience. One major accomplishment has been the development of terminal facilities in suburban areas in conformance with urban population shifts.

RATE RELIEF OFTEN DELAYED

Yet economics cannot be defined: service quality improvement demanded by the public (and necessary to meet competition) can be expensive. Accordingly, fare adjustments are necessary to withstand the inflationary spiral and to help offset the cost of capital improvements. The industry has sought to adjust fares so as to maintain them at an economic level. Unlike other industries in the public transportation sector, which receive ample subsidies to underwrite uneconomic fares, the intercity bus industry's business strategies must adhere firmly to free-enterprise tenets, under which an industry prospers or falls on its own. There is a wrinkle in this, however. The industry is regulated, and fare adjustments are subject to ICC approval. Several increases have gone into effect since mid 1972, but these represented something less than the industry required. Through the end of 1976, about 71 percent of the industry's proposed increases were awarded. The 29 percent gap translates into an apparent loss of \$48.3 million in the industry's revenue base. This gap, in 1977, is widening. Additional increases of 13 percent had been requested; 11 percent were approved as of May 1977.

It must be understood that the industry's requests for increases in fares are invariably conservative, and are the product of careful market research and knowledge. Failure to win timely approval for these requests has paved the way for the dangerous fiscal erosion that the industry faces.

BUS INDUSTRY AT A CROSSROADS

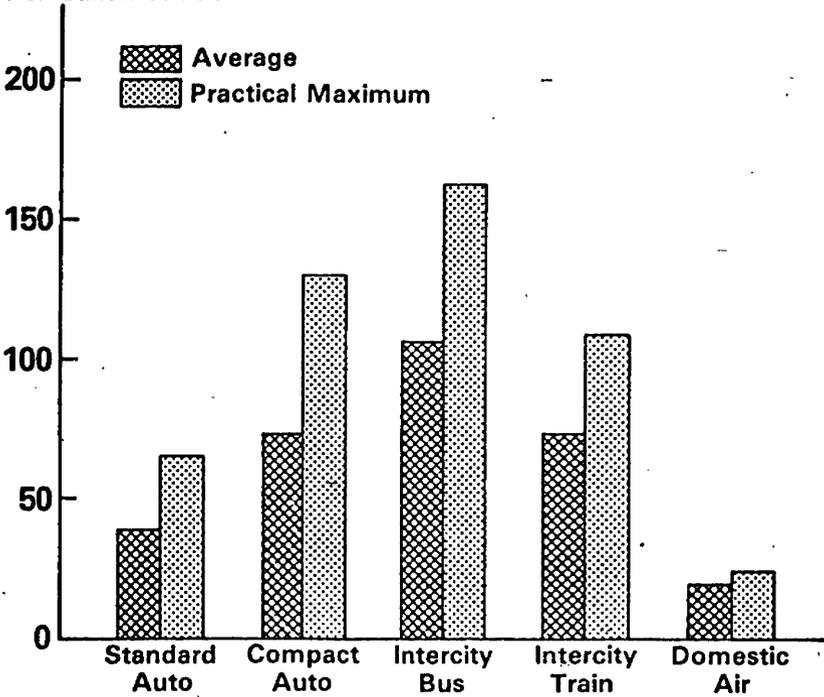
Looking back at the facts just presented, two things are certain: one, the intercity bus industry has severe economic problems, and, two, your immediate and aggressive action is needed to assure its well-being.

Ironically, the industry's decline comes at a time when the nation needs its services the most to meet national clean air and energy conservation objectives.

Accordingly, on behalf of the industry, I urge you to consider the refundable tax credit program now before you as a key step toward preserving and enhancing the industry. Mr. Currey will now describe that program for you:

BUSES ARE THE MOST FUEL-EFFICIENT CARRIERS OF INTERCITY PASSENGER TRAFFIC

Passenger Miles
Per Gallon of Fuel

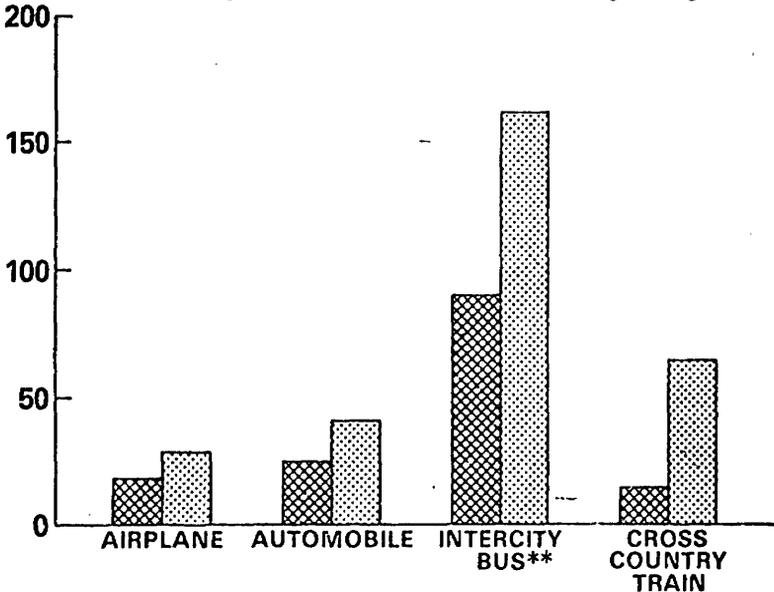


Source: Highway Users Federation (May 1974) and CAB (1975).

REFINED ESTIMATES OF MODAL FUEL EFFICIENCY MAKE ALLOWANCES FOR IMPORTANT ROUTE AND OPERATIONAL CHARACTERISTICS (E.G., CIRCUITY) - - WHEN THIS IS DONE, INTERCITY BUSES ARE SHOWN TO BE 4 TIMES AS EFFICIENT AS AUTOS, 5 TIMES AS EFFICIENT AS AIRLINES, AND AS MUCH AS 6 TIMES AS EFFICIENT AS TRAINS

Boeing Estimates of Comparative Fuel Efficiency:

Great Circle Passenger Miles Per Gallon - Low and High Range*



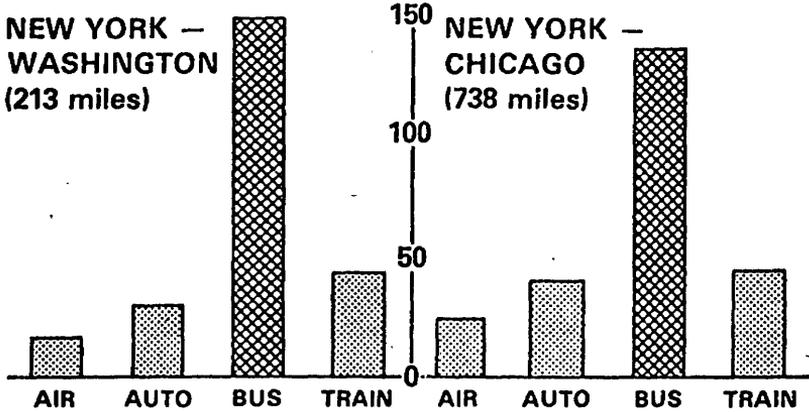
*Boeing assumes a trip distance of 700 statute miles, 60% load factor on public modes

**Class I operators

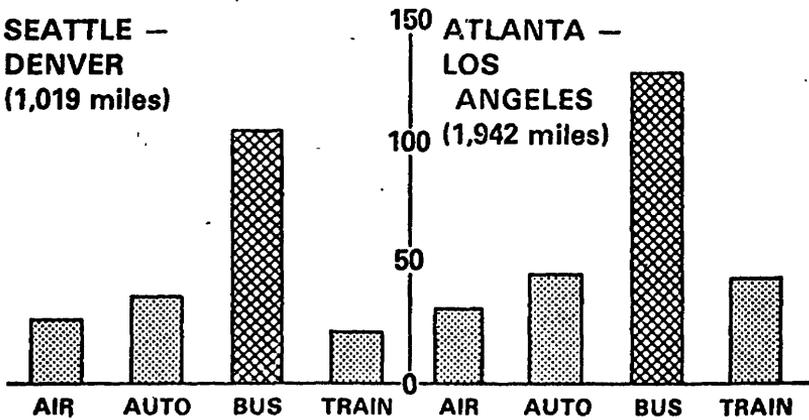
Source: The Boeing Airplane Co., "Intercity Transportation Data, Energy Comparison," Seattle, 1974.

BUSES ARE THE MOST FUEL - EFFICIENT PASSENGER CARRIERS IN MARKETS OF ALL TYPES AND DISTANCES

Great Circle Statute Passenger Miles per Gallon*



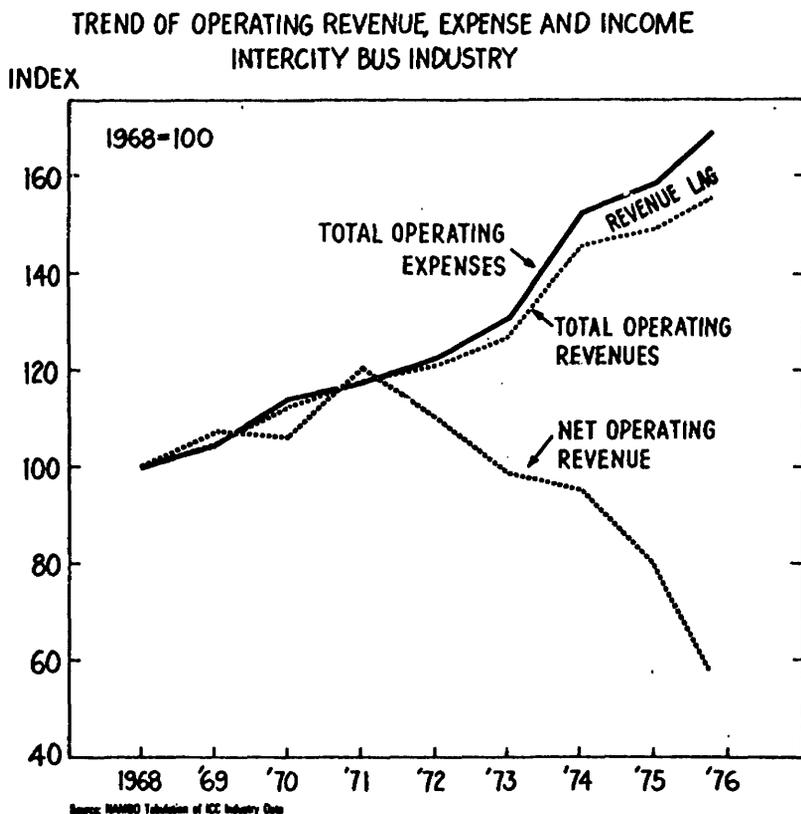
Great Circle Statute Passenger Miles per Gallon*



*Midpoint of range estimates

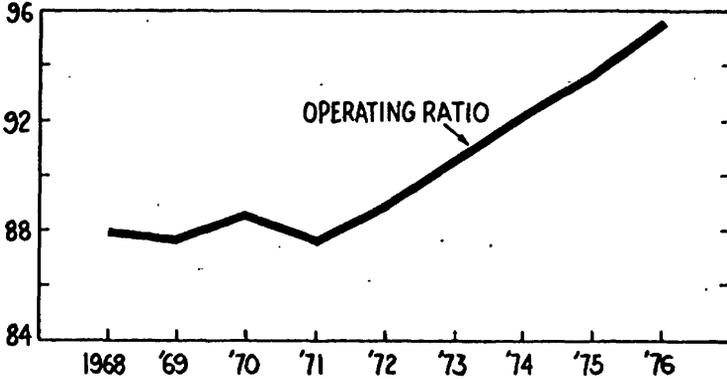
Source: The Boeing Airplane Co.; "Intercity Transportation Data, Energy Comparison," Seattle, 1974.

**GROWTH OF OPERATING REVENUE TRAILS FAR
BEHIND OPERATING EXPENSE INCREASES—
AS A RESULT NET OPERATING REVENUE
HAS DROPPED SHARPLY**



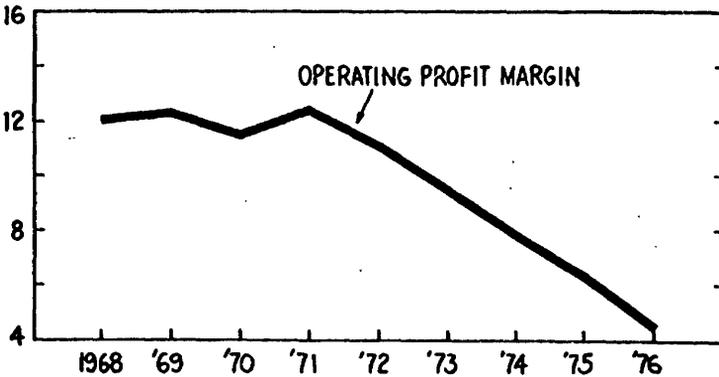
INTERCITY BUS INDUSTRY EXPENSES ARE OVERTAKING REVENUES-- THEY AMOUNTED TO 96% OF OPERATING REVENUES IN 1976

PERCENT EXPENSES OF REVENUES



FAST CLIMBING EXPENSES HAVE SQUEEZED THE INDUSTRY'S PROFIT MARGINS FROM 12% IN 1968 TO 4% IN 1976

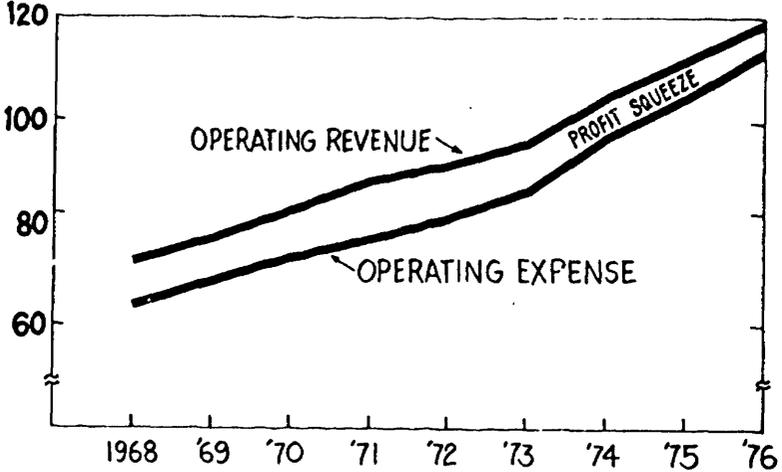
PERCENT NET OPERATING REVENUE OF TOTAL REVENUES



Source: NABHO Tabulation of ICC Industry Data

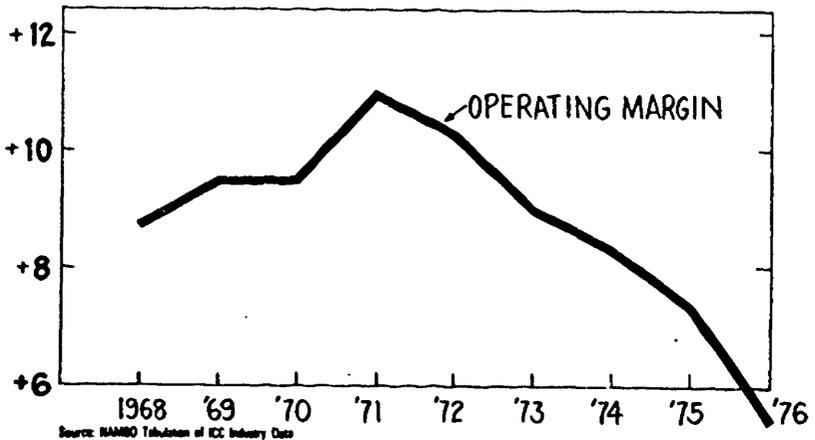
AVERAGE OPERATING EXPENSES PER BUS MILE FOR ALL SERVICES ARE INCREASING FASTER THAN REVENUE PER MILE

CENTS PER BUS MILE

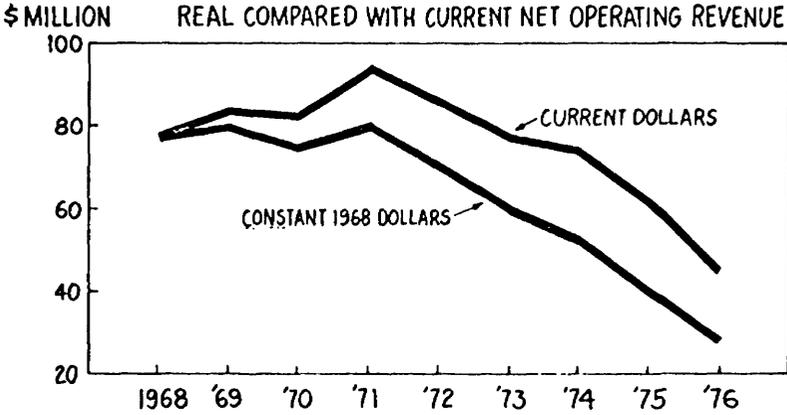


AS A RESULT, THE INDUSTRY'S OPERATING MARGINS ARE SHRINKING RAPIDLY

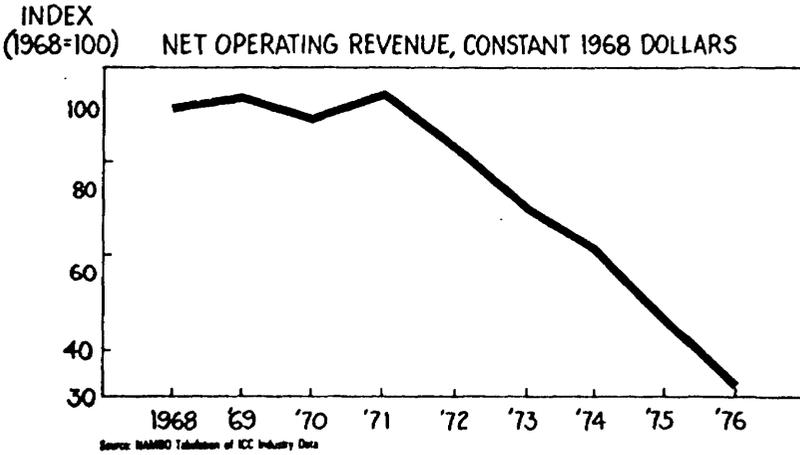
CENTS PER BUS MILE



**INTERCITY BUS NET OPERATING REVENUES
HAVE DROPPED CONTINUOUSLY--IN REAL TERMS,
THEY ARE DOWN 66% FROM THE 1971 PEAK**



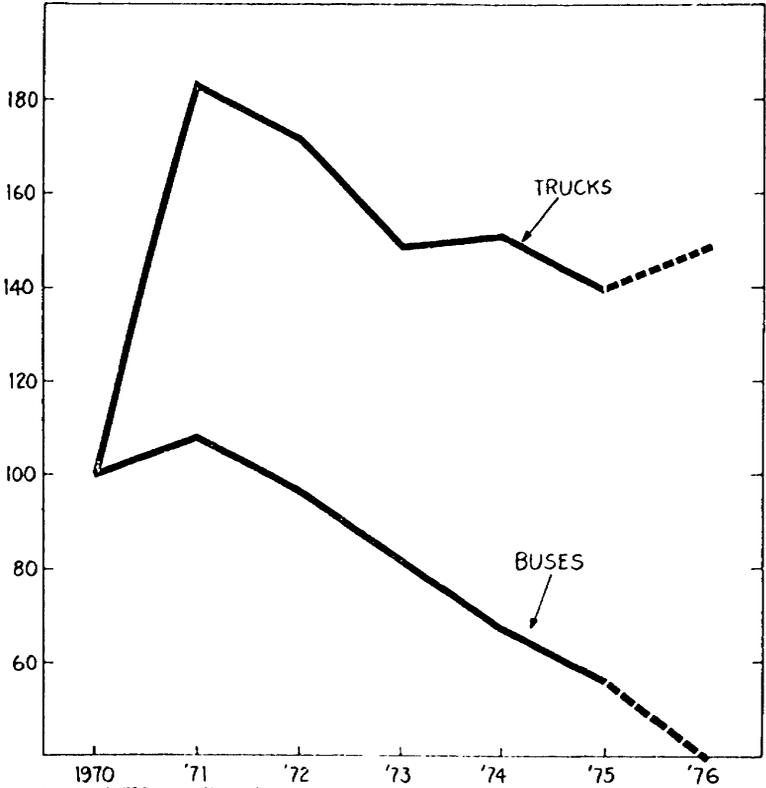
**A FIVE YEAR PLUNGE HAS PLACED INTERCITY
BUS NET OPERATING REVENUES IN 1976 AT
ONLY 36% OF THE 1968 LEVEL**



TRUCKERS HAVE NOT HAD THE SHARP DECLINES IN OPERATING MARGINS RECENTLY EXPERIENCED BY THE INTERCITY BUS INDUSTRY

RELATIONSHIP OF OPERATING MARGIN TRENDS
SINCE 1970

INDEX

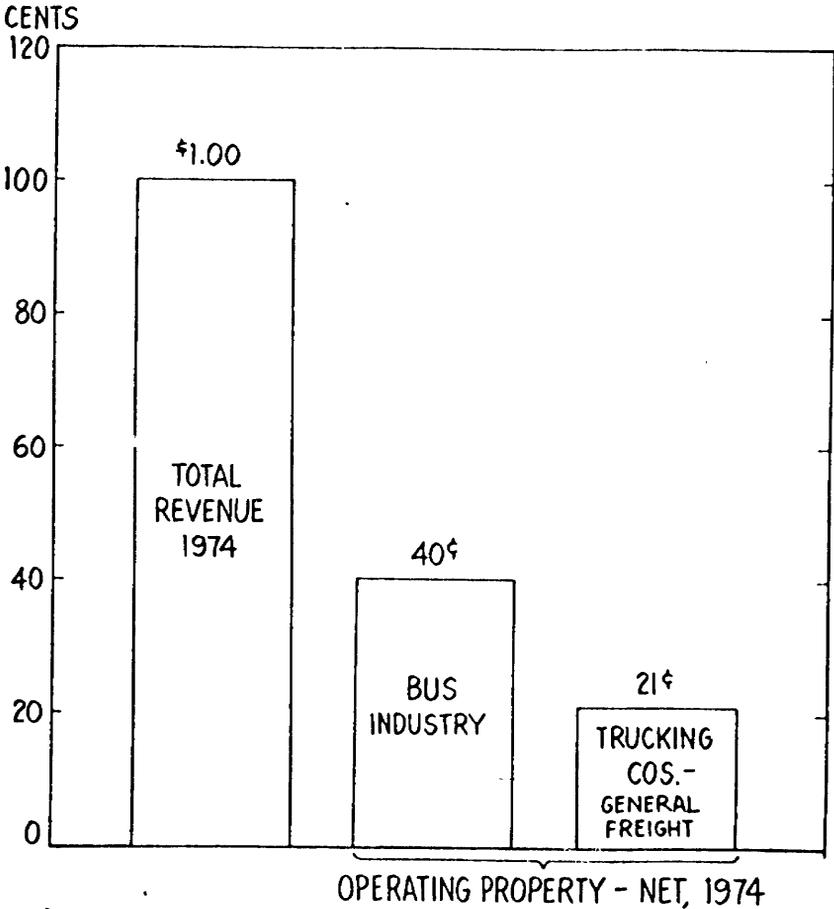


Source: Bus - NAMBD Tabulation of ICC Industry Data
Trucks - 1975 Financial Analysis of Motor Carrier Industry for Non-Bus of Person

**THE BUS INDUSTRY IS MORE CAPITAL INTENSIVE
THAN THE TRUCKING INDUSTRY:**

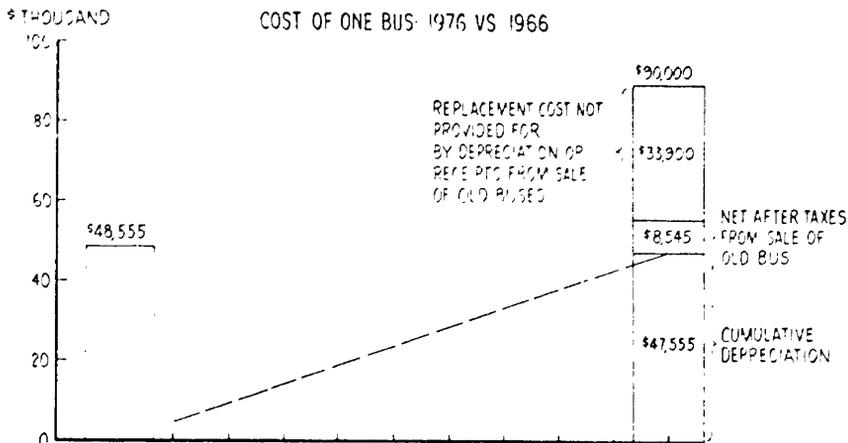
**THE BUS INDUSTRY MUST MAKE A FORTY CENT
INVESTMENT TO EARN A DOLLAR--**

**ALMOST DOUBLE THE INVESTMENT
REQUIRED BY TRUCKERS**

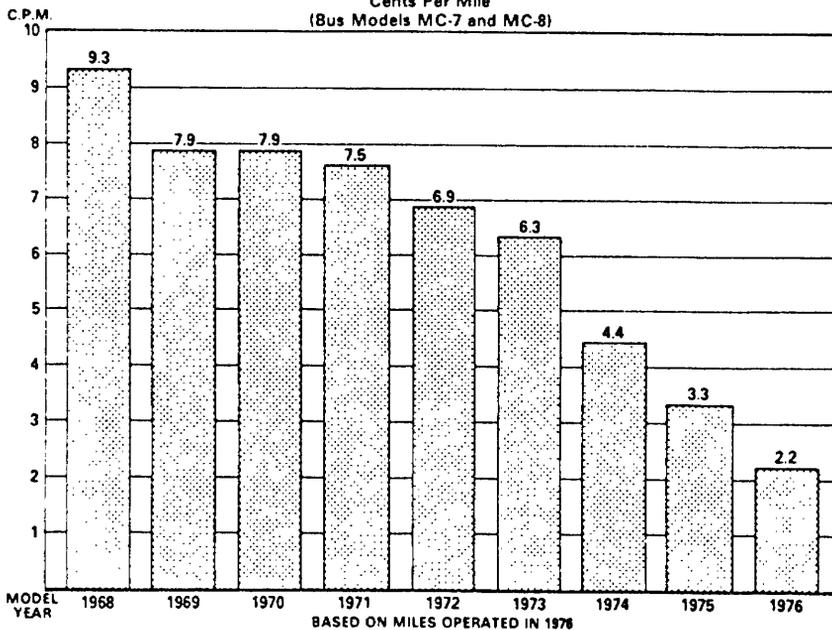


Source Bus - NAABO Tabulation of ICC Industry Data
Trucks - 1975 Financial Analysis of Motor Carrier Industry 1st Nat. Bank of Boston

THE COST OF BUS REPLACEMENTS HAS NEARLY DOUBLED OVER THE LAST DECADE, WHILE DEPRECIATION ALLOWANCES WILL COVER ONLY SLIGHTLY MORE THAN HALF THE PRICE OF A REPLACEMENT

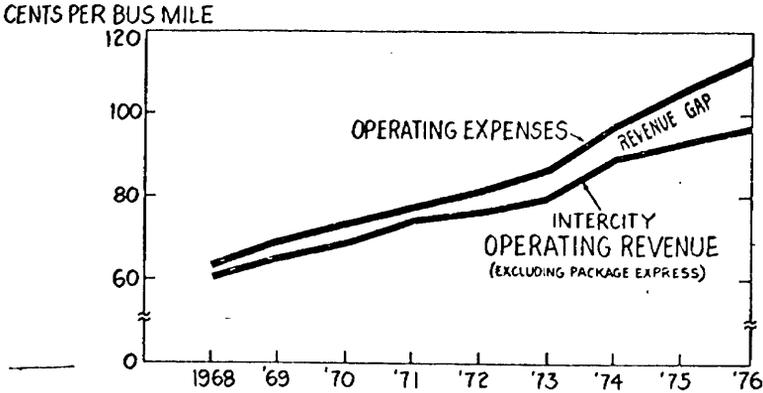


OLDER BUSES ARE MORE EXPENSIVE TO MAINTAIN
Relationship of 1976 Maintenance Cost and Equipment Age

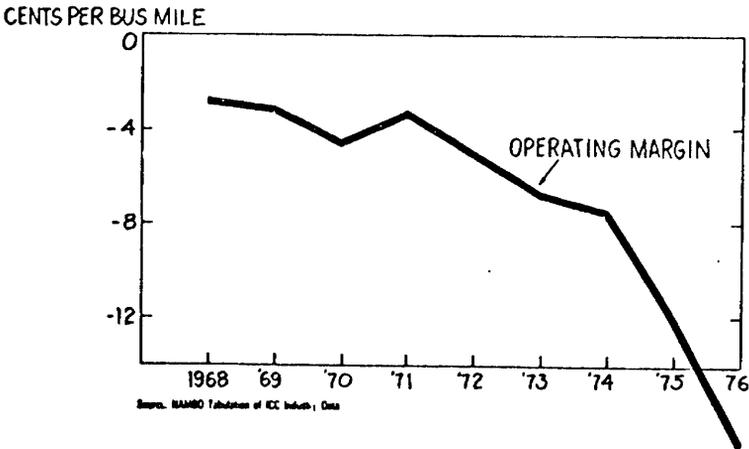


Source: Company record

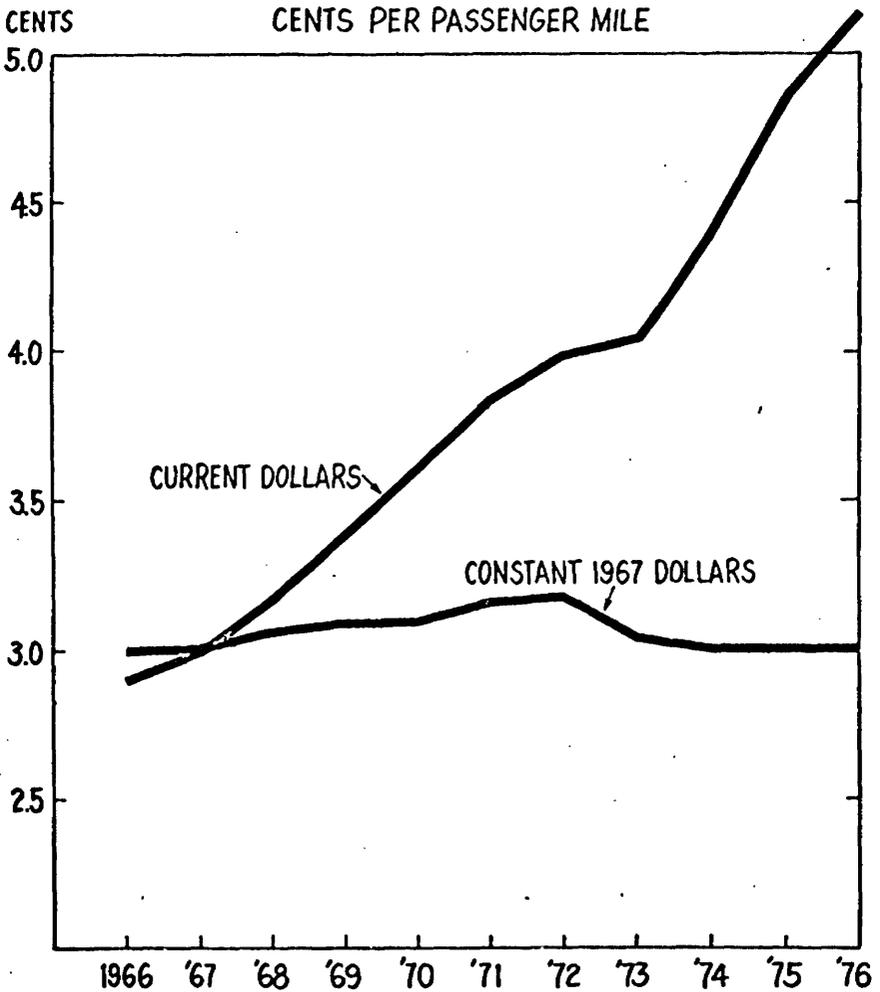
INTERCITY BUS REGULAR ROUTE SERVICE APPARENTLY IS OPERATED AT A LOSS: INTERCITY BUS REVENUES PER MILE ARE LESS THAN AVERAGE SYSTEM EXPENSES PER BUS MILE...



...THEREFORE, REGULAR ROUTE SERVICES ARE AN INCREASING DRAIN ON INDUSTRY PROFITS

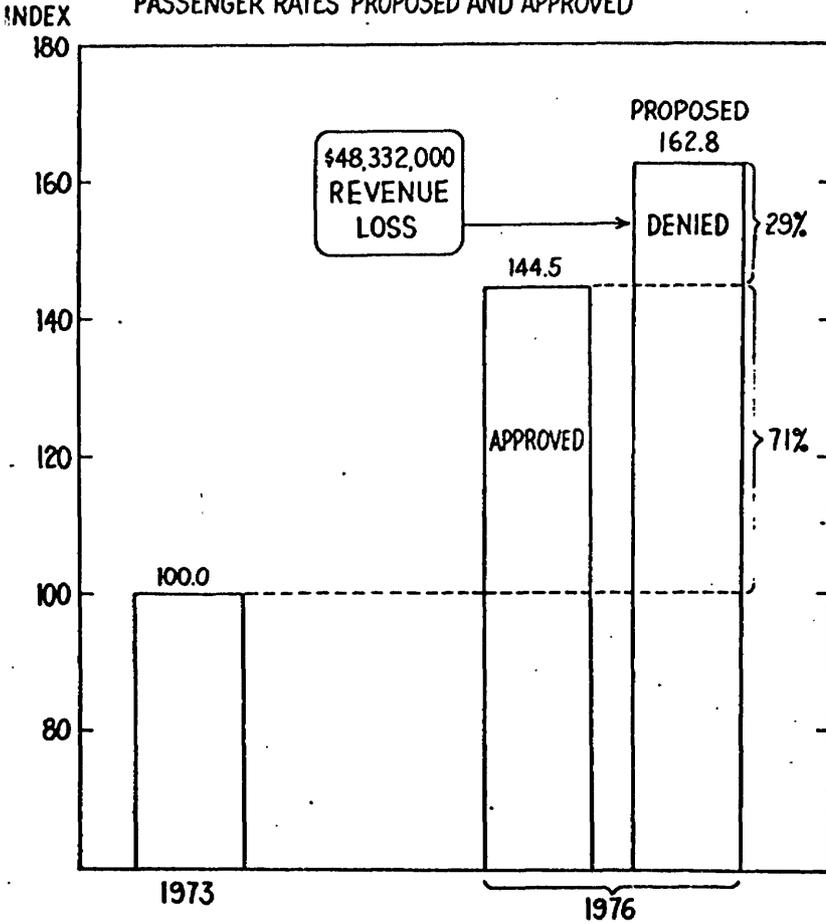


MEASURED IN TERMS OF 1967 DOLLARS
 BUS FARES HAVE NOT INCREASED
 OVER THE PAST TEN YEARS



SINCE 1973, 29% OF THE TOTAL PROPOSED RATE INCREASE HAS BEEN DENIED

INDEX OF CUMULATIVE PERCENT OF INCREASED PASSENGER RATES PROPOSED AND APPROVED



Source: 1976-77 Submission of ICC Industry Data

FEDERAL INCENTIVES TO CONSERVE ENERGY AND HELP BUS

Previous witnesses described the industry's financial plight and the outstanding fuel efficiency of intercity buses.

We believe the refundable tax credit provides an opportunity to give the industry financial relief while helping the nation divert travelers from autos to energy efficient buses.

Moreover, it is our belief that revenues generated from the crude oil and natural gas liquids equalization taxes should be used in an active way (not passively, as in the form of a rebate) as incentives to encourage energy conservation and/or increase energy efficiency. Higher costs of energy, coupled with rebates (as suggested by the Administration) to mitigate the impact of energy price increases, work at cross purposes. However, motivation to conserve or use more energy efficient products can result from allowing costs to increase on the less efficient products or services and using incentives to decrease the cost of energy efficient products or services.

Accordingly, it is in light of the above that we offer for your consideration a federal program to encourage energy conservation through increased usage of intercity bus. It is our suggestion that this is best achieved through the use of refundable tax credits.

We have developed a refundable tax credit formula that can be used by all intercity bus operators. The refundable tax credit is the product of a volume factor times a conservation factor times a revenue coefficient (see graph.)

FUEL CONSERVATION INCENTIVE FORMULA

$$\text{VOLUME FACTOR} \times \text{CONSERVATION FACTOR} \times \text{INCENTIVE FACTOR} = \text{REFUNDABLE TAX CREDIT}$$

PM Passenger Miles	x	FEC (Fuel Efficiency Coefficient) = Current bus passenger miles per gallon on an index* basis <div style="text-align: center;"><u>MINUS</u></div> AC (Auto Coefficient) = Current average auto passenger miles per gallon.	x	I \$0.0001	=	RTC
---------------------------------	---	---	---	----------------------	---	------------

$$\text{PM} \times (\text{FEC} - \text{AC}) \times \text{I} = \text{RTC}$$

Inherent in the formula are incentives for the bus operator to maximize ridership while at the same time to obtain the highest possible passenger miles per gallon. The total refundable tax credits that we are seeking is \$200 million per year.

- The use of the refundable tax credits will be earmarked as follows:
- 20 percent for terminals;
 - 30 percent for equipment; and
 - 50 percent for fare reductions.

The refundable tax credits earmarked for fare reductions will be targeted to specific segments of the population to achieve the following:

Alleviate the disproportionate burden of increased energy costs to the elderly, the poor and those on fixed incomes, consistent with the objectives of the National Energy Plan and the fifth principle thereof.

Stimulate the use of more energy efficient modes of transportation, consistent with the National Energy Plan and the sixth principle thereof.

For example, if 3 percent of intercity auto traffic were diverted to buses, over 375 million gallons of fuel would be saved annually; this approximates one day of oil imports.

The remaining 50 percent of the refundable tax credits would be used for terminals and equipment as delineated below. Through the use of these credits the country is investing in the long-term viability of the intercity bus industry. Without modern equipment and terminals, it would not be possible for the intercity bus industry to remain as a provider of essential transportation.

Twenty percent of the refundable tax credits are earmarked for new, or renovation of existing terminals. The refundable tax credits for terminals are employed as follows:

Fifty percent of these credits are directly available to the bus companies for renovation of terminals.

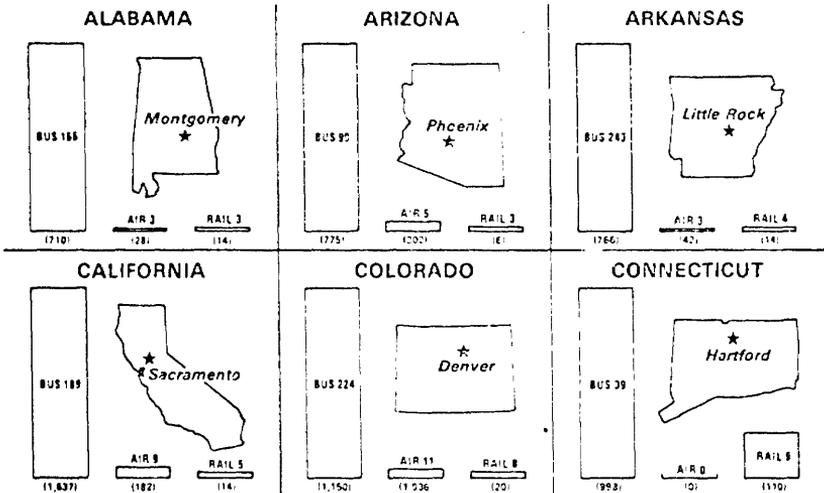
Fifty percent of these credits are paid into a Terminal Trust Fund.

Gentlemen, that briefly summarizes our proposed refundable tax credit program. To some, it addresses the tough task of solving this nation's energy problem—without inflicting undue hardships on any of our citizens. Concurrently, it provides financial relief for America's vital, but financially troubled intercity bus industry.

Thank you.

BUSES LINK MORE CITIES WITH THEIR STATE CAPITALS THAN DO RAIL OR AIR

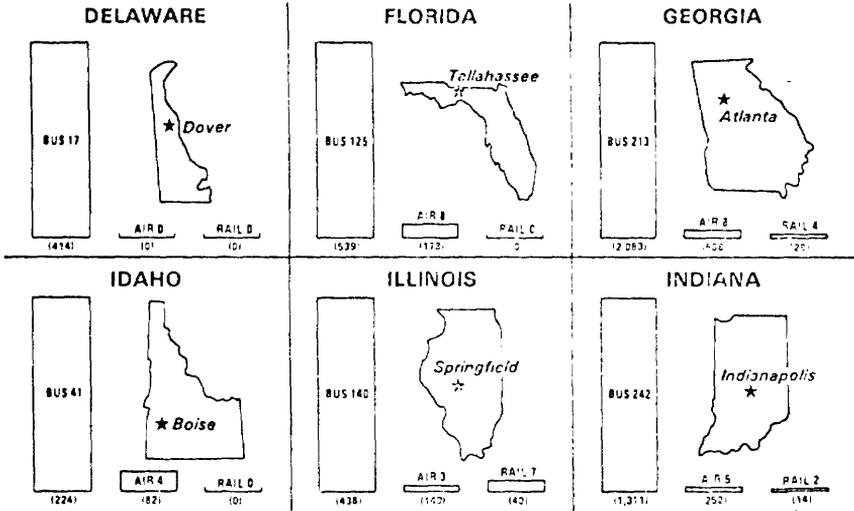
Number of Points Linked with State Capitals by Bus, Air and Rail Service
Winter 1976-77



NOTES: AIR REFERS TO CAB CERTIFICATED CARRIERS ONLY
SMALL NUMBERS BELOW BARS IN () INDICATE NUMBER OF WEEKLY ARRIVALS AND DEPARTURES AT STATE CAPITAL

CHART 23A

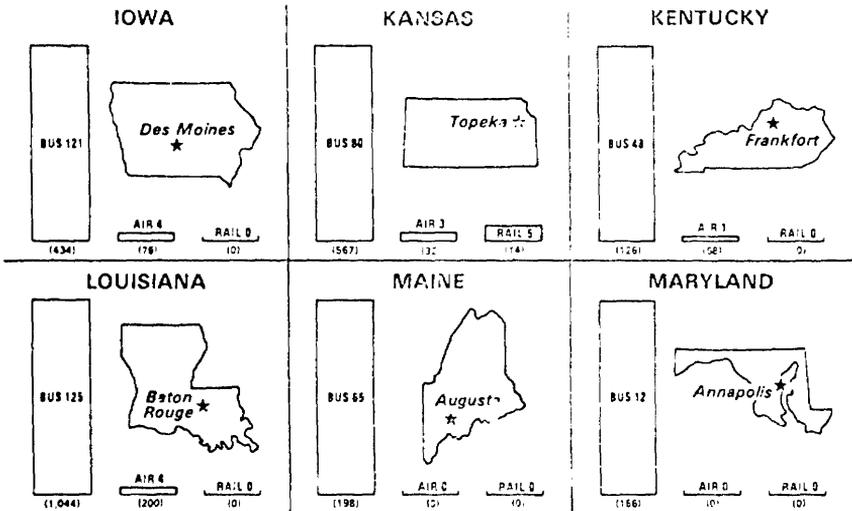
BUSES LINK MORE CITIES WITH THEIR STATE CAPITALS THAN DO RAIL OR AIR
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CHART 23B

BUSES LINK MORE CITIES WITH THEIR STATE CAPITALS THAN DO RAIL OR AIR
 Number of Points Linked with State Capitals by Bus, Air and Rail Service
 Winter 1976-77

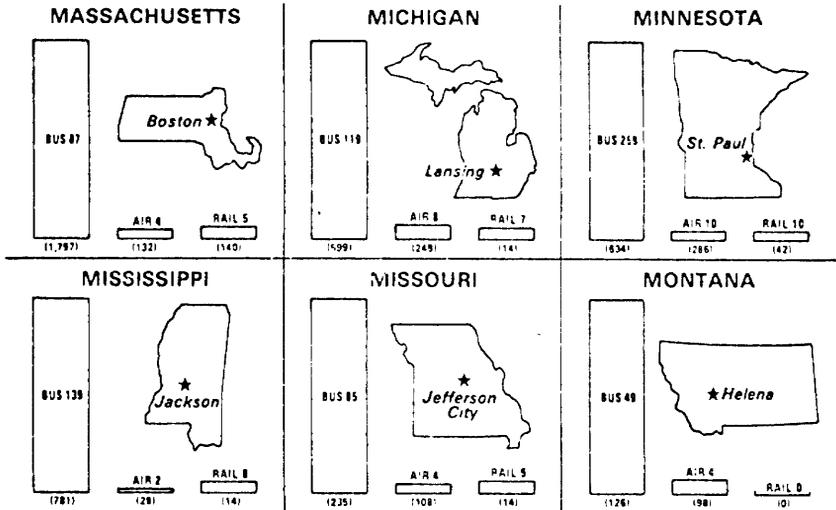


NOTES: AIR REFERS TO CAB CERTIFICATED CARRIERS ONLY
 SMALL NUMBERS BELOW BARS IN () INDICATE NUMBER OF WEEKLY ARRIVALS AND DEPARTURES AT STATE CAPITAL

CHART 23C

BUSES LINK MORE CITIES WITH THEIR STATE CAPITALS THAN DO RAIL OR AIR

Number of Points Linked with State Capitals by Bus, Air and Rail Service
Winter 1976-77

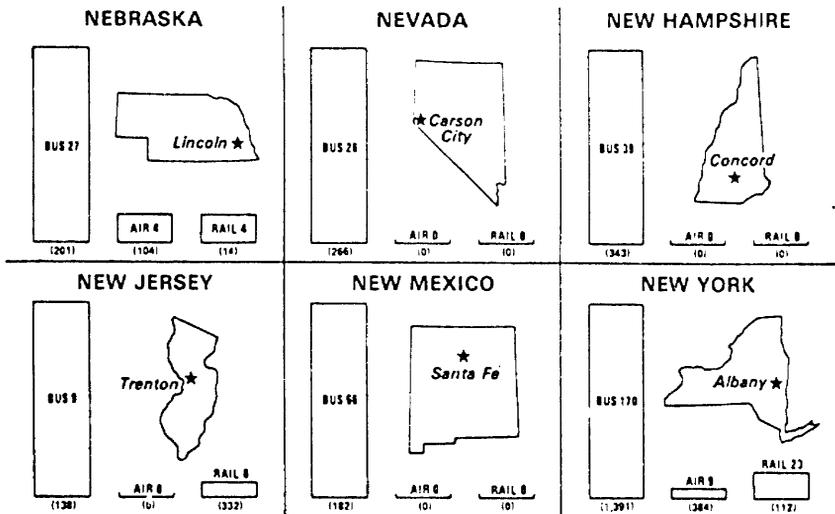


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CHART 23D

BUSES LINK MORE CITIES WITH THEIR STATE CAPITALS THAN DO RAIL OR AIR

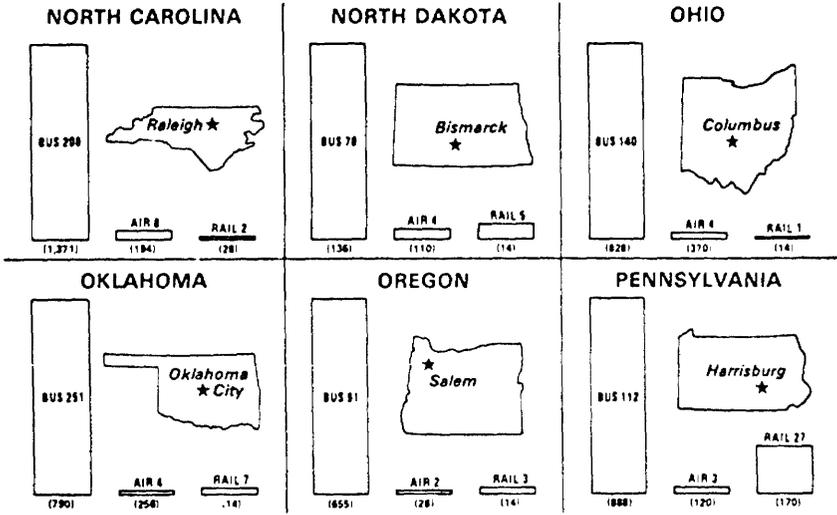
Number of Points Linked with State Capitals by Bus, Air and Rail Service
Winter 1976-77



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CHART 23E

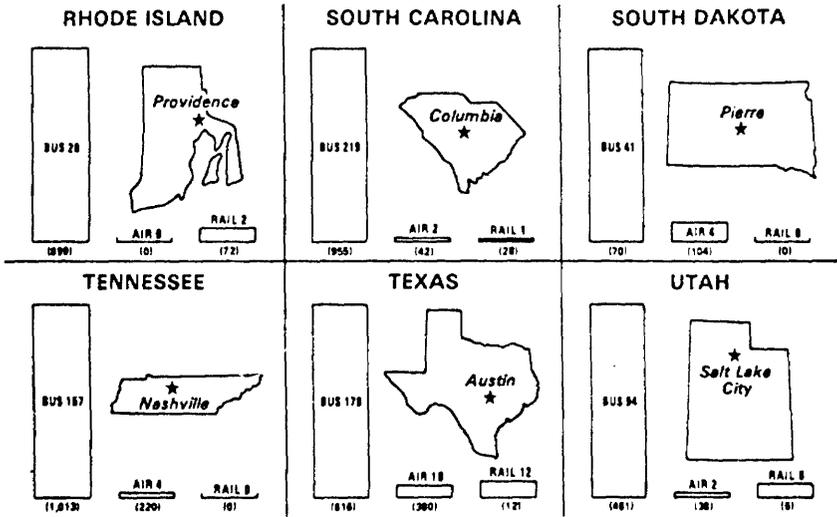
BUSES LINK MORE CITIES WITH THEIR STATE CAPITALS THAN DO RAIL OR AIR
 Number of Points Linked with State Capitals by Bus, Air and Rail Service
 Winter 1976-77



NOTES: AIR REFERS TO CAB CERTIFICATED CARRIERS ONLY.
 SMALL NUMBERS BELOW BARS IN () INDICATE NUMBER OF WEEKLY ARRIVALS AND DEPARTURES AT STATE CAPITAL.

CHART 23F

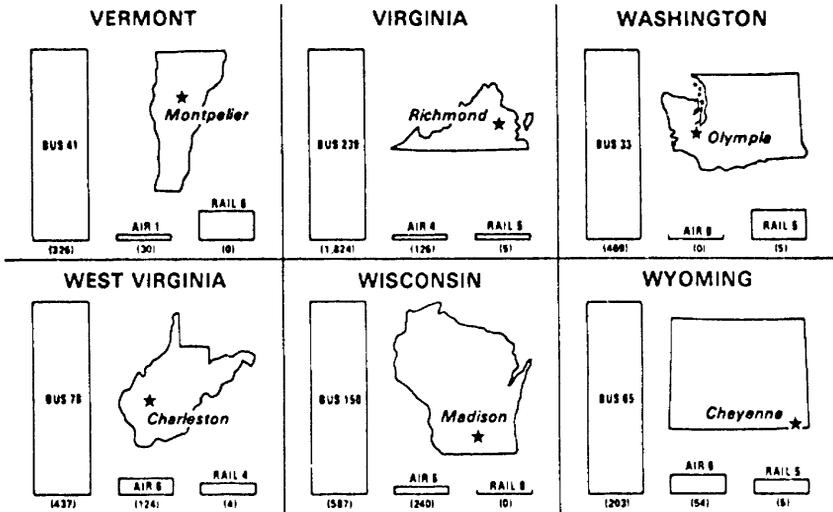
BUSES LINK MORE CITIES WITH THEIR STATE CAPITALS THAN DO RAIL OR AIR
 Number of Points Linked with State Capitals by Bus, Air and Rail Service
 Winter 1976-77



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CHART 23G

BUSES LINK MORE CITIES WITH THEIR STATE CAPITALS THAN DO RAIL OR AIR
 Number of Points Linked with State Capitals by Bus, Air and Rail Service
 Winter 1976-77



NOTES: AIR REFERS TO CAB CERTIFICATED CARRIERS ONLY
 SMALL NUMBERS BELOW BARS IN () INDICATE NUMBER OF WEEKLY ARRIVALS AND DEPARTURES AT STATE CAPITAL

CHART 23H

STATEMENT OF ARTHUR D. LEWIS ON REPEAL OF FEDERAL EXCISE TAXES ON INTERCITY BUSES

Dear Mr. Chairman: The Administration and the Congress have made clear their intention to effect a conservation of energy used in passenger transportation by stimulating a greater use of public transportation in place of the private automobile. As you know, President Carter, in his April 20, 1977 message to the Congress, supported intercity buses as a "fuel-efficient form of transportation." In addition he has authorized use of the message "Thanks for taking the bus and saving energy" over his signature.

With Administration support the House Ways and Means Committee and subsequently the Ad Hoc Energy Committee and the House of Representatives have passed the National Energy Act (H.R. 8444) which, among its provisions would repeal most of the various Federal taxes, which in 1976 amounted to \$16.6 million, paid by the intercity bus industry. These taxes include a tax on new buses (10 percent), bus parts and accessories (8 percent), diesel fuel tax (4¢ per gallon), tires, tubes, tread rubber and lubrication oils. The sole tax, which would not be repealed by the House bill, is the Federal vehicle use tax which is assessed at the rate of \$3 per hundred weight on gross vehicle weights above 26,000 pounds or approximately \$150 per intercity bus and amounts to \$1.2 million annually.

The justification for repeal of these taxes, including the Federal vehicle use tax is the relative fuel efficiency of intercity buses as compared to any other form of public or private passenger transportation.

A breakdown of the Federal Excise Taxes paid by the intercity bus industry in 1976 is as follows.

	Class 1 carriers	Entire industry (estimated)
Motor fuel and lube oil tax.....	\$5,200,000	\$6,900,000
Excise tax on purchase of new buses.....	4,900,000	6,100,000
Excise tax on purchase of parts and accessories.....	1,700,000	2,200,000
Excise tax on purchase of tires and tubes.....	1,000,000	1,300,000
Vehicle use (weight) tax.....	900,000	1,200,000
Total.....	13,700,000	17,800,000

The CHAIRMAN. Next, we will call Mr. R. G. Daniel, vice president, Atlantic Richfield, accompanied by Mr. Charles H. Brown, president of TOSCO.

STATEMENT OF R. G. DANIEL, VICE PRESIDENT, ATLANTIC RICHFIELD, ACCOMPANIED BY CHARLES H. BROWN, PRESIDENT, TOSCO RESEARCH, INC.

Mr. DANIEL. Good morning. I am Mr. Daniel, vice president of Atlantic Richfield. We have a statement that I would like to put into the record here this morning. I would like to paraphrase some of what we said.

I am vice president of the division responsible for coal and oil shale activity for Atlantic Richfield, and I might mention to Senator Curtis that we expect to start significant deliveries of coal to your State in January. We are very pleased—

Senator CURTIS. Coal?

Mr. DANIEL. Coal from Wyoming.

Atlantic Richfield has been very active in oil shale for several years now. We have spent \$75 million on oil shale R. & D. in the past 10 years. We ran a plant in the Colorado area at 1,000 tons per day for about 75 days before we shut it down, convinced we had the technology pretty well worked out, and I am here to express our views on the Energy Act concerning the tax incentive proposals that could foster the early development of oil shale in the United States.

As you know, the oil shale reserves are quite large. The first generation reserves, those that are the very best, are about 130 billion barrels, or three to four times the reserves of conventional oil in the United States.

When you add the lower quality reserves, you get into the trillion barrel range.

My company believes that oil shale technology has been proven and it is now time for commercial-sized project testing. That will be the only way that we will have a good handle on the actual costs. Until then, we simply have to work with paper studies, and field studies of pilot-sized operations.

This industry will require a long, slow process of building up since it is so large and so technical, but we do need to start now, and it would be our expectation that by the mid-90's it would be a sizable industry.

Although several hundred million dollars have been spent by dozens of companies, none has yet announced plans for commercial-sized activities. The reasons are due to the uncertainties in the economics, national energy policy, world oil price and environmental issues.

We think that the technology is ready for testing, but we expect a commercial-sized plant to cost over \$1 billion. ARCO was the operator for an oil shale group called Colony. In October of 1974, our group deferred construction of a commercial plant due to the rapid runup of cost from inflation that was experienced from the 1970-74 period.

We had plans to build a 50,000-barrel-per-day plant, but our cost estimate tripled throughout that period of time.

All of our construction plans were delayed—

The CHAIRMAN. What kind of plant was that?

Mr. DANIEL. Oil shale plant.

The CHAIRMAN. To convert shale into crude oil?

Mr. DANIEL. Yes.

Although our construction plans were delayed, we did work with the Government to complete the final studies necessary for our environmental impact statement. Our 19-volume analysis was submitted to the BLM at a cost of \$10 million.

In August 1977, the Council on Environmental Quality released their final draft. We are now free to apply for the other permits and approvals required for project development.

Our current analysis would indicate the economics of pioneer shale plants would be unattractive at present world oil prices. The project would be very expensive, and also quite risky, due to the new technology involved.

We would expect improvements from subsequent plants, however, so eventually this industry could be quite attractive.

For these reasons, we would propose an incentive that encourages creation of this industry with unusual external risks, yet allows the investment motives to function as needed. Such an incentive could be an oil shale production credit.

A copy of our proposal is attached to my statement, in detail, which would provide a \$3 per barrel tax credit for each barrel of production from U.S. oil shale. The credit would be limited to 50 percent of the taxpayer's liability after deductions for foreign tax credit and the investment tax credit.

Any excess credit that results from this limitation may be used by applying it against taxes of other years by carrying the excess back 3 years or forward 7 years. The credit is only applicable to the production of oil shale deposits located in the United States.

We envision the production credit to be applicable to the first few pioneer oil shale plants and for the expected life of the plant.

I feel that if the oil shale production credit is adopted, the climate necessary to attract investors will exist, and a commercial oil shale industry could get off the ground. I believe that Atlantic Richfield would be willing to participate in an early oil shale plant under this program.

Since the costs and risks would be so great, we would be reluctant to build a plant alone. Therefore, the project would require several—three or more—participants to share the risks.

As our dependence on imported oil continues to dramatically increase, the requirement to develop this Nation's realistic energy resources becomes paramount. Oil shale's potential to augment liquid fuel production should be determined now.

The oil shale production tax credit should provide the incentive to initiate shale oil production. The benefits to be derived from a commercial synthetic fuel program, for early oil shale projects are substantial. The magnitude of shale oil reserves justifies a near-term commercial-scale production program so that the Nation can move more quickly toward appreciable production of oil shale.

Thank you.

The CHAIRMAN. Someone tells me that if we are going to develop shale, the problem will be finding enough water. They say it takes about seven barrels of water to one barrel of petroleum which you produce. Then I am told there is another process, apparently Occidental seems to be interested in it, where you can do it a somewhat different way where it does not require that amount of water.

Can you help us on that?

Mr. DANIEL. Our analysis would indicate it would take three barrels of water for each barrel of oil produced from oil shale. We have done quite a bit of work on the water flow down the Colorado, as have several Government agencies, and we see the indications that there is enough water to foster a sizable shale industry.

I noticed a figure awhile back which said that the water available for the development of industry in the area after agriculture and the historic needs are met, would be equal to the water necessary if it were all used on oil shale at 4.5 million barrels a day.

We think the industry would be in the 1 to 2 million barrels a day range, so we think there is adequate water from the Colorado.

In addition, there are underground saline waters that can be used also, so that between the two, we think there is adequate water.

The CHAIRMAN. Let us say you produce $1\frac{1}{2}$ million barrels a day. What would you estimate to be the energy needs of the country at that point?

Mr. DANIEL. About 25 to 30 million barrels a day in 1985.

The CHAIRMAN. You would be—

Mr. DANIEL. 10 percent.

The CHAIRMAN. You would hope maybe to produce up to between 5 and 10 percent of our energy needs?

Mr. DANIEL. Yes, or 30 percent of imports. Each domestic shale oil barrel would replace an imported barrel.

The CHAIRMAN. Someone tells me that Occidental is advocating a different oil shale process. Has it been tried, or do you think it can be done? What is your attitude toward that process?

Mr. DANIEL. You will have to understand, we have not worked directly on this process, although we have in the past done research and field pilot work on in situ technology just as Occidental is continuing to pursue.

It became our conclusion that our process—the surface mining process—was more attractive. It indicated a better chance of success, so that was the way we decided to go several years back.

I would not suggest that Occidental's process not also be supported. We think that there is opportunity for two or three technologies to work out, and the reserves are so vast that they should all be given an opportunity.

The CHAIRMAN. What is your guess about whether their process works? Does it sound as though it may be feasible? What is your thought about it at this moment?

Mr. DANIEL. My thought about it would be, any of the three or four technologies being worked on could work, and the chances are 20 to 30 percent on each, so let's try them all.

The CHAIRMAN. Do you not think you should explore each one of them and see which one works out the best?

Mr. DANIEL. Right.

Mr. BROWN. The water question, as far as surface retorting and in situ retorting, are two different questions. If the surface retorting uses more water, there is also the question about the effects of in situ retorting on the underground water supply and what it will do to the surface water.

So, in one case, it might be a question of water supply; in the other, it might be a question of water pollution.

Mr. DANIEL. That is very true. That was one of our chief concerns—an inability to control what was going on underground, in in situ technology. Again, I would say that the national interests would be best served by providing incentives for each of the technologies to hopefully get one or more of them to work.

But if the United States puts all its eggs in one basket and fails, we have lost a lot of time.

The CHAIRMAN. Most of this shale is located on Government land, I am told. Is that correct?

Mr. DANIEL. That is true.

The CHAIRMAN. I am also told that the potential amount of energy in that shale exceeds the amount of oil that the Arabs have in the Near East.

Mr. DANIEL. That is true.

The CHAIRMAN. We are talking about a fantastic national resource, and we are doing practically nothing to develop it.

Mr. DANIEL. That is correct.

The CHAIRMAN. If this resource could be properly developed, it could conceivably solve the whole energy problem. Is that correct?

Mr. DANIEL. Correct.

The CHAIRMAN. It could solve the problem for hundreds of years to come. To me, it is absolutely inexcusable that we are piddling around with oil shale when we ought to be going all out with a process whose technology appears to be feasible.

You are telling me that a subsidy of \$3 a barrel could bring on this supply of energy, if I understand you correctly?

Mr. DANIEL. I am going further than that, Senator, in saying a \$3 incentive program can get people across this threshold and get us working on the technology, get more effort on it. Let me give you an example.

We worked very hard, myself included, on tar sands in Canada. I recall in the very early period, the tooth life on the bucket wheel miner that the tar sand people used was 5 hours; 3 years later, it was 2,000 hours. You begin to break through some of these things and get it into a viably commercial operation. Then you do not need this sort of program anymore.

We are saving, turn it on. See what industry will do, and turn it off when it is not working, or it works so well you do not need it anymore.

The CHAIRMAN. What you are saying, it is a technology to develop when once you get into production. To me, it could be illustrated by my experience with my swimming pool.

In order to clean the junk off the bottom of that pool, you have to shut down everything. Then you hook up a vacuum arrangement and you suck the water off the bottom and through the filter system. Then you would shut everything down again and take the trap up and take

the junk out of the trap. Then you put it back on and you shut it back off and take all your connections away, and hopefully you get all the air outside of the system. By the time you get through with that, you have managed to get some leaves off the bottom.

Some fellow just came along with a new invention. He just took a garden hose and a little net. You just put the device on the bottom of the pool, connected to a little garden hose. The water blows everything into the net, and then it comes off the bottom, with about 1 percent all the trouble and bother and mechanization that it takes to do that, with the cleaning method that we had before.

Those type of improvements are possible when you are working with something on a day-to-day basis. Engineers continue to work on the process. Even the workmen, I should think, would come up with new ideas.

Mr. DANIEL. That is right.

The CHAIRMAN. I would think anybody—just the garage mechanic, even a fellow who had not done a thing but piddle around the house—could have thought of that, which appears to be the easy answer to the problem.

If you are not working with the process, you are not going to come up with the solution.

Mr. DANIEL. That is true.

The CHAIRMAN. Thank you very much, gentlemen.

Senator CURTIS?

Senator CURTIS. I am very much interested in what you have said here. Along the line of the illustration of the chairman, we have won the case in the development of rubber.

In World War II, all of a sudden our supplies of natural rubber were cut off. President Roosevelt appointed a distinguished Nebraskan, president of the Union Pacific Railroad, to be the rubber czar. He told him to make rubber.

The first synthetic rubber that was produced was of such high cost, it would be a scandal, but in a matter of a few short months and years, it not only was greatly reduced, but it became competitive with natural rubber, and practically has driven it from the American scene.

Most tires, and everything else now, are made of synthetic rubber.

Mr. DANIEL. I think that is a very good analogy.

Senator CURTIS. Research programs of the government are very important. There is no question about that. But we do reach a point where we are wasting money just going on and on researching and putting it on the shelf and do not go through the trial and error period of development.

Do you agree with that?

Mr. DANIEL. We agree with you that is the next step with oil shale, to get out there and get some of them going.

Senator CURTIS. Where is most of this oil shale located?

Mr. DANIEL. The best reserves are in Colorado. There are also reserves in Wyoming and Utah.

Senator CURTIS. Let me ask you something about petroleum and natural gas, not from shale, but otherwise.

How much of the surface of the United States has been actually explored for oil and gas—5, 10, or 3 percent?

Mr. DANIEL. Well, if you include Alaska, it would be smaller. I would have to answer you this way, Senator.

The bulk of the attractive sedimentary basins have been explored onshore in the United States. There are certainly still opportunities with depth. As the price goes up, as technology allows us to drill deeper, you can explore further through research on recoveries of third generation or tertiary recoveries from existing reservoirs.

Offshore has not been explored quite to this extent.

Senator CURTIS. Onshore. My question is not a theoretical thing as to where the basins are, but if you break the land down into 40-acre tracts, is it not true that over 95 percent of the surface of our country has not been drilled for gas or oil?

Mr. DANIEL. That is true, but a higher percentage of that that is attractive to our geologists has been explored onshore.

Senator CURTIS. I understand that, but is it not the history of the oil companies such that when the wildcatters and the others have gone out and searched, they brought in a lot of surprises?

Mr. DANIEL. Yes.

Senator CURTIS. Is there any reason to think that those surprises are all over?

Mr. DANIEL. They are not. Clearly, they are not.

Senator CURTIS. I am quite disturbed when I hear high officials in Government with assurance and positive positions say our reserves are x amount. It is to a substantial degree based upon the past and the unknown. Is that not right?

Mr. DANIEL. Yes. You never really know until you drill.

Senator CURTIS. As to the supply of water, the earth's supply of water never diminishes, does it?

Mr. DANIEL. That is really not a field that I can speak to.

Mr. BROWN. I think you are right.

Senator CURTIS. I have asked some very good authorities on that. The Earth's supply of water is never diminished; you cannot destroy it.

Of course, there are spots where too many people live in one place, but that is their fault. There is nothing wrong with creation. The Creator did not shortchange anybody.

The CHAIRMAN. He gave us enough of it to cover two-thirds of the Earth's surface.

Mr. BROWN. May I interject here?

When we speak of the limitations of water on future supplies of oil shale, we are talking about the water in place near where the deposits are. When you look at a pipeline map now of the United States, how we transfer oil and gas over across country, we could transport a lot of water to where the oil shale deposits are if the price of OPEC oil goes in the 1990's to the levels that we anticipate it is going to go. You could move a lot of water.

Senator CURTIS. Do you not believe that this country is determined to meet the situation; otherwise, we have to be dependent on OPEC oil in 1990?

Mr. BROWN. I hope that we are not going to be dependent.

Senator CURTIS. I think that if we turn to the people who are knowledgeable in the energy field, that that could be done. I think that

our program is being sponsored by an office where there is not anybody in it drawn from the energy field with practical knowledge.

That is all, Mr. Chairman.

The CHAIRMAN. Senator Talmadge?

Senator TALMADGE. Thank you very much, Mr. Chairman.

You made almost an identical suggestion to the one that I made to Secretary Blumenthal when he testified to this committee in August.

Mr. DANIEL. We commend you for it.

Senator TALMADGE. At that time Secretary Schlesinger testified the first day and Secretary Blumenthal the second day. Secretary Schlesinger stated that Occidental Petroleum stated that they could produce petroleum shale rock at a cost of \$12 per barrel.

The next day, Secretary Blumenthal testified that we are importing \$42 billion worth of petroleum a year in the country now. I asked Secretary Schlesinger the day before what he thought it would cost to produce a barrel of oil. I think his own estimate was \$18 to \$20.

I did a little computation there. With the importation of energy at 7 million barrels a day, a subsidy of \$5 a barrel—that would be \$35 million a day? So if you Government-subsidized production of shale rock to the extent of \$12.5 billion, we could not only break OPEC and make ourselves independent of their cartel, but we could save \$42 billion in the importation of energy.

That thought seemed to make sense to me, and you have reinforced the fact that I had.

How long would it take, and at what cost, to get enough plants in operation to produce 7 million barrels of petroleum from shale rock a day?

Mr. DANIEL. Our studies would indicate, as I mentioned earlier, that the shale industry would be in the 1 and 2 million barrels a day range by the late 1990's. I also mentioned that this is a slow, tough technology; that we are disturbed that we have not already gotten underway, because the reserves are so immense.

So I guess to set as an objective 6 to 7 million barrels a day shale industry should not be expected before 2010 or so, to keep it realistic.

Senator TALMADGE. Why? Why should we not make the same effort that we did, as Senator Curtis pointed out a moment ago, to make artificial rubber during World War II? Why should we not make the same effort as developing the atomic bomb?

Do you not think it is that important?

Mr. DANIEL. That is a good point. I am a little out of my field, but I do know that the capital costs would be significant. It is a matter of how we want to set our priorities.

I think that 1 or 2 million barrels a day is very significant.

Senator TALMADGE. How many plants would we have to have to produce 1 or 2 million barrels a day?

Mr. DANIEL. Fifteen.

Senator TALMADGE. Fifteen different plants at 15 different locations?

Mr. DANIEL. Yes. Our thought is that we would start with a 50,000-barrel-a-day plant and get up to 100,000- then 200,000-barrel-a-day plant, and stay in that range.

Senator TALMADGE. Start with the small plant and expand the existing plant as you know how and as expertise is increased?

Mr. DANIEL. That is true.

Senator TALMADGE. You testified there is adequate water available?

Mr. DANIEL. Yes.

Senator TALMADGE. You mentioned that saline water was available?

Mr. DANIEL. That is true.

Senator TALMADGE. Saline water cannot be used for agricultural purposes, can it?

Mr. DANIEL. Except by cleaning it up, of course.

Senator TALMADGE. It could be for the production of shale rock?

Mr. DANIEL. Yes. The biggest water consumer in oil shale operations is wetting the spent shale, and you can use saline water for that.

Senator TALMADGE. As I understand it in your testimony, and I have read both of your statements here, a \$3 tax credit on shale rock is what you are asking?

Mr. DANIEL. Yes.

Senator TALMADGE. That is all you are asking? You do not want any Government money?

Mr. DANIEL. No.

Senator TALMADGE. If you do not produce the petroleum from the shale rock, the Government would lose nothing?

Mr. DANIEL. That is correct.

Senator TALMADGE. If you do produce petroleum from shale rock, the Government, by spending \$3 per barrel of tax revenues, would save \$13 to \$14 per barrel on imported energy from the OPEC countries at the present time. Is that not correct?

Mr. DANIEL. That is correct, plus you plant the seeds for this industry and even save \$3 in the long run. That would be our expectation.

Senator TALMADGE. With an expenditure of 20 cents on the dollar, we would save \$1 that we are losing for expenditures of OPEC?

Mr. DANIEL. That is correct.

Mr. BROWN. Plus the fact, Senator, that you are creating real tax-generating facilities. Each one of these plants will generate an awful lot of corporate tax revenue.

Senator TALMADGE. Not only corporate tax revenues, but you create jobs in this country.

Mr. DANIEL. That is right; exactly.

Senator CURTIS. Would you yield right there?

Senator TALMADGE. I yield.

Senator CURTIS. Is it not true that a growing economy and full employment is based upon the use of energy, not the nonuse of energy. Is that not correct?

Mr. DANIEL. Yes.

Senator CURTIS. That is why it seems to me that this program that has been put before us, based entirely on conservation, is so ridiculous. It is a blueprint for a stagnant economy.

Thank you.

Senator TALMADGE. Is it your testimony that if we spent \$3 a barrel with a tax credit for pioneer oil plants it would cost the Government about \$200 million a year and conventional financing of \$3 to \$5 billion of shale oil development would be forthcoming?

Mr. DANIEL. We think so. Atlantic Richfield thinks that that is adequate encouragement to get industry started.

Senator TALMADGE. It seems to me that this problem is so serious that we must utilize every resource that Government has, making

our country independent of imported energy at the earliest possible day, and certainly you gentlemen make a very strong case. With the tax credit, if you did not deliver, it would not cost the Government anything. If you did deliver, we would have petroleum, we would have the tax base, and we would have jobs.

I certainly am going to support it wholeheartedly. I hope the Finance Committee and the Senate will do likewise.

Mr. DANIEL. Thank you, Senator.

The CHAIRMAN. Senator Dole?

Senator DOLE. Thank you.

I have read the statement hurriedly. I have listened to Senator Talmadge. I certainly agree with his line of questioning. It sounds too logical to be accepted by the Senate, so I guess you will have to come up with something else that does not make so much sense.

First of all, how did you arrive at the \$3? You may have explained that earlier.

Mr. DANIEL. Well, as you might well imagine, we have done an awful lot of work on the economic analysis of oil shale over the years, and you might also find it not surprising that it has been awfully hard to keep the numbers current with our inflation experiences.

We have very substantial investigations on mining costs, upgrading costs of raw shale once you get it out of the rock, disposal costs of spent shale, environmental requirements.

If, when you piece it all together and put it into our economic analysis, we see world prices are so short of what it takes to get management to put the funds required into this venture, a \$1 billion project, new technology, it is just more than even a company the size of Atlantic Richfield could stand.

As I said in our statement, we would even then need partners in the thing, so we would try to find some other companies to go with us.

We think that a \$3 incentive program can make the thing fit together, that our management would push very hard to get one underway.

Senator DOLE. I am just wondering—I have not seen any language—would the \$3 credit be a fixed credit that would never change, or would there be an indexing or some other formula where it could go up or down?

Mr. BROWN. Senator, it is our belief that the \$3 is necessary only for the first few pioneer plants because of the unusual expenses attached to pioneer plants. We believe that the technology will advance and the economics will improve as we work with the resource, and we think that the \$3 for a limited number of plants that get under construction before 1981, that that is all the tax credit that would be necessary. That is our belief.

Senator DOLE. You would limit it to those plants which were under construction by some cutoff date?

Mr. BROWN. Yes.

Mr. DANIEL. I would want to be sure you understand that it be for the life of those pioneer plants.

Senator DOLE. In order to hold out the incentive to get into the business, as Senator Talmadge was saying, we should not wait until the year 2010. That is another purpose of the tax credit, I assume.

Mr. BROWN. That is to expedite the construction of the early plants.

Mr. DANIEL. I think the Senator also makes a point when he observes that this \$3 is only due if the industry gets results.

Senator DOLE. There is pretty good evidence you will get results?

Mr. DANIEL. We certainly think so.

Senator DOLE. Not a total gamble?

Mr. BROWN. No. We think we can produce shale oil. We produced it in some of our plants, and we think that the first plants will have difficulty in getting started, that there will be cost overruns on these first plants.

Senator DOLE. What about the Colony plant? Is that going to cost \$1 billion?

Mr. DANIEL. Yes. In today dollars. It will be more with inflation, when we actually get it all constructed.

Senator DOLE. How many more forms do you have to fill out? Do you think you will ever get a permit?

Mr. DANIEL. As I mentioned in my statement, we had a 19-volume submittal of just raw data for the environmental impact statement. There will be an awful lot more paper created for permits before it is developed.

Senator DOLE. Do you plan to go ahead with that operation whether or not we do anything as far as the tax credit?

Mr. DANIEL. I think, on behalf of Atlantic Richfield, I can say most likely not. The economics just are not that good.

Mr. BROWN. Senator, we at TOSCO have, in the last 3 years, talked with 40 or 50 prospective participants in an oil shale venture. That includes oil companies, steel companies, farm co-ops, investment bankers, banks, insurance companies.

The economics are very close. It is this mystery of these firsts—the first plant, really; how long will it take to get it on full steam? What will be the cost overrun? What are the environmental hangups?

If there were just some little carrot out there to get this first, or the first three or four built, I would think this industry would demonstrate that this is very feasible, that some of the environmentalists are worrying about things that are not going to happen.

If we just show what the effects are, I think that this industry can mushroom.

Senator DOLE. Will there be some way—of course, it is a tax expenditure—to assure that the money would go into expansion of the industry rather than what some might term as a windfall profit?

Mr. BROWN. In this new industry, I do not see how it could be a windfall profit. I think that we are much more worried about covering the cost in those first few years.

The CHAIRMAN. If I might object, it just seems to me to talk about this proposal as being a windfall is like saying that Dr. Jonas Salk made a windfall profit when he came up with the vaccine for polio. I do not think I am at variance with the Senator from Kansas at all. It seems to me that some of the potential of good for the country in this area is so tremendous that it might be heresy on the Senate floor among our liberal friends, but one ought to hope somebody would make a profit on something like this.

Senator DOLE. That is the very thing I am anticipating of what might be said on the Senate floor. If there is some way to soften the blow, that all you have to do is mention the industry and you already

have a big handicap, then associate some of us with it and it makes it even a bigger handicap.

The problem is real. We think there might be some solutions, if we could apply some logic, where nobody would be making any windfall, excess or obscene profit. Where we could develop this new source.

Mr. DANIEL. From what I know about it, I do not think there is much danger of that happening. We worked very hard in tar sands, as you might recall, and finally gave up. The costs went up double within the first year after we started construction, and now it is triple.

We think that we have got oil shale in a little better shape. But when you are doing something new, it is awfully risky.

Senator DOLE. I think the \$3 tax credit may prevent any overdrafts.

Mr. DANIEL. That is more likely.

Senator DOLE. Thank you.

The CHAIRMAN. Let me explore one matter with you. Here is a statement, and I ask that this be included in the record,¹ of Charles H. Brown, TOSCO Research; he supports what you are advocating.

He says that for the relatively small amount of tax credit that you are asking for, the Federal Government could spur private investment of \$5 billion in this new industry. He thinks three or four plants might be under construction by 1980.

I find myself thinking of the proposal that former Vice President Nelson Rockefeller suggested when he was Vice President. He said that the Government could make loans, guarantee loans, or whatever it takes, up to \$100 billion in putting money into getting these energy projects done.

His approach was to use the free enterprise system entirely. Basically I guess the Government would say, "make us a proposition, and the Government can put the money up. The Government will lend you the money, or you can set up a subsidiary corporation to limit your corporate liability, or put in whatever provisions you think you ought to put in, and make us a proposition."

If we are going to do something like that—and I have a lot of interest in that type of proposal—it seems to me as though we should think in terms of urgency. Why could we not go to work building a plant now, before the year is out, and hope that in 1978 we could build it? Why can we not do that?

Mr. DANIEL. We have to have permits.

The CHAIRMAN. Why could we not get the permits? We are in the law-making business. Why could you not tell us whatever it takes in the way of permits and let us provide for the permit right in this legislation?

That is how we got the Alaska pipeline going. We just approved an environmental survey that had been made as offered by the Senator from Alaska; we voted for it. A committee opposed it—not this committee, but the Energy Committee—opposed it. We just voted it in. That way, we were able to start construction of the pipeline.

Why could we not just give you legislative authority to go ahead and do business, to go ahead and put a plant in operation?

If we did that, could you do it next year?

Mr. DANIEL. Yes. We can physically go to work. We have our engineering in good shape. We have all our basic designs ready.

¹ See p. 980.

The CHAIRMAN. For example, somebody tells me that there is nobody in Mr. Schlesinger's office that knows anything about oil and gas production. There are experts in environmental issues slowing down activity and waiting until next year, maybe until 1990 to get things underway. Most of the bills passed before the energy crisis were suggested by the environmentalists to slow things down. The little old ladies in tennis shoes represented by long-haired lawyers could go to court and hold everything up from now to the year 2000 and give them additional standing to sue and pay for the judges, or pay for the lawyers, lawsuits to help see that nothing ever happens.

That is what most of the legislation has done, with the exception of the Gravel amendment to move forward on the Alaskan pipeline, which was bitterly opposed by the committee at the time. That is the only thing that has been done at all to move things forward. All the rest of recent legislation looks to me to be "thou shalt not drill in the Atlantic until you have satisfied the environmentalists. Thou shalt not make a profit. Thou shalt not do anything that would help solve the problem." The recent laws would ease the pain while the situation gets worse by rationalizing and things like that, but nothing to save energy.

If this committee sees it your way, why can we not go ahead and have the Government guarantee a loan, or actually make a loan, to someone to do the kind of thing that you are advocating?

How much money would it take to go ahead and build your plant if we get all the good-will people out of the way who would like to keep us from producing energy and just let the energy producers have their day in court? How long would it take you to build the plant?

Mr. DANIEL. Three years of construction time, 1½ years to marshal forces to get in the field and get underway—\$1 billion for a 50,000-barrel-per-day plant.

The CHAIRMAN. You think it would take \$1 billion and 5 years?

Mr. BROWN. That is right.

The CHAIRMAN. According to this statement, prepared by your colleague who supports your position, if we do what you are advocating that you might have the construction underway by 1980. It would save 2 years if we just do that, I take it.

Mr. BROWN. Senator, what I meant was that the first plant, let us say, would probably be the Colony plant. It is the farthest advanced and has an environmental impact statement already.

The other two or three plants that I call pioneer plants, with other technologies, other companies would probably build these as fast as they could, but would probably get construction underway in the next 2 or 3 years. That is what I was driving at.

I believe that it could be done with a \$3 tax credit. The loan business gets into another field.

It has been our experience that where a government guarantees loans or makes direct loans, that it is not just the banking analysis or just the financing analysis that goes along with it. The environmentalists get into the picture. The technologists get a new picture. They want to tell you whether to build a 5,000-ton-a-day plant or a 10,000-ton-a-day plant instead of a 50,000-ton-a-day plant.

I think that we are far enough along, we are very close to being, you know, ready for conventional financing. And \$3 would probably

trigger it, we think, and if it could be done without all of this other reanalysis and restudy and everything, I think it would be wonderful.

The CHAIRMAN. The President is an environmentalist. He is very proud about that.

It seems to me that we ought to get to the action stage and maybe bypass all these in-between people and have no bureaucracy in between to look at it. A proposal would just go directly to the President's desk, and he would have 2 weeks to say either yes or no. No court would have jurisdiction to get involved. We are not going to pay for lawyers for either side. That being the case, the President could take the responsibility for it, and we would either do something or not do something.

When the President gets ready to run for office 3 years from now, he can tell people that no energy projects went forward because proposals stayed on his desk, or he can tell people that something did happen because he signed the go-ahead. If he wants to hold it up, he can tell people what the prior steps are. But when we decide to do it, we should go ahead and get on with it. We have got to find some way to expedite some energy solutions.

Mr. BROWN. That is right.

Mr. DANIEL. Let me give you the benefits of some thought that I have had here the last few months.

We think that a loan program could create delays where a \$3-per-barrel incentive program could speed things up. When you have a loan program, you do not take the loan and do your business. You get an awful lot of help.

The CHAIRMAN. You receive a lot of unsought advice.

Mr. DANIEL. You also have the problem as Government of deciding who to let have the loans and who not to let have the loans, where if you throw a \$3 carrot in front of people, then the guys that have the technology and the courage, they step forward and try to do something.

Senator CURTIS. The Government has no obligation unless it succeeds; is that right?

Mr. DANIEL. That is right.

So you do not put yourself in the position of trying to decide between various advocates, but you just hang the carrot up there and let them deliver, if they are serious.

The CHAIRMAN. I am not opposed to that. It is all right with me.

It seems to me that just in case that does not get the job done, we had better have some other provisions available to move it along, too.

Mr. DANIEL. Well, \$3 is not magic. If you throw the \$3 out there and nothing happens for 6 months, if you want to get it going, you come back with \$4. I think that the incentive is certainly valid, and we are saying that our analysis would indicate \$3 will do it.

We may be wrong, but we think that that is going to be adequate.

The CHAIRMAN. It seems to me if we are going to try to provide incentives in this bill, we ought to try to do enough. It will be tough enough to pass this bill the way it is. If, after we get through with all of this legislation and nothing happens, I for one will be very disappointed. It seems to me we had better be on the safe side. I would rather provide too much incentive rather than too little to try to get some production; do you think \$3 is enough?

Mr. BROWN. We do.

Mr. DANIEL. Yes.

The CHAIRMAN. Senator Moynihan?

Senator MOYNIHAN. Excuse me for coming in late.

Do you mean \$3 on top of the now-existing price of oil, or do you mean a \$3 ride on future prices as well?

Mr. DANIEL. The latter, Senator.

Senator MOYNIHAN. You want to have \$3 ahead of market price for some period?

Mr. DANIEL. Yes.

Senator MOYNIHAN. You are not talking about some fixed price which is economical to you now?

Mr. DANIEL. No; the costs keep going up.

Mr. BROWN. This is a tremendous front-end investment facility. Our cost studies over the past 10 years indicate that the cost of the plant, which is already in excess of \$1 billion, keeps going up every year with inflation.

Senator MOYNIHAN. I would simply like to associate myself with the chairman's feeling about the problems in production. Thank you.

The CHAIRMAN. I understand that Mr. Peterson, who served as Secretary of Commerce for a while, testified before the Energy Finance Subcommittee in favor of a \$3 subsidy for various quantities of new energy production, and to throw it open to competitive bidding. How does that sound to you? Can you do better than that, simply to bid for how much new energy you would like to provide on that basis?

Mr. DANIEL. It sounds to me as though delays could come from such an arrangement. What I mean from that, Atlantic Richfield is going to have a tough job with the \$3 program putting together a group, and if you get bidding going on, I just wonder how much delay that would create.

Frankly, I feel if you threw a \$3 program into the regulations, you are not going to have a stampede. You will have a few cautious folks step forward and you can always turn it off.

I would guess that the very most you would see would be three or four plants. I think it would be in the material interest if it were six or eight plants, but surely no more than that.

The CHAIRMAN. Thank you very much, gentlemen. I have one further question.

What you are talking about is something that ought to be done. You are telling me your company does not have enough money to do it.

The President of the United States has the impression that there is plenty of money in the oil and gas industry, and Mr. Schlesinger testified here that the industry is awash with capital, that there is no problem about money, but there is plenty of money to do all of this.

My impression, from the best I can make of it, talking to business people, is that he got that impression from talking to one of the executive officers, chairman or president, or your company. I understand that the president or chairman of your company told the President that there is no shortage of capital in the oil industry. That is where the White House and the Secretary of Energy got the impression that the industry is awash with money. And yet you are saying you do not have enough to embark on this program.

That is true even if you get three other companies or two other companies to come into a joint venture with you—is that correct, or not? Does the industry have plenty of dough?

Mr. DANIEL. I would make two points. One, this was mentioned to me, that we had been quoted as having said that and we failed to find where that happened.

The CHAIRMAN. Would you check it out with the chairman of your board and the president of your company and see if that is where the President got that impression—if one of those men said that there is no shortage of money in the oil industry? The President apparently had that impression, and so did the Secretary for Energy. I am under the impression that they gained it from either the chairman or president of your company.

Mr. DANIEL. I would be happy to try to check that out, but—

The CHAIRMAN. My impression is that the President of the United States and the Secretary of Energy, based on what he told me personally, think that the money is just all over the place, that you are just awash with money.

If that is correct, I would like to know about it. I would like to know where they got that idea.

Mr. DANIEL. I know for the past 2 or 3 years our financial department has been scrambling madly just trying to pay our bills on the North Slope. I doubt that was said by our president.

The CHAIRMAN. Would you help, please, to find out? Sometimes people misunderstand. I think it is the president of your company that made the statement some years ago that the company could get by, and this industry could get by, without a depletion allowance if they could sell their oil at the world market price, that they would not have to have the depletion allowance. They could pay taxes like everybody else.

Of course, the Congress promptly took him up on it. They took away the depletion allowance and they did not let them sell at the world market price.

I wish they would have talked to me before they made that statement. I could have told them that is how it would work out.

Before we have any misunderstanding, I hope you can help me run that down.

Mr. DANIEL. We observed in our company that we got the quid, but not the quo.

[The following was subsequently supplied for the record:]

ATLANTIC RICHFIELD Co.,
Los Angeles, Calif., September 20, 1977.

HON. RUSSELL B. LONG,
Chairman, Senate Committee on Finance,
Dirksen Senate Office Building, Washington, D.C.

DEAR SENATOR LONG: You recently inquired of Mr. R. G. Daniel, an Atlantic Richfield representative appearing before the Senate Finance Committee in connection with hearings on H.R. 8444, whether our Chairman, Mr. R. O. Anderson, or I have made statements that Atlantic Richfield and the oil industry in general are "awash in cash". Neither Mr. Anderson, nor I, nor to our knowledge any other authorized Atlantic Richfield representative has made such a statement. Please permit me to take this opportunity to provide you with certain facts and some personal insights on this matter, so as to clarify the record.

Atlantic Richfield has increased its debt in recent years in order to find, develop and bring to market more energy for American consumers. Our total

debt, including production payments, has risen from \$1,198,000,000 to \$3,905,000,000 during the 3½-year period from January 1, 1974 to June 30, 1977. Such debt increase resulted from the fact that our capital expenditures during those 42 months totaled \$5,355,000,000 while our net income during that same period totaled only \$1,737,000,000. Far from being "awash in cash", as of September 9, 1977, Atlantic Richfield's short-term debt alone, mainly commercial paper, exceeded marketable security investments by \$271 million.

Debt of the 16 largest American oil companies has also increased dramatically. From December 31, 1967 to December 31, 1976, debt of these entities increased from \$10.3 billion to \$32.5 billion and the percentage of debt to total capitalization jumped from 19.8 percent to 30.9 percent.

Even though Atlantic Richfield has pushed its total debt ratio (43.5 percent at December 31, 1976) near the limit considering prudent stewardship of shareholder funds, there is perhaps some unused borrowing capacity in certain of the 16 largest petroleum companies, and probably in a few isolated instances a less meaningful surplus of cash and marketable securities awaiting investment. For that financial capacity to be put to work for our country requires we feel, continuing improvement in the energy investment climate. We believe we need to bring an end to government regulations that require oil and gas to be sold at a price less than the cost of replacing such reserves. The opportunity must be present to take on the enormous exploratory risks in frontier areas and recover those costs, along with a return on development costs, comparable with the return available on the average in American manufacturing industries. This, in turn, requires elimination of many of the uncertainties surrounding the oil industry such as: continuing threats of horizontal divestiture and vertical divestiture; proposed limitations on the ability to invest in other sources of energy and the facilities necessary to bring such energy to market; protracted delays and litigation from government and private environmental groups; and retroactive changes in regulatory practices that directly alter the financial return from investments.

We most appreciate your continuing efforts to improve the environment for investment by American energy companies. I am confident that improvement in the equity capitalization and earnings potential of the industry will produce further borrowing and investment in the energy sector by companies such as Atlantic Richfield which already have assumed extensive debt in order to do the best possible job for the Nation in the development of new energy supplies.

Sincerely yours,

T. F. BRADSHAW, *President.*

[The prepared statements of the preceding panel follow:]

STATEMENT OF R. G. DANIEL, VICE PRESIDENT, ATLANTIC RICHFIELD CO.

SUMMARY

Atlantic Richfield Company recognizes the urgent requirement for this nation to aggressively develop all realistic domestic energy resources to counteract our dangerously increasing dependence on foreign oil. One of the options available is the development of synthetic fuels such as oil shale. The nation's huge oil shale resources are estimated at 130 billion barrels in relatively high grade shale.

Oil shale technology has reached the stage where commercial plants must be built in order to test oil shale's economic potential, as well as technological and environmental consequences of commercial development. While considerable lead time will be required, if the nation starts now, shale oil could make a significant contribution to our energy base by the mid 1990's.

Development has not gone forward primarily due to uncertainties in the economics, national energy policy, the world price of oil, as well as environmental issues and regulatory delays. Technological risks still exist.

An incentive is needed to encourage creation of this industry which faces unusual external risks. One such incentive could be an "oil shale production credit" which would provide a \$3.00 per barrel tax credit for each barrel of liquid hydrocarbon produced from oil shale.

Oil shale's potential to augment domestic liquid fuel production should be determined now. The magnitude of oil shale reserves calls for early affirmative Congressional action in establishing appropriate incentives.

INTRODUCTION

Good morning. I am R. G. Daniel of the Atlantic Richfield Company. I am Vice President of the Synthetic Crude and Minerals Division which is responsible for developing mineral-related projects such as oil shale, coal, and phosphates.

Atlantic Richfield has played a major role to date in the development of oil shale technology. As part of Colony Development Operation, Atlantic Richfield operator, a thousand ton-per-day semi-works plant was operated in the late 1960's and early 1970's. In 1974, Colony was forced to postpone indefinitely construction of what was to be the first commercial oil shale complex in this country. Today, I would like to express my Company's views on Title II of the Energy Tax Act (H.R. 8444) concerning a proposed tax incentive that could foster the early development of a few commercial pioneer oil shale plants.

NEED TO DEVELOP ALL DOMESTIC RESOURCES

Before elaborating on the proposed tax incentive, I want to stress the urgent requirement to aggressively develop all realistic domestic energy resources because of our dangerously increasing dependence on foreign oil. Imports for the first three months of this year amounted to 47 percent of liquid fuel consumption and is projected to cost almost \$45 billion for the year. In addition to balance of payments problems, these high level of imports result in loss of jobs and a substantial increase in the insecurity of our supplies of energy. In our opinion, the benefits from increased domestic energy production will come to fruition only if we actively pursue all available options—increased exploration for oil and gas, accelerated utilization of coal and nuclear energy sources, development of synthetic fuels such as oil shale and coal gas, and development of renewable energy sources such as solar. We all recognize the need for greater conservation of energy as a means of reducing demand for energy.

POTENTIAL OF OIL SHALE

The oil shale resource base is huge, and the world's largest reserves are located in the states of Colorado, Utah and Wyoming. Domestic oil shale resources are estimated at 130 billion barrels in relatively high grade shale, compared to conventional oil reserves in the United States of almost 40 billion barrels, and for the world about 670 billion barrels.

Oil shale technology has reached the stage where commercial plants must be built. Large-scale plants must be operated and evaluated in order to determine oil shale's economic potential as well as the technological, environmental and socioeconomic consequences of commercial development. Considerable time will be required to first demonstrate the technology and then grow to significant production levels if the impacts associated with shale oil development are as manageable as we expect. If this nation starts now, shale oil could be a significant contributor to the nation's energy base by the mid-1990's and beyond.

Although hundreds of millions of dollars have been spent by dozens of companies, no company has, as yet, announced firm intentions to construct a commercial plant. The reasons are primarily uncertainties regarding economics, national energy policy and the world price of oil, as well as environmental issues and regulatory delays. Technical risks still exist. Commercial plants will involve scaling up by a factor of 10-1 of the size of pilot plants. But industry has assumed this kind-of risk before and could do it again notwithstanding the enormous front-end investment to build a single plant and mine as well as high operating costs. There is also a large risk which potential developers must face which dwarfs the usual venture risk issue—that of estimating future oil prices. The assessment of shale project economics is substantially shaped by the projected level of oil prices. Oil price projections are extremely uncertain because of the actions of OPEC and the U.S. Government. For example, the Carter Administration has stated that shale oil will be treated for pricing considerations as "new new" oil but much uncertainty remains as to what Congress will do and as to the specific mechanics of application.

THE COLONY EXPERIENCE

Colony, in October of 1974, suspended its plan to begin construction of a 50,000 barrel per day commercial oil shale plant on private lands in northwestern

Colorado. The decision was reached due to economics and national energy policy uncertainties. The principal economic factor was unprecedented inflation in construction costs which had a greater impact on capital goods than on any other sector of the economy. Past escalation and the prospect of a continued high rate of inflation severely eroded the project economics, even though crude oil prices had risen sharply during the project design period.

Colony construction cost estimates dramatically increased during recent years. The 1974 cost estimate is more than three times the cost estimate of 1970, with the bulk of the increase attributable to inflation. A 50,000 barrel per day oil shale complex would now cost in excess of one billion dollars. When the effects of inflation on capital costs, the high costs of investment funds and future market uncertainties are combined, it is not at all surprising that the resulting economic picture is not optimistic.

Regulatory delays have also adversely impacted the Colony project as well as other major energy-related projects. The Colony project requires more than 60 separate county, state and federal permits and approvals before an operation could get underway. The Federal Government began work on an environmental impact statement (EIS) for Colony in June of 1974. Colony had conducted extensive environmental demonstration programs, as well as exhaustive studies of air quality, water quality, land and water ecology and socioeconomic issues costing approximately \$10 million. This information formed the basis of a 19-volume environmental impact analysis performed by Colony and submitted to the Bureau of Land Management as an aid in preparing Colony's EIS. Notwithstanding this extensive data base, the preparation of the EIS has taken more than three years and cost Colony an additional half million dollars. The final draft was released by the Council on Environmental Quality in August of 1974.

Expenditures of this time and money do not guarantee government approvals will be forthcoming. For example, the Department of the Interior has advised Colony that "it is free to do the things necessary to acquire the permits and approvals which are not contingent upon the completion of an analysis to determine the necessity of a supplemental impact statement." The final EIS stipulates that the pipeline right-of-way will not be granted to La Sal Pipe Line Company until such time as Colony announces its intention to proceed with the construction of the plant. At that time, the Department of the Interior will prepare an analysis to determine whether a supplemental EIS will be required. According to the Department of the Interior spokesman, Colony is now free to apply for and acquire the other federal permits and approvals covered by the final EIS. The above described effort on the Colony EIS does not assure that Colony will receive a construction permit from the Colorado Air Pollution Control Commission nor that it will pass federal EPA prevention of significant deterioration review. The potential veto over the use of water by the state of Colorado is also significant.

PROPOSED AMENDMENT

An incentive which encourages creation of this industry with unusual external risks, yet allows the investment motive to function is needed. Such an incentive could be an "oil shale production credit" (copy attached) which would provide a \$3 per barrel tax credit for each barrel of liquid hydrocarbon produced from oil shale. The credit is limited to 50 percent of the taxpayers liability after reductions for the foreign tax credit and the investment tax credit. Any excess credit that results from this limitation may be utilized by applying it against taxes of other years by carrying the excess back three years and forward seven years. The credit is only applicable to production from oil shale deposits located in the United States. We envision the production credit to be applicable to the first few pioneer oil shale plants and for the expected life of the plant.

I feel that if the oil shale production credit is adopted, a climate necessary to attract investors will exist and a commercial oil shale industry can get off the ground. I believe Atlantic Richfield would be willing to participate in an early oil shale plant under this program. Since the costs and risks are so great we would be reluctant to build a plant alone. Therefore, the project will require three or more participants to share the risk.

CONCLUSION

As our dependence on imported oil continues to dramatically increase, the requirement to develop this nation's realistic energy resources becomes paramount.

Oil shale's potential to augment domestic liquid fuel production should be determined now. The oil shale production tax credit should provide the incentive to initiate shale oil production. The benefits to be derived from a commercial synthetic fuel program for early oil shale projects are substantial. The magnitude of shale oil reserves justifies a near-term commercial scale construction program so that the nation can move more quickly and confidently toward appreciable production from oil shale.

ATTACHMENT

SEC. 2013 Oil Shale Production Credit:

(a) *General rule.*—Subpart A, part IV of subchapter A of chapter I (relating to credits allowable) is amended by inserting section 34.

OIL SHALE PRODUCTION CREDIT

SEC. 34. (a) Amount Of The Credit:

(1) *General rule.*—There shall be allowed as a credit against the tax imposed by this chapter for the taxable year a tax credit of \$3 for each barrel of liquid hydrocarbons produced from oil shale from deposits located in the United States.

(2) *First-in-first-out rule.*—The amount of the credit allowed by section 34 for the taxable year shall be an amount equal to the sum of the following in the following order:

(A) The amount of the oil shale production credit carryovers carried to such taxable year.

(B) The amount of the credit determined under paragraph (1) for such taxable year, plus

(C) The amount of the oil shale production credit carrybacks carried to such taxable year.

(b) Limitation Based On Amount Of Tax:

(1) *General rule.*—Notwithstanding subsection (a) the credit allowed by this section for the taxable year shall not exceed 50% of the taxpayer's tax liability for the taxable year.

(2) *Liability for tax.*—For purposes of subsection (b) (1), the liability for tax for the taxable year shall be the tax imposed by this chapter for such year, reduced by the sum of the credits allowable under—

(A) section 33 (relating to foreign tax credit), and

(B) section 37 (relating to credit for the elderly),

(C) section 38 (relating to the investment tax credit).

For purposes of this subsection, any tax imposed for the taxable year by section 56 (relating to minimum tax for tax preferences), section 72(m)(5)(B) (relating to 10 percent tax on premature distributions to owner-employees), section 408(f) (relating to tax on lump sum distributions), section 402(e) relating to tax on lump sum distributions, section 531 (relating to accumulated earning tax), section 541 (relating to personal holding company tax), or section 1378 (relating to tax on certain capital gains of subchapter S corporations), and any additional tax imposed for the taxable year by section 1351(d)(1) (relating to recoveries of foreign expropriation losses), and shall not be considered tax imposed by this chapter for such year.

(c) Carryback and Carryover Of Unused Credits:

(1) *In general.*—If the sum of the amount of the oil shale production credit carryovers to the taxable year under subsection (a)(2)(A) plus the amount determined under subsection (a)(2)(B) for the taxable year exceeds the amount of the limitation imposed by subsection (b) for such taxable year (hereinafter in this subsection referred to as the "unused credit year"), such excess attributable to the amount determined under subsection (a)(2)(B) shall be—

(A) an oil shale production carryback to each of the three taxable years preceding the unused credit year, and

(B) an oil shale production credit carryover to each of the seven taxable years following the unused credit year,

and, subject to the limitations imposed by subsection (b), shall be taken into account under the provisions of subsection (a)(2) in the manner provided in such subsection. The entire amount of the unused credit for an unused credit year shall be carried to the earliest of the ten taxable years to which (by reason of subparagraphs (A) and (B) such credit may be carried and then to each of the other taxable years to the extent, because of the limitations imposed by subsection (b), such unused credit may not be taken into account under subsection (a)(2) for a prior taxable year to which such unused credit may be carried.

(2) *Limitation on carrybacks.*—The amount of the unused credit which may be taken into account under subsection (a) (2) for any preceding taxable year shall not exceed the amount by which the limitation imposed by subsection (b) for such taxable year exceeds the sum of—

(A) the amounts determined under subparagraphs (A) and (B) of subsection (a) (2) for such taxable year, plus

(B) the amounts which (by reason of this subsection) are carried back to such taxable year and are attributable to taxable years preceding the unused credit year.

(3) *Limitation on carryovers.*—The amount of the unused credit which may be taken into account under subsection (a) (2) (A) for any succeeding taxable year shall not exceed the amount by which the limitation imposed by subsection (b) for such taxable year exceeds the sum of the amounts which, by reason of this subsection, are carried to such taxable year and are attributable to taxable years preceding the unused credit year.

(d) *Definitions:* The term "oil shale production credit" as used in this section shall mean any credit allowed by subsection (a).

STATEMENT OF CHARLES H. BROWN, PRESIDENT, TOSCO RESEARCH, INC.

SUMMARY OF PRINCIPAL POINTS

1. First generation technology for oil shale production is available, has been successfully demonstrated, and is ready for commercialization.

2. Extensive monitoring and impact assessment work indicate that the environmental effects of shale oil production can be managed in a manner consistent with reasonable environmental protection goals.

3. The best available cost estimates indicate that oil from a commercial oil shale plant would be competitive with imported oil if conventional debt financing could be obtained. But because of the risks and uncertainties associated with large pioneer plants, estimated project economics are not firm enough for normal project-financing.

4. Federal incentives using a relatively small portion of the new tax revenues contemplated by H.R. 8444 could reduce the abnormal risks involved in pioneer plants to manageable dimensions and expedite construction of such plants.

5. Thereafter, a commercial oil shale industry should grow in a conventional and orderly manner without the need for further federal incentives or support.

6. Unlocking the vast U.S. oil shale deposits will serve the national interest by providing a secure domestic source of oil, by enhancing the value of U.S. Government's extensive oil shale lands, and by creating new employment opportunities and significant new federal, state, and local tax revenues.

My name is Charles H. Brown. I am President of Tosco Research, Inc., a wholly owned subsidiary of Tosco Corporation, an independent energy company organized in 1955 as The Oil Shale Corporation to develop a commercial technology for the recovery of hydrocarbons from oil shale. Tosco was one of the original organizers of the Colony joint venture in 1964 and, along with the Atlantic Richfield Company, we remain a part of Colony Development Operation. The proposed Colony facility will utilize the Tosco II pyrolysis process.

Over the past twenty years, Tosco has spent more than \$100 million to develop oil shale recovery technology, to acquire oil shale lands, and to establish the facts regarding the economic and environmental viability of commercial oil shale production. The information we have gained from all this work and money is, we believe, as complete and accurate as any oil shale data available anywhere today; and we are here to share this information with this committee. We hope that your deliberations will lead to some kind of incentive program which will expedite construction of the first few oil shale facilities to establish U.S. oil shale as a viable energy resource of the future.

The three questions which we at Tosco are most frequently asked about oil shale are: (1) Is commercial oil production from shale technologically feasible today? (2) Is commercial production of shale oil compatible with national environmental protection goals? (3) Can shale oil be produced at a price competitive with foreign oil imported into the U.S.? The answer to all three questions is a qualified "Yes."

Having mined over 1,200,000 tons of oil shale and pyrolyzed it at rates of 1,000 tons per day and higher, the Colony Group has demonstrated that the Tosco pro-

ess retorts 100 percent of the hydrocarbon content of U.S. shale. Obviously, Colony has confidence that the technology can be scaled up to commercial size because the venture has spent more than \$70 million, including \$12 million for detailed designs and cost estimates for a 48,000 barrels per day facility. It is Tosco's opinion that there is at least one and possibly two other surface retorting technologies which, in due course of further demonstrations, will prove commercially feasible. However, no one has yet built and operated a commercial-size plant, so the answer to the technology question can be only a qualified "Yes."

Environmentally, the Colony Environmental Impact Statement—based on studies compiled at a cost of some \$10 million—shows that the environmental effects of a commercial oil shale facility are manageable. There is sufficient available water even in the dry western states to support up to 2 million barrels per day of shale oil production. There is no risk of contaminating surface or underground water if you build the dams and take the precautions which Colony proposes to take. The shale residue can be revegetated. The plant can be built to comply with federal clean air standards for public health and safety. However, no one has yet built and operated a commercial plant, so the answer to the environmental question must be only a qualified "Yes."

Now, shale oil costs. Tosco believes that an oil shale plant built with appropriately leveraged project-financing could probably produce and market shale oil profitably today at a price competitive with OPEC oil of comparable quality landed in U.S. ports (that is, \$14.50 to \$15 per barrel).

We are, right now, in the process of updating our cost estimates, as we do every 2 years. Our September 1975 numbers showed direct operating costs of about \$4.80 per barrel of hydrotreated oil (raw shale oil upgraded to a sulfur-free distillate). (See table 2.)

To this figure must be added capital costs, which are larger than operating costs, because oil shale facilities are capital intensive. In September 1975, the Colony plant was estimated to cost \$960 million, plus interest during construction. (We expect 1977 numbers to go well over \$1 billion). If project-financing were available for pioneer oil shale plants and two-thirds of the capital requirement could be debt-financed, debt service would require about \$4.50 per barrel (September 1975). This \$4.50 plus direct operating expenses of \$4.80 means that investors would have out-of-pocket costs of some \$9.30 per barrel before getting any return on their \$300-\$350 million equity investment. (See table 4.)

In September, 1975, low sulfur foreign crude landed in the U.S. at \$13.50 to \$14 per barrel. A \$1 to \$5 margin between probable market price and estimated out-of-pocket costs would appear to be sufficient return to attract equity investors. Yes, shale oil is competitive with OPEC oil today. But the "Yes" has to be qualified because no commercial plant has yet been built and these are pre-construction estimates. While these estimates have been carefully compiled at huge cost, they are still estimates; and we in industry and you in government are all too familiar with cost overruns these days, especially on projects using first-of-a-kind machinery.

It would not be alarming if the first oil shale plants overran engineering estimates as much as 50 percent, running capital requirements to \$1.5 billion instead of \$1 billion. It is also probable that the first plants will not operate at designed capacity until 3 or 4 years after startup.

So, instead of operating costs and debt service of \$9.30 per barrel, this number could go to \$12 or \$14 in the first plants; and the product would then have to be marketed for \$16 to \$18 per barrel to provide a reasonably attractive after-tax return to investors. With the likelihood of cost overruns and the unusual risks attendant to any pioneer plant, lending institutions are understandably unwilling to provide debt financing for commercial oil shale projects.

Yet, the fact remains that U.S. shale oil could well be an energy gold mine if we could just get the first plant built and take the mystery out of some of the uncertainties which presently frighten investors and environmentalists. Toward that end, Tosco believes that industry and government have a joint responsibility and opportunity.

Eighty percent of the U.S. oil shale deposits with commercial potential are on government lands. If shale oil can be produced economically without violating the environment, the U.S. will not only reduce its imports of foreign oil; Government's oil shale properties will become extremely valuable.

Government could expedite the determination of oil shale's viability by helping to reduce the unusual risks of the first oil shale plants to manageable dimensions. In our opinion, this could be done in one of several possible ways, such as:

(1) The Federal Government could offer a special incentive to private industry to expedite oil shale development in the form of a \$3 per barrel tax credit for each barrel of shale oil produced. This "carrot" could be limited to pioneer plants only (those getting under construction before December 31, 1980). If desirable, the Treasury could even set aside 1 percent or 2 percent of 1978-85 revenues from the Crude Oil Equalization Tax, as passed by the House, to reimburse the Treasury for the loss of revenue from such a tax credit.

We suggest the \$3 figure as one which is probably adequate to get the first plants underway and to cover much of the abnormal risks attendant to pioneer plants (as opposed to follow-on plants). With this incentive, we believe that three or four plants would get under construction by 1980. Each would produce 15 to 18 million barrels of oil per year. Maximum loss of corporate income tax revenues would probably be \$150 million to \$160 million per year. For this relatively modest figure, the Federal Government could spur private investment of \$3 billion to \$5 billion in new source domestic energy production; could establish the viability of U.S. oil shale deposits; could make valuable assets of government-owned oil shale lands; and could create new corporate income tax-paying entities which do not exist today.

Our figures indicate that a 50,000 barrels per day oil shale facility will generate more than \$300 million of Federal corporation income tax revenues over the life of the plant at present tax rates; revenues from severance taxes and corporation income taxes to the state government would amount to more than \$130 million; and revenues from personal income taxes paid by permanent employees would exceed \$150 million.

(2) The Federal Government could, over the next 6 to 8 years, earmark some \$500 million per year of the Crude Oil Equalization Tax Trust Fund for direct loans to pioneer oil shale plants under construction before 1981.

Smaller energy companies and energy users (steel companies, farm co-ops, chemical companies) are interested in participating in oil shale joint ventures but only if debt-financing is available to the project. The CET Trust Fund could provide such long-term financing at interest rates comparable to the prime rates which are now available only to the largest AAA companies for projects of impeccable quality. Lower interest costs would decrease per barrel capital costs and make pioneer shale oil plants more competitive.

(3) The Federal Government could double the investment tax credit for pioneer oil shale plants just as the House-passed energy bill doubles the ITC for business investments in certain conversion, conservation, and alternative energy properties.

CONCLUSION

Any one of these incentives or an appropriate combination of the three, would encourage investment in pioneer oil shale facilities. Of the three incentives, we believe the proposed per barrel tax credit would provide the most direct and effective means for stimulating construction of the few initial plants necessary to resolve present uncertainties and to remove the unusual risks of pioneer projects. Thereafter, it is Tosco's opinion that a commercial oil shale industry will grow in a conventional and orderly manner; and billions of barrels of oil now lying fallow in the shale lands of the west will be unlocked to provide energy and jobs for Americans at consumer prices which are competitive and without harm to the environment.

TABLE 1.—COLONY PROJECT INVESTMENT

[September 1975 dollars]

	Investment (millions)		
	Capital	Expense	Total
Contractor expenditures:			
Mining, crushing and spent shale disposal.....	\$100		\$100
Pyrolysis and oil recovery.....	244		244
Oil upgrading and hydrogen plant.....	103		103
Byproduct recovery.....	54		54
Utilities and general facilities.....	159		159
Subtotal.....	660		660
Reserves.....	131		131
Other expenditures:			
Mine and spent shale disposal mobile equipment.....	18		18
Catalysts and chemicals.....	12		12
Spare parts.....	3		3
Project management and plant staffing.....		\$25	25
Taxes and insurance during construction.....		6	6
Community assistance costs.....		28	28
Prerequisite costs.....		10	10
Mine predevelopment costs.....		9	9
Prepaid process licenses.....	1		1
Miscellaneous other costs.....	9		9
Working capital.....	18		18
Plant fixit and startup allowance.....		30	30
Grand total.....	852	108	960

Investment is in September 1975 dollars. Some \$660 million of this total was estimated by the engineering contractor. Other costs were estimated by Tosco or the operator of the Colony venture. Investment includes \$131 million as provision for acquisition of a 30-year supply of oil shale reserves at a cost of 25 cents per barrel of contained Fischer assay oil. Estimate includes pipelines to deliver liquid by-products to a rail head in Grand Valley, Colorado. Interest during construction is added in table 4.

TABLE 2.—COLONY PROJECT DIRECT OPERATING COSTS

[Basis—September 1975 dollars]

Cost center	Per year (millions)	Per barrel
Mining, crushing and SS disposal.....	\$30,000	\$1.91
Plant operating labor.....	1,700	.11
Plant maintenance (excluding mining).....	11,000	.70
Electrical power costs (excluding mining).....	8,800	.56
Catalysts and chemicals.....	6,200	.39
Administrative.....	2,200	.14
Taxes and insurance.....	7,000	.45
Miscellaneous other.....	1,100	.06
License fee.....	3,600	.23
Contingency.....	3,400	.22
Total operating costs.....	75,000	4.77

TABLE 3.—COLONY PROJECT NET OPERATING REVENUE

Component	Units per year	Unit value	Millions per year
Gross operating revenue:			
Oil (barrels).....	15,708,000	\$12	\$188.5
Ammonia (tons).....	50,500	125	6.3
Sulfur (tons).....	58,100	15	.9
Coke (tons).....	240,400	10	2.4
Total.....			198.1
Direct operating cost (\$4.77 per barrel).....			75.0
Net operating revenue.....			123.1

¹ In September 1975, the price of light, low sulfur foreign crude oil landed in the United States was \$13.50 to \$14 per barrel. Hydrotreated shale oil merits a premium over any crude oil because it is sulfur-free and contains no heavy, residual oil fraction. Refining of the hydrotreated oil requires only atmospheric pressure distillation and naphtha reforming to produce high value products—gasoline, diesel fuel, home heating oil, and sulfur-free industrial fuel oil.

TABLE 4.—COLONY PROJECT: INVESTMENT PROFILE DURING CONSTRUCTION PERIOD WITH ⅓ DEBT FINANCING

[In millions of September 1975 dollars]

Year	Funds provided			Deductible expenses			Tax benefits		Posttax equity investment	
	Total	Debt	Equity	Interest	Other	Total	50 percent of deductible expenses	Investment tax credit		
1.....	314	209	105	9	33	42	21	15	36	69
2.....	241	161	80	25	20	46	23	20	43	37
3.....	325	217	108	43	11	54	27	26	53	55
4.....	202	134	68	44	14	58	29	10	39	29
Total.....	¹ 1,082	721	361	122	78	200	100	71	² 171	190

¹ Plant is completed at end of 3rd quarter of 4th year of construction period.

² Interest accrual during the construction period of \$122,000,000 (at 9 percent) increases the total project cost from \$960,000,000 (the amount shown in table 1) to \$1,082,000,000.

³ Tax benefits result from tax deductible expenditures shown in table 1, accrual of interest and investment tax credits. The tax benefits, counting 50 percent of deductible costs and the full amount of investment tax credits, totals \$171,000,000. For investors who can make use of the tax credits at the time they are generated, construction period credits reduce the equity investment at the time of plant startup from \$361,000,000 to \$190,000,000.

TABLE 5.—COLONY PROJECT OPERATING CASH FLOW WITH 3/5 DEBT FINANCING AND THE OIL PRODUCT VALUED AT \$12 PER BARREL

[In millions of 1975 dollars]

Year	Net operating revenue	Interest	Depreciation	Taxable income, predepletion	Income taxes		Posttax income	Deferred investment	Debt principal	Posttax cash flow
					State	Federal				
1	123.1	64.9	165.0	(106.8)		(53.4)	(53.4)	9.9	5.3	96.4
2	123.1	64.4	130.0	(71.3)		(36.3)	(35.0)	9.9	5.8	77.3
3	123.1	63.9	116.8	(57.6)		(29.8)	(27.8)	9.9	6.3	72.8
4	123.1	63.4	100.3	(40.6)		(21.6)	(19.0)	9.9	6.8	64.6
5	123.1	62.7	83.8	(23.4)		(13.3)	(10.1)	9.9	7.5	56.3
6	123.1	62.1	67.3	(6.3)		(5.1)	(1.2)	9.9	8.1	48.1
7	123.1	61.3	50.8	11.0	0.3	2.6	8.1	9.9	8.9	40.1
8	123.1	60.5	34.3	28.3	0.7	6.6	21.0	9.9	9.7	35.7
9	123.1	59.7	17.8	45.6	1.1	10.7	33.8	9.9	10.5	31.2
10	123.1	58.7	16.2	48.2	1.2	11.3	35.7	9.9	11.5	30.5
11	123.1	57.7	14.7	50.7	1.3	11.9	37.5	9.9	12.5	29.8
12	123.1	56.6	13.1	53.4	1.3	13.1	39.0	9.9	13.6	26.6
13	123.1	55.3	11.5	56.3	1.4	14.5	40.4	9.9	14.9	27.1
14	123.1	54.0	9.9	59.2	1.5	15.9	41.8	9.9	16.2	25.6
15	123.1	52.5	9.9	60.7	1.5	16.6	42.6	9.9	17.7	24.9
16	123.1	51.0	9.9	62.2	1.6	17.2	43.4	9.9	19.2	24.2
17	123.1	49.2	9.9	64.0	1.6	18.1	44.3	9.9	21.0	23.3
18	123.1	47.3	9.9	65.9	1.7	19.0	45.2	9.9	22.9	22.3
19	123.1	45.3	9.9	67.9	1.7	19.9	46.3	9.9	24.9	21.4
20	123.1	43.0	9.9	70.2	1.8	21.0	47.4	9.9	27.2	20.2
21	123.1	40.6	9.9	72.6	1.8	22.1	48.7	9.9	29.6	19.1
22	123.1	37.9	9.9	75.3	1.9	23.4	50.0	9.9	32.3	17.7
23	123.1	35.0	9.9	78.2	2.0	24.7	51.5	9.9	35.2	16.3
24	123.1	31.8	9.9	81.4	2.0	26.2	53.2	9.9	38.4	14.8
25	123.1	28.4	9.9	84.8	2.1	27.8	54.9	9.9	41.8	13.1
26	123.1	24.5	9.9	88.7	2.2	29.7	56.8	9.9	45.7	11.1
27	123.1	20.5	9.9	92.7	2.3	31.5	58.9	9.9	49.7	9.2
28	123.1	16.0	9.9	97.2	2.4	33.6	61.2	9.9	54.2	7.0
29	123.1	11.1	6.6	105.4	2.6	37.5	65.3		59.1	12.8
30	123.1	5.7	3.3	114.1	2.9	41.5	69.7		64.5	8.5
Total	3,693.0	1,385.0	980.0	1,328.0	40.9	336.9	950.2	277.2	721.0	932.0

NOTES TO TABLE 5

Deferred Investment.—Mobile equipment used for mining and spent shale disposal must be replaced periodically during the plant operating period. Investment for this purpose will average about \$9.9 million per year over the life of the project.

Depreciation.—The depreciation amounts shown for the initial investment presume accelerated depreciation. The first year amount is computed by the double declining balance method. Thereafter, the sum-of-the-year's-digits method is used. Depreciation lives used are 8 years for retorting, mining and solids handling facilities and 13 years for oil upgrading units. Deferred investments (for purchase of mobile equipment) are depreciated over three-year periods.

State Income Taxes.—Treatment of state income taxes is conservative in that no credit is presumed in the early years of the project when accelerated depreciation makes taxable income negative, and no accrual is made in these years to offset future tax liabilities. When taxable income is positive, in years 7 and thereafter, state income tax is computed following the regulations of the State of Colorado.

Federal Income Tax.—The Federal income tax amounts are 48 percent of the pre-depletion taxable income amounts shown in the Table offset by the amounts in each year of state income tax and the Federal depletion allowance. In years 1 through 6, statutory depletion is used. The amount of this allowance is \$4.4 million per year—the cost of the oil shale reserve (\$131 million) divided by the life of the reserve (30 years). Percentage depletion may not exceed 50 percent of pre-tax income. The 50 percent limit sets depletion in years 7 through 11. Thereafter the depletion allowance used is \$24.7 million per year as computed by regulations now applicable to oil shale.

Post-tax Cash Flow.—The post-tax cash flows are the sum of post-tax income and depreciation less deferred investment and debt principal. The post-tax cash flow amounts are cash available to the equity investors presuming only that the investors can take advantage of the tax credits generated in the early years of the project by the accelerated depreciation methods. With this cash flow schedule, the post-tax equity investment of \$190 million is returned well before the end of the third operating year. Post-tax cash flow in excess of equity investment is \$742 million. The post-tax discounted cash flow rate of return on equity investment is well in excess of 15 percent.

In the event the early years' tax credits shown could not be utilized by the equity investors, longer depreciation lives and other depreciation computation methods would be used. The effects would be to eliminate tax losses in the early years of the project and to distribute more evenly the cash flow amounts. The total cash flow for the project would be modestly increased because of more effective use of the depletion allowance.

The CHAIRMAN. Next, we will hear Mr. Sheldon H. Butt, president, Solar Energy Industries Association, accompanied by Mr. Paul W. Cronin, vice president, Solar Energy Industries Association.

Mr. CRONIN. Thank you, Mr. Chairman. My name is Paul Cronin. I am vice president of the Solar Energy Industries Association, and having appreciation for the time of this committee, we would like to submit our statement for the record and have Mr. Butt give a brief summary of it and hold us open for questions from the committee.

STATEMENT OF SHELDON H. BUTT, PRESIDENT, SOLAR ENERGY INDUSTRIES ASSOCIATION, ACCOMPANIED BY PAUL W. CRONIN, VICE PRESIDENT, SOLAR ENERGY INDUSTRIES ASSOCIATION

Mr. BUTT. Basically, we are proposing three changes, or changes in three areas in the bill as it passed the House of Representatives. First of all, on the first \$1,500 of a homeowner's investment in solar equipment, we are proposing to increase the rate of tax credit from 30 percent to 40 percent.

We think this is more important than it might superficially sound like it is, and I think would probably go a long way toward increasing the rate at which solar applications would be adapted, since it would specifically bear on the most ready kind of application today, which is the domestic hot water heater.

The proposal is limited to the first \$1,500, since we feel that that is the most cost-effective area to put additional incentives.

Second, since natural gas apparently is the one fuel resource that we have the most supply problems with, we are proposing a bonus credit for homeowners to retrofit, specifically to replace natural gas, of 15 percent of the expenditure of the retrofit replacing natural gas, with the total amount of the bonus being limited to \$1,000.

In the area of tax credits for business, the tax credits rates established by the House are rather low-level, their rationale being that the taxes being imposed upon business consumption of oil and gas have the same effect as tax credit on the solar application in that they tend to improve the competitive position of the solar application.

However, I do not think the House bill is quite as good as it might sound; there are two problems. First of all, the situation with respect to the smaller businessman is quite different. He is not subject in the same degree to the taxes on consumption, thus the economics are not improved thereby to the same extent.

It is not our purpose here to speak for or against the plans as far as consumption taxes are concerned. This is an area where we have no expertise; we are simply analyzing what the results of them are.

For that reason, we have proposed a graduated system in which the business gets 45 percent of the first \$50,000 back; 40 percent of the next \$50,000; and 30 percent of all over \$100,000. These are our three principal proposals.

We feel that with these proposals we can come a whole lot closer to the goals which we set out for solar in the analysis that we made back in March for the administration which was within 15 years to be saving somewhat in excess of 6 million barrels of oil per day.

We think that we will come much closer to the goal that we set out that within 15 years, There would be 11 million homes using solar in one form or another, as compared to the administration's goal of 2.5 million.

That, I think, pretty well summarizes our position.

The CHAIRMAN. Thank you, sir.

Senator Curtis?

Senator CURTIS. I have no questions.

The CHAIRMAN. Senator Dole?

Senator DOLE. I think Mr. Cronin has had some experience in the Congress on some of these matters. Were you not a member of the Energy Committee on the other side?

Mr. CRONIN. That is right, Senator, in the 93d Congress.

Senator DOLE. Did you pay special attention to the solar energy portion?

Mr. CRONIN. I was a cosponsor of the Solar Demonstration Act in the 93d, and frankly it was my service in the Congress and the exposure to the problems of the Nation in energy that prompted me, upon leaving the Congress, to go into energy.

I have my own solar company in Massachusetts as well as having done some work with coal, but it is the solar company at this stage which is my first love and the one that I think can make the greatest contribution at this point in time to our Nation's energy problems.

Senator DOLE. I am wondering, rather than a complicated system of tax credits, could you not just allow business to expense the solar equipment over a period of 3 years, or something of that kind, rather than the tax credit?

Mr. CRONIN. It seems to me that the present system has almost created the need for tax credit. Solar for domestic hot water, is economical today with a 5-year payout. It is technology that is thousands of years old. It is being used today in many other nations of the world.

But here in the United States, where we still have the lowest energy prices of any nation in the world, all too many of our citizens have failed to realize the problem and have been slow to respond to the need for additional supplies of energy that include solar.

As a result, they look to the Government for some sort of an incentive to do it.

The tax credits go a long way for the lower to middle-income wage earner. A person, who, for example, probably has a home mortgage, they are trying to put a couple of kids through college, a couple of car notes, and they have payment to make on a boat.

These are the people who are really hurt by the price of energy.

Senator DOLE. How about business? I can understand about the individual, but business, that should be expensed in some way rather than a tax credit.

Mr. BUTT. That would amount to a 1-year amortization. That is not a bad alternative to the matter. The only problem that I see with it, it would not again impact the smaller businesses as much as the larger businesses, since the value of rapid amortization is greatest for the large companies. Unlike Paul, I work for a large company. I guess we represent both ends of the spectrum.

Certainly instantaneous amortization for tax purposes would be a very powerful incentive, particularly for larger companies.

Senator DOLE. Tax credits are very attractive and appealing. As a member of the Budget Committee, we are taking a harder and closer look at tax credits and tax expenditures. There may be some set laws with some of those provisions like everything else, the same as taking it out of the till.

Mr. CRONIN. I think that when the Senator reviews the mountain of information that was inserted for the record, he will see a case was made on how the Government can receive an excellent return on investment in a very short period of time for this particular tax credit, and Mr. Butt is the man who has done most of the economic analysis on this.

I think it presents an exceptionally fine case. Unlike many tax credits that your Budget Committee is faced with, the one-way street type of situation, this does provide an excellent return in a very short space of time for the entire Nation.

Senator DOLE. There is another thing that is a concern for some. We are making it so attractive to go out and purchase solar energy and home insulation, we have to make certain that somehow we are pro-

tecting the consumer. There will be a lot of fly-by-night people in the solar business and the home insulation business.

I do not know how to protect against deception with this legislation. It is one thing to provide the incentive, another thing to protect the consumer.

Mr. CRONIN. That is an excellent point.

One of the best ways that can be provided to protect the consumer on solar is to finally come up with some decent standards. The HUD intermediate standards are a first step toward this, and I would assume that the Senate and the House in their wisdom are going to require that certain standards be met in order to qualify for these particular benefits.

However, the industry association has been trying to work with FEA to get some funding to create a decent program of standards and policing and certification to avoid the very problems that you are talking about. Up to now, anybody has been able to make claims. In many cases, they are comparing apples and oranges.

What we need are some solid industry standards, so we are constantly comparing apples and apples. We are working very hard toward that. The HUD intermediate standards are a good first step, but we have submitted a proposal to FEA for financial support. We are still a rather infant association.

On July 6, FEA asked for a R.F.P. which is to be submitted this week, September 15. We will submit a new proposal. That is one of the other things we are going to do when we are in town over the next couple of days, finalize that proposal.

You make a good point, Senator. It is an essential point and we recognize it as being essential.

Mr. BUTT. We hope FEA recognizes your concerns for the necessity of getting these standards.

Senator DOLE. Thank you.

The CHAIRMAN. I just want to ask one question. If there is anything we can do in a practical way to move solar energy forward, do you picture solar energy right now as being primarily to heat water, for the hot water system inside the home?

— Mr. CRONIN. As opposed to photovoltaic?

The CHAIRMAN. Rather than space heating for houses.

Mr. CRONIN. Not necessarily. The domestic hot water, yes; it is here and now. It is thousands of years old, really.

Space heating in many parts of the country, by solar is economically viable today, particularly when it is combined with technology such as the heat pump. Solar assisted water to a heat pump, for example, while not providing 100 percent of the space heating in many parts of the country, is economically viable for a major percentage of that heat and it is still the game that you have to play so often when you discuss the energy question, of checkers—moving something from one square to another square.

You offset the oil and gas that is used for space heating by solar for a major proportion of this. I went to a roundtable in Washington that was held just this past week by the National Swimming Pool Association, for example, and we started talking about how we could integrate swimming pools with some of the needs for solar. And we quickly came to recognize that our industry is paying about \$1.15 a gallon for

storage facilities, where they can build swimming pools for 50 cents a gallon.

And then we started discussing how they could utilize it. Somebody brought up the point about how they are building geriatric swimming pools in nursing homes now. You can literally wheel somebody in a wheelchair into the pool where they get whirlpool baths and so forth in a large pool.

To be able to integrate something like that with the heat pump and with solar, you cannot only get some tremendous economic advantage, but I think you can very quickly see that it could change the lifestyle of many people in our country and change our ways of thinking about how to maximize the utilization of energy.

It opens up many new areas.

Mr. BURR. I think our emphasis on water heating, and there is an emphasis on water heating in the program that we have proposed, as well as in the original program we proposed back in March, is basically intended to do the job as cost effectively as possible.

That is, as we initially put a heavy emphasis on water heating, we would pull the rest of it along behind us. Over an extended period of time. Over the life of the incentive program there would be less cost in tax revenues than if we struck out initially for a broader program.

We tried to design the program as cost effectively as we could. That is how we came up the way we did.

Mr. CRONIN. This is an area where you can have the quickest return on investment for the lowest number of dollars.

The CHAIRMAN. One gets the most results the quickest using solar heat for hot water in homes.

Mr. CRONIN. Exactly.

The CHAIRMAN. From that, do you think other technology would develop?

Mr. CRONIN. You can use it as a building block. You can add additional collectors so that as you go along, for example, you could add space heating as time went on.

I had an interesting experience that the chairman may appreciate: in Libya over a year ago in Leptis Magna, a pretty well-preserved Roman city. I was there on oil business, not solar business, but I went to the Roman baths, which were great big marble swimming pools. Up above the hot baths were the remnants of a solar collector. It was a piece of black slate with channels cut in it, the water then ran into the hot baths. So the Romans were using this thousands of years ago, and here in the United States we are looking at this as a technological breakthrough, space age technology, and it is far from that.

It is very basic, very simple, and it is very cost effective today.

The CHAIRMAN. Senator Curtis?

Senator CURTIS. Solar energy has a short-range program and a long-range program. These things that you are talking about now are immediate.

Mr. CRONIN. Right.

Senator CURTIS. I envision a time before the turn of the century that you are going to make electricity out of solar energy. We already have the technology, and you will overcome the problem that half the time the Earth is covered with darkness, rain, or cloud, because they will penetrate it. But direct solar rays do not penetrate, but with

a very, very large antenna out beyond the atmosphere you can make a conversion there and send it to Earth.

Mr. CRONIN. The Senator warms my heart when he says that. I moved for the first million dollars in the Science Committee in the 93d Congress for the solar satellite. I am glad to see it is coming along.

Senator CURTIS. The Space Committee and the Joint Atomic Energy Committee developed that testimony. That is quite a sophisticated thing, compared to heating some water.

Mr. CRONIN. Yes; that is the space-age side of solar.

Senator CURTIS. What have you done on being able to store the solar heat for the hours of the day you need it?

Mr. BUTT. That is quite feasible. That is basically how most of the installations that exist today operate. They include a storage capability, extending from 24 hours to 36 hours, generally. One of the things we need to do is coordinate the storage capabilities with the demand structure of the utility industry so that the use of the solar equipment will help reduce utility peaks and thereby reduce the need of the utility industry for future capital funding.

This is all very practical, and the details are not all that complicated. This is one of the things that we are confident that will evolve as we go further to solar energy.

Senator CURTIS. Can you do it with the battery concept?

Mr. CRONIN. Battery with the photovoltaic, liquid storage for the water collectors, and beds of hot rocks for air collectors.

Senator CURTIS. Thank you.

The CHAIRMAN. Thank you very much, gentlemen.

[The prepared statement of Mr. Butt and Mr. Cronin follows:]

TESTIMONY OF SHELDON H. BUTT, PRESIDENT, AND PAUL W. CRONIN, VICE-PRESIDENT, OF THE SOLAR ENERGY INDUSTRIES ASSOCIATION

On behalf of the Solar Energy Industries Association, we want to express our appreciation for being allowed to appear before you to testify relative to the solar provisions of the "National Energy Act." Our comments will be directed to Title II of the Act.

The detailed previous recommendations of S.E.I.A. for solar incentives are incorporated in our "Proposed Solar Incentive Program" of March 3, 1977, a copy of the Executive Summary of which is appended. There are differences between the program which we proposed and that now incorporated in the Act.

SUMMARY OF CHANGES IN THE NATIONAL ENERGY ACT NOW PROPOSED BY S.E.I.A.

In order to substantially increase the impact of the solar incentive program without excessive increase in its cost, we propose the following changes in the Act as passed by the House of Representatives:

For homeowners; increase the tax credit on the first \$1,500 invested in solar from 30 percent to 40 percent, leaving the credit on the next \$8,500 at 20 percent.

Add a bonus tax credit applying only to retrofit installations replacing natural gas of 15 percent of the taxpayer's solar expenditure, with the maximum amount of the bonus being limited to \$1,000.

For business; the present tax credits as applying to businesses are inadequate, particularly as they apply to smaller businesses. Change the solar business tax credit to provide a 35 percent credit on the first \$50,000 spent, 30 percent on the next \$50,000 and 20 percent on all over \$100,000.

GENERAL COMPARISON OF TAX BENEFITS TO HOMEOWNERS

The following table compares the tax credits provided in the National Energy Act as passed by the House of Representatives with those called for in our proposals:

Homeowner solar tax credits

National Energy Act :	
Credit on 1st \$1,500.....	\$450
Maximum credit.....	2, 150
S.E.I.A. basic proposals (not including gas retrofit credit) :	
Credit on 1st \$1,500 ¹	667
Maximum credit ¹	2, 267

¹ Net average after tax benefit to the homeowner.

The comparisons are made at two levels; the \$1,500 level representing generally the typical installed cost of a solar water heater and the maximum benefit which the consumer can obtain. The economics of a solar installation vary with climatic factors and also with the cost and availability of conventional energy sources. There is no single level of benefits which would be universally adequate. Thus, the higher benefits which we proposed would be expected to have a somewhat greater impact upon the market than those included in the National Energy Act. The differences are particularly important in the case of water heaters represented by the first \$1,500 spent. We recommend that the credit upon the first \$1,500 be increased from 30 percent to 40 percent, thereby increasing the credit on the first \$1,500 to \$600 and the maximum credit to \$2,300.

THE GAS RETROFIT BONUS

S.E.I.A. proposed a special bonus credit for homeowners (as well as others) installing solar equipment to replace consumption of natural gas. Where available to the homeowner, natural gas is still relatively very low priced. As a result, our studies show that the payout time for solar installations replacing natural gas consumption is generally overly long. This will still be true, but to a lesser extent, when the incentives provided for in the National Energy Act are taken into account. At the same time, we recognize that natural gas is the energy resource which is in particularly short supply.

The potential for retrofitting with solar to reduce residential natural gas consumption is further complicated by other measures incorporated in the Act which would have the effect of reducing industrial and large commercial natural gas consumption in such manner as to help assure the homeowner of continuing supplies of natural gas at relatively reasonable prices. As homeowners, we certainly can appreciate the importance of these measures, and it is not our purpose to argue against them. However, these measures have the effect of increasing the importance and potential impact of proposals for additional credits to be granted only to those retrofitting with solar devices replacing natural gas.

The S.E.I.A. proposal provided a net average after tax benefit of 16.7 percent of the first \$6,000 of qualified solar expenditures or a maximum of \$1,000 additional average benefit. We recommend that the following additional paragraph (3) be added:

"(3) In the case of qualified solar expenditures made by the taxpayer with respect to the taxpayer's existing principal residence, an additional credit equal to the lesser of \$1,000 or 15 percent of such expenditures."

BUSINESS SOLAR TAX CREDITS

The following table compares the tax credits provided in the National Energy Act as passed by the House of Representatives with those called for in our proposals:

<i>Business solar tax credits</i>		<i>Percent</i>
National Energy Act :		
All applications.....		10
Additional credit for retrofit only.....		10
S.E.I.A. basic proposals (credit not including gas retrofit bonus) :		
1st \$50,000.....		45
Next \$50,000.....		40
All over \$100,000.....		30

The credits now proposed are much lower than those proposed by S.E.I.A. and do not include the additional credit offered for the relatively smaller installations, such as might be made to supply solar energy to smaller apartment complexes, small commercial establishments and small industry.

We recognize that justification exists for reducing the level of tax credits for businesses since the relative economic position of solar installations will benefit as the result of the increases in business costs for petroleum products and natural gas called for by the National Energy Act. However, we point out that the computation of the oil and gas consumption taxes provided has the effect of exempting smaller business users from the tax. The effect is to reduce the incentive to convert to solar for the smaller business. Accordingly, we recommend that the credit provided in the National Energy Act be established at 35 percent for the first \$50,000 of qualified expenditures, 30 percent for the next \$50,000 and 20 percent for all over \$100,000.

The original S.E.I.A. incentive proposal also called for an additional "bonus" tax credit for solar installations when made as retrofit installations replacing natural gas. It appears that natural gas consumption tax eliminates the need for the "natural gas retrofit bonus" in the case of all except the smaller business users (who would be provided for by the proposal made to provide larger tax credits for nonresidential solar investments on the first \$50,000 and on the first \$100,000 invested).

INCREASED BENEFITS FOR LOW INCOME HOMEOWNERS

Returning now to the subject of tax credits for homeowners, we make note that the S.E.I.A. proposal actually called for taxable rebates rather than a direct tax credit. (The figures quoted in the comparisons made previously for "net average after tax benefit" were based upon subtracting from the gross rebate the portion of the rebate which would be repaid in taxes by the taxpayer.) The purpose of proposing taxable rebates rather than a direct tax credit is explained in some detail in the S.E.I.A. proposal. Basically, it was to provide a mechanism by which the net after tax benefit to higher income families would be less than for lower income families. We feel that it is, in principle, appropriate to do this. However, we gather that there is material concern for the administrative burden which would be imposed upon the Treasury Department were they called upon to process substantial numbers of requests for taxable tax rebates. In the final analysis, we believe that our position must be that the principle of the taxable rebates is a desirable principle but it is not our purpose to propose the creation of a system which would be administratively overly burdensome.

We now propose to explore other means of providing other added assistance to low income homeowners. One possibility is loan guarantees which would make money available to them at lower interest cost. Such proposals are presently addressed in other pending legislation.

SOLAR ENERGY INDUSTRIES ASSOCIATION PROPOSED SOLAR INCENTIVE PROGRAM

EXECUTIVE SUMMARY

We propose a system of incentives intended to accelerate commercialization of the production and use of solar-thermal energy for heating, hot water and cooling. Results expected, expressed in terms of equivalent barrels of oil saved per day, are:

	<i>Barrels per day</i>
1982 -----	38,000
1987 -----	365,000
1992 -----	1,653,000

Production of solar energy at these rates represents a major contribution to our Nation's energy problem ten to fifteen years hence.

The cost of the incentive program, based upon these projections, is as follows:

1977 -----	\$16,000,000
1978 -----	30,000,000
1979 -----	106,000,000
1980 -----	268,000,000
1981 -----	457,000,000
1982 -----	829,000,000

In these and other calculations, we allow for future inflation at an average rate of 5 percent per year.

It is presently proposed that incentives be provided for the years 1977-1982, with results and rates to be reviewed during the fifth year. If nonrenewable energy prices rise no more rapidly than we expect, we expect that the program will need to be continued through 1988, but at decreasing levels of incentives.

Investments made in solar equipment are "new" investments and conventional equipment is needed as "backup" to the solar facilities. Thus, solar investments are additive to GNP. We expect them to total (including inflation) :

	<i>Billion</i>
1977-82	\$4. 43
1983-87	42. 00
1988-92	230. 40

This new economic activity will add to Federal revenues. At the 1976 average, Federal receipts are 19 percent of GNP. Based on this percentage, new Federal revenues, offsetting program cost, are estimated at :

[Billions of dollars; including inflation]

	Cost of incentives	Additional revenues
1977-82.....	1. 7	0. 84
1983-87.....	19. 1	8. 0
1988-92.....	13. 7	43. 8

¹ Estimated future program costs assuming incentive program continued beyond 1982.

Increased economic activity also means new jobs. We expect that the solar industry will create 74,000 new jobs in 1982; 347,000 in 1987 and 931,000 in 1992.

The solar resource is diffuse and commercialization means that literally millions of individuals and businesses must become producers of solar energy. Even with the help of incentives, this takes time. The timing of the program is important. We must begin it now if we are to reach long term goals.

In developing our incentive proposals, our objective has been to encourage commercialization in the most cost-effective and equitable manner possible. We have structured our program to particularly assist low income individuals and small businesses who are most heavily impacted by energy shortages and by high energy prices. The table which follows details our proposals.

PROPOSED SOLAR INCENTIVES

A. For individuals

Treasury Rebates, taxable as income to the individuals as follows:

1. General, for all applications :

[In percent]

	Gross taxable rebate	Net average after tax benefit
1977-80:		
1st \$1,000 expended on a solar system.....	70	46. 7
Next \$2,000 expended on a solar system.....	60	40. 0
Next \$3,000 expended on a solar system.....	50	33. 3
1981-82:		
1st \$1,000 expended on a solar system.....	50	33. 3
Next \$2,000 expended on a solar system.....	40	26. 7
Next \$3,000 expended on a solar system.....	30	20. 0

2. Additional taxable rebate, limited only to retrofit systems replacing natural gas :

[In percent]

	Gross taxable rebate	Net average after tax benefit
1977-80: 1st \$5,000 expended on a solar system.....	25	16. 7
1981-82: 1st \$5,000 expended on a solar system.....	25	16. 7

3. Limitation; maximum rebate, including the natural gas retrofit bonus; 85 percent gross (56.7 percent net average).

4. Provision for restudy; 5 years after implementation, the incentive system shall be reviewed to determine if it is to be continued and, if so, at what rates.

5. Assignability of rebates; the buyer shall be permitted to assign to the seller all or any part of the rebate to which he is entitled.

B. For corporations

1. The status of solar facilities is to be clarified. Facilities producing solar thermal energy from solar radiation are to be positively classified and defined as production equipment and thereby made eligible for regular investment tax credits at the same rates as those provided by law for other energy production facilities.

2. In lieu of depletion allowances and other incentives and to encourage the use of renewable energy sources, the following additional tax credits are to be provided:

(a) For all applications:	<i>Investment tax credit (percent)</i>
1977-80:	
First \$50,000 expended on a solar system.....	35
Next \$50,000 expended on a solar system.....	30
All over \$100,000 expended on a solar system.....	20
1981-82:	
First \$50,000 expended on a solar system.....	25
Next \$50,000 expended on a solar system.....	20
All over \$100,000 expended on a solar system.....	15
(b) Additional tax credits limited only to retrofit systems replacing natural gas:	
1977-80:	
First \$100,000 expended on a solar system.....	20
1981-82:	
First \$100,000 expended on a solar system.....	15

3. Limitation; maximum tax credit allowed in any 1 year, 50 percent of taxable income, with provisions for carry-forward as in present tax credit systems.

4. Provision for restudy; 5 years after implementation, the incentive system is to be reviewed to determine if it is to be continued and, if so, at what rates.

C. Federal loan guarantees

Federal loan guarantees, without subsidy and at prevailing rates, to provide solar producer-users with access to the investment funds required at reasonable rates. Both individuals and corporations are eligible for guaranteed loans. The guaranteed loans are to be made available for terms of up to fifteen years.

D. Solar Government buildings program

A solar Government buildings program mandating that the Federal Government utilize solar energy in new and existing Federally owned or controlled structures when a life cycle cost analysis indicates that this is justified after crediting the cost of the solar installation with investment tax credits at the rates called for in Section B. In the case of structures owned or controlled by other Governmental Agencies (State and local), grants for solar installations are to be made available to these entities at the investment tax credit rates called for in Section B.

The CHAIRMAN. Next, we will call Mr. Carl Bruechert, president of Frank A. Player Co., on behalf of the Mechanical Contractors Association of America.

STATEMENT OF CARL BRUECHERT, PRESIDENT, FRANK A. PLAYER CO., ON BEHALF OF THE MECHANICAL CONTRACTORS ASSOCIATION OF AMERICA, INC.

Mr. BRUECHERT. We appreciate the opportunity to be here before your committee this morning. I am speaking on behalf of the Mechani-

cal Contractors, known as MCAA. We have submitted a written report of our proposal, and incidentally you pronounced my name very well.

I will try to give some highlights from our written report that has been submitted and make a few comments and I will try to be brief.

The MCAA—which is the way we refer to our organization—is a trade association of about 1,500 firms employing approximately 125,000 persons. Most of us employ union labor.

A mechanical contractor builds systems that move fluids, both liquid and gas. This includes the fabrication and installation of heating, ventilating, air conditioning, and process piping systems, and further encompasses service, maintenance, and the testing, adjusting, and balancing of these systems.

Our work affects multiresidential, commercial, public and industrial facilities. The equipment our members install is the principal user of energy in buildings, and energy is the key to our industry.

Consequently, we are deeply concerned about conservation and the effective use of our Nation's fuel resources. We have extensive experience and know-how in this field. Even before the OPEC oil embargo in 1973, MCAA had formed an Energy Conservation Committee to inform and assist our members in the areas of energy conservation.

Let me add that our members, while they are all contractors in the construction business and selling mechanical systems, are very active, and many of them are members and participate in technical society business and work and many, many of our members are engineers, as well as professional engineers.

MCAA has long recognized that this Nation needs strong and comprehensive energy policies to eliminate our dependence on foreign oil and gas. In March, the association prepared an energy policy statement outlining its recommendations, which it forwarded to Dr. James R. Schlesinger, now Secretary of Energy. A copy of this statement is attached: See appendix A.

We are pleased that proposals of the National Energy Act to consider that effective nationwide energy conservation is necessary. We strongly agree with the premise that conservation in existing residential, commercial, and industrial buildings is necessary to bring immediate and substantial savings in the use of petroleum and to ease our Nation's energy problems while new sources of energy are being developed.

When we speak of conservation, we are not speaking of reducing the quality of services and buildings, we are really talking about energy that you might say is being wasted—or at least energy that does not have to be used. Sometimes this requires modifications, sometimes it requires quite a bit of capital expenditure.

We are not speaking about conservation in the sense that we are going to eliminate what we now presently enjoy.

The estimates show that if the amount of energy used in existing buildings were reduced by 25 percent, which we feel is conservative as a goal, this Nation could save an equivalent of 3 million barrels a day. That is a very substantial amount.

Therefore, conservation must be our first priority in the Nation's energy program, because we do have the capability of doing something right away.

We would like to focus on the administration's proposals in part I and part VI of title II, regarding tax credits for homeowners and businessmen. MCAA wholeheartedly agrees in theory that tax credits are necessary to stimulate what we in this industry call retrofit, the renovation, restructuring or repair of structures and mechanical systems to assure the more efficient use of petroleum or other energy sources.

The majority of our present heating, cooling, and energy systems were built in an era when energy was cheap. They were relatively inexpensive to install but they require far more gas and oil than more efficient systems, which are now available but which are costly to install.

Motivating people to undertake energy conservation is a matter of economics. At present prices it would take a homeowner up to 10 years or even more to recover the cost of undertaking a worthwhile—25-percent savings—energy improvement project, including insulation, double glazing, installation of heat pumps or other renewable source systems.

By today's business practices an owner of a typical commercial establishment—office building, restaurant, or store—considers that a capital expenditure for energy conservation measures, such as the replacement of a boiler, a more efficient control system and insulation, must be recovered in 2 to 5 years to be a worthwhile investment. With present and projected fuel prices, relatively few projects can meet the criteria.

These measures should not be limited by a restrictive laundry list of permitted improvements.

MCAA therefore proposes that on top of an investment tax credit, which can be set at whatever rate Congress deems appropriate, an energy conservation tax incentive be granted that would provide credits based on the amount of energy saved by the new installation or equipment. This would give owners a true "incentive" to invest in the most efficient improvements having the best energy conserving results or the higher quality equipment. It could also be granted on a sliding scale to encourage the conversion to more plentiful resources.

Our proposal is based on the following considerations.

One, there is no shortage of know-how in the U.S. private sector to achieve substantial energy savings.

Two, the tax method used should be sufficiently broad and flexible to encourage full use of the inherent ingenuity of the U.S. private sector, and should encourage innovation.

Three, incentives should encourage a total conservation effort in buildings and encompass a full range of improvements, including structural and equipment corrections and not be limited to the addition of solar equipment and insulation.

Four, the incentives should be based on the principle that predictable results in energy savings can be calculated.

Five, energy savings can be accurately forecast by a qualified professional who has known expertise in this area.

Six, a certification by a qualified professional will be as valid as a certification by a certified public accountant.

Seven, the concept of tax incentives should be based on the principle that for each barrel of oil saved, an equivalent tax credit is given. The equivalent can be applied to other fuels.

Eight, the per barrel value of oil to the United States for tax purposes can be determined annually by the Secretary of Energy, Commerce or other Government official, based on pertinent considerations, such as worldwide prices and the value of fuel savings to the national economy.

The Internal Revenue Service can allow tax credits equal to the dollar amount of the number of barrels of oil saved.

The credits can be applied annually for a specific number of years.

The advantages of this proposal for tax credits for energy conservation are that it:

One, encourages maximum quality energy conservation as a national policy.

Two, gives credits for total energy conservation in buildings, rather than for partial steps.

Three, provides incentives on all types of buildings, including homes, commercial, and industrial.

Four, stresses fuel savings, provides credit on the amount of fuel actually saved, rather than just the amount of capital expended.

Five, assures accurate reporting due to required evaluation by qualified professionals.

Six, is flexible. The value of a barrel of oil for tax purposes can be established annually. The value can get high enough to stimulate conservation for the annual target objective in savings and low enough to avoid undue pressure on the U.S. Treasury.

Referring to the 25-percent savings that we mentioned earlier and the potential of producing a savings of 3 million barrels a day if this were carried out, so in the example here, or in the illustration, if we could achieve this goal over the next 10 years, the average savings per day by the end of the first year would be 300,000 barrels.

If Congress sets a price—if it would ever set the value of \$10, just as an example—the tax credits would amount to an average annually of slightly more than \$1 billion per year. Over the 10 years assumed to reach this goal, the target tax credits would then be slightly more than \$10 billion, if the credit were allowed, for only the first year of fuel savings in the renovated building or plant.

Similarly, if a credit were allowed for the first few years of fuel savings, total credits would amount to \$20 billion over the program, and so on.

Thus, it is possible for the Congress to provide an effective incentive based on results and at the same time exercise control over the ultimate amount of the tax credit.

Another advantage of the proposal is that it entrusts the work to the people best qualified to judge energy efficiency and those who have gained their expertise by operating in a free competitive business climate.

The most effective way to spur energy conservation in the private sector and among millions of American homeowners is to offer tax credits for renovation and retrofitting of buildings and equipment to save energy. Investment tax credits will spur energy conservation, but incentives to promote quality conservation improvement, based on the amount of fuel saved are also needed. Valid and effective methods for calculating these credits exist and can be implemented immediately by congressional authorization.

The country, as you gentlemen well know without my mentioning it, is ready to move. The professional engineers, the contractors have the know-how. However, our observations have been that even though you would think there would be a natural incentive in saving fuel, we have not moved.

We have made a considerable effort to stimulate activity in the energy conservation field, but little has happened.

Mr. Chairman, I want to thank you for this opportunity to present these highlights of this report. I will be pleased to answer any questions that you may have, to the very best of my ability.

The CHAIRMAN. Let me ask you this. Your scheme, I take it, would envisage that someone would go to every house and every apartment building and every business and make an analysis of what could be done most efficiently to reduce energy waste in those buildings, is that right?

Mr. BRUECHERT. Some of the buildings would be done as a group. In small buildings, in homeowners situations, these can be classified by areas of the country and by size and by what is in them, et cetera. It would not be an involved, tremendously lengthy problem to judge what would have to be done in those cases.

In large installations, yes; the analysis would be made in each individual case, and it would be certified of course, after the work had been done by a qualified professional. We do not want to just hang our hat on somebody's opinion; it would be a qualified opinion.

The CHAIRMAN. Someone would go in and make an estimate of the amount of energy that would be saved. As I understand it, your proposal would give them a tax credit for a portion of what is to be gained, or would you give them a tax credit for what amounts to one barrel of energy for every barrel he saves. Is that the idea?

Mr. BRUECHERT. The idea is if the improvement or modification to a system or building would result in the professional judgment for this plant to save, let us say, 1,000 barrels of oil per year, then an owner or company would be given the credit, then, of 1,000 barrels of oil, which was his savings for the year, his annual savings. It, of course, would have to be certified by the professional before the owner could put it in on his tax return.

This would be a continuing saving, you see, down the road, by virtue of the fact that he made those improvements.

The 1,000 barrels credit would have to be established according to the value per barrel to the country and whether it would apply for 1 year, 2 years, or what have you.

In other words, the concept is that we have tied a credit, in this case, an incentive, directly to the results to be achieved in savings on a continuing, down-the-road basis.

The CHAIRMAN. It could be done all at one time. But it would take a long time, I should think, to have an analysis of all of these buildings, would it not?

Mr. BRUECHERT. We have a large number of people in the engineering community in this country who are ready to go—the professional societies, the contracting communities. It would not take huge amounts of time to do.

Some will require capital-intensive modifications; others will be less complicated. There is a whole, broad range of energy wasting systems out there, just begging to have something done to them.

The CHAIRMAN. In other words, there are literally millions of inefficient heating units and inefficient air-conditioning units, I take it?

Mr. BRUECHERT. Yes; there are many.

Estimates have shown that our Nation has 24 billion square feet of floor space in commercial, institutional, and governmental buildings. Experts agree that these buildings, on the average, waste between 40 and 50 percent of the energy consumed.

In addition, the United States has 113,048 manufacturing plants, which employ over 20 million people. These too waste in some cases up to 50 percent in energy.

Let me illustrate how this has come about. Energy has been rather inexpensive in our country and in providing comfort for heating and air conditioning, let us say, in an office building.

One simple device has been to make basic calculations, for example, to design a heating and cooling system in a building worth \$10,000. That figure will provide enough manpower and enough time to design the basic requirements for a sample building.

But we know that if we reduce the size of equipment unreasonably and search for the last opportunity to save energy, as designers, we stick our neck out a bit and we say, well, it is not really worth it. All we have at stake here is our reputation. We are going to get a standard unit on the market. It will be a little bit bigger than we need. We will run it as a cooling unit.

This will take a little more energy, but we will compensate for the temperature control system by providing another unit, which will be the heating unit. We will heat hot water with natural gas during the summer, and we will correct any overcooling tendency in different areas of the building by providing the hot water to reheat the air in those areas. Then we can't miss.

It is true it is extremely effective. It provides wonderful comfort conditions. What you have done is use more electrical energy on the cooling cycle, for example. You are using a new-source energy, like natural gas, for heating hot water during the same period. So we are wasting double in a case like that.

Now, to get into the alternatives, you get into much more complex calculations. You are going to have to spend more than \$10,000 for engineering. These things have been created because energy was cheap, and you had to have the boiler anyway for heating in the wintertime.

It made good sense. Energy was not determining factor.

But if we are correct in assuming that petroleum fuels are finite, if we feel they are critical, here is a real opportunity to quit throwing away a nonrenewable product. We have the technology, the people, the equipment, all of this, ready to go. It would also immediately become quite an important factor in the economic recovery of our construction industry.

The CHAIRMAN. Thank you.

Senator Curtis?

Senator CURTIS. You are convinced that the mere reduction in fuel costs will not cause homeowners and business to do this?

Mr. BRUECHERT. You mean the increasing cost of fuel?

Senator CURTIS. The reduction. If the heating and cooling system in a house is inefficient now, if you put in an efficient one, it will lower the cost, will it not?

Mr. BRUECHERT. Yes, it will.

Senator CURTIS. You do not think that is sufficient?

Mr. BRUECHERT. At the present time, we do not feel that it is. However, we do not think that there is any question that ultimately everything will adjust in the free market, no question about it. It is just a matter of whether it will happen soon enough. We feel that to make conservation occur now, when the price of fuel is still cheap, a tax incentive is needed.

Senator CURTIS. I have known a number of homeowners who have found in the last few years that their systems were very inefficient, and they have changed them.

Mr. BRUECHERT. Yes.

Senator CURTIS. I have in mind one home in particular that the system was electricity. Not too large a home, but the heating bill was running \$200 a month.

Mr. BRUECHERT. That is a good example of reaching the level.

Senator CURTIS. The heat pump was put in, and it was very substantially lowered.

Mr. BRUECHERT. Yes.

Senator CURTIS. They felt that the lowering of the cost was sufficient incentive to make the change.

Mr. BRUECHERT. Yes. No question about it. The prices will eventually seek their proper level in the market. There is no doubt. New installations, of course, too.

The question in our mind was it was not happening very fast, and we deal primarily in the industrial and commercial sector. There we see some prime examples of this, perhaps much worse than the typical home.

But anyway, because it is not taking place we have to presume also that the present price of fuels is not stimulating that end result.

Senator CURTIS. Thank you.

The CHAIRMAN. Senator Dole?

Senator DOLE. It sounds complicated. I do not know how it would work.

In other words, you would not be penalized for not doing something, you would be rewarded for doing something?

Mr. BRUECHERT. Yes, that is true. Of course, we say—and maybe it is from our own viewpoint, that it is very simple. The reason we say that it is simple is because we have to deal all the time with forecasts of energy use in the installations that we make, not so much as contractors, but as engineers, and the engineering community has to do this.

Therefore, we say the results are predictable with rather good accuracy. We felt the simplicity was, once this work had been done and certified, both as to its completeness and as to its capability for saving barrels of oil, then the certification simply allows the same number of barrels as the credit, at whatever price has been set.

We thought that was simple. It did not require an administrative group in Government to look after it. It would simply be part of your tax return that is necessary anyway.

Senator DOLE. What would the estimated cost be if this were implemented?

Mr. BRUECHERT. The cost to the Government—this incentive—we would have to make a few assumptions.

In the example I used, we said, if it is carried out over 10 years, and the price per barrel of oil is \$10 in our 25 percent example it would be about \$1 billion a year.

But then you wind up ultimately with a savings on this projection also of 3 million barrels of oil equivalent a day in our system, buildings, institutions, and plants around the country, which we thought was significant.

We felt that we needed to begin to generate the savings of the petroleum fuels right away, very, very quickly through action of Congress.

Senator DOLE. That is all I have.

The CHAIRMAN. It seems to me that you might get double mileage of what you are trying to do if you used both the carrot and the stick by putting a tax on all energy inefficient buildings.

I live in the Watergate. It was built at a time when everyone thought that energy would be very, very cheap, and I gain the impression that it is a very energy-inefficient building—about 50 percent of the outside wall space is glass.

Mr. BRUECHERT. That is one aspect of Watergate that I know nothing about.

The CHAIRMAN. It is easy to break into. About 50 percent of the outside walls are glass. I do not think it is insulated glass, either.

It seems to me that if we enact a tax of 30 percent, you said, all right, a 30-percent premium tax, for the privilege of having an inefficient building. If the owners could do what needs to be done to make a building reasonably efficient, we could grant, let us say, a first-year tax credit of 30 percent.

It seems to me that with such a program it would get people moving; they would get busy and hire an engineer to provide them some energy estimates. The first thing we knew, they would be off and going.

When people computed the savings of energy conservation, they could add the 30-percent annual savings for not paying the inefficiency tax or the wastrel tax. One would add what one saves by not paying the tax for being an energy wastrel and then would add what he saves by being energy efficient. As a result, I would think that people would be calling for members of your association in a hurry to come see them.

So far, not much has been done about this problem, it seems to me.

Mr. BRUECHERT. That is true. This would be a greater stimulus than just the one, the carrot by itself.

When you mentioned glass—this can be a two-edge sword, too. The glass can be beneficial as well as harmful, it depends on how you deal with it. It can accept solar energy when it is useful, but some means must be provided to reject heat when it is not useful energy. This is being worked on, and this will be incorporated in new building design. But in existing buildings, it is going to be much slower coming down the road. In a new building, many of these things can be done rather cost effectively, because now the emphasis is on not wasting.

And I must give our professional people good marks for paying a lot of attention to that in new design work. I think this is excellent.

The CHAIRMAN. In the Watergate building, as one example—I am sure others were built at the same time—50 percent of the wall space is glass, just one thickness of glass.

How much energy would be saved if there was a second thickness of glass between that and the weather on the outside?

Mr. BRUECHERT. The transmission of thermal cuts it about in half. There are other things, however, in addition. Double glazing can be good, but this is one of the risks in identifying things as being specifically qualified, you know, for some kinds of credit and incentive.

There is another way to look at it. You can say, OK, we can use exterior movable blinds, such as louvres, and these can reject the acceptance of solar heat during cool weather when you do not want it. You can receive it when the temperatures are such that you will largely benefit from it. You could also provide movable screens on the inside that will close off and do the same thing as double glazing. These can be extremely effective when there is no sun and you can use for heating in the building, or at night, particularly in periods where there is no sunlight.

Glass could be both good or bad. It depends on how you deal with it, and the time of year, et cetera.

The CHAIRMAN. Thank you very much for your statement, sir.
[The prepared statement of Mr. Bruechert follows:]

STATEMENT OF MECHANICAL CONTRACTORS ASSOCIATION OF AMERICA

Mr. Chairman and members of the committee. The Mechanical Contractors Association of America, known by its initials MCAA, appreciates this opportunity to testify on the tax aspects of President Carter's Energy Proposals.

MCAA is a construction trade association of about 1500 firms, employing approximately 125,000 persons. Almost all of the firms employ union labor. I am Carl J. Bruechert, President of Frank A. Player Company, Atlanta, Georgia, a mechanical contracting firm.

A mechanical contractor builds systems to move fluids, both liquid and gas. This includes the fabrication and installation of heating, ventilating, air conditioning and process piping systems, and further encompasses service, maintenance and the testing, adjusting and balancing of these systems. Our work affects multi-residential, commercial, public and industrial facilities. The equipment our members install is the principal user of energy in buildings, and energy is the key to our industry. Consequently, we are deeply concerned about conservation and the effective use of our nation's fuel resources. We have extensive experience and know-how in this field. Even before the OPEC oil embargo in 1973, MCAA had formed an Energy Conservation Committee to inform and assist our members in the areas of energy conservation.

MCAA has long recognized that this nation needs strong and comprehensive energy policies to eliminate our dependence on foreign oil and gas. In March the association prepared an energy policy statement outlining its recommendation, which it forwarded to Dr. James R. Schlesinger, now Secretary of Energy. A copy of this statement is attached. (See: appendix A.)

We are pleased that proposals of the National Energy Act consider that effective nation-wide energy conservation is necessary. We strongly agree with the premise that conservation in existing residential, commercial and industrial buildings are necessary to bring immediate and substantial savings in the use of petroleum and to ease our nation's energy problems while new sources of energy are being developed. Studies show that on the conservative side, 25 percent of the energy used in buildings can be saved, and this figure might well rise to 50 percent.

Taking a very broad view, MCAA believes that because of our fuel shortages this nation must take three important steps:

1. We must uncover more oil and gas reserves.
2. We must develop new technologies on a broad scale so that we can take advantage of unused sources of energy, such as safe nuclear power, solar energy,

fusion, geothermal, wind and biomass. This also includes finding ways to burn coal more efficiently and making it environmentally acceptable.

3. We must undertake wide-ranging and effective conservation programs. Through this alternative we can obtain immediate and extensive energy savings, while we develop new sources of energy and new technologies. Estimates show that our savings can be substantial. If the amount of energy used in existing buildings were reduced by 25 percent, this nation could save an equivalent of 3 million barrels of oil a day.

Therefore, conservation must be our first priority in the nation's energy program.

Today we would like to focus on the Administration's proposals in Part I and Part VI of Title II regarding tax credits for homeowners and businessmen. MCAA wholeheartedly agrees in theory that tax credits are necessary to stimulate what we in this industry call "retrofit", the renovation, restructuring or repair of structures and mechanical systems to assure the more efficient use of petroleum or other energy sources.

The majority of our present heating, cooling and energy systems were built in an era when energy was cheap. They were relatively inexpensive to install but they require far more gas and oil than more efficient systems, which are now available but which are costly to install.

Motivating people to undertake energy conservation is a matter of economics. At present prices it would take a homeowner up to ten years or even more to recover the cost of undertaking a worthwhile (25 percent savings) energy-improvement project (including insulation, double glazing, installation of heat pumps or other renewable source systems). By today's business practices an owner of a typical commercial establishment (office building, restaurant or store) considers that a capital expenditure for energy conservation measures such as the replacement of a boiler, a more efficient control system and insulation, must be recovered in two to five years to be a worthwhile investment. With present and projected fuel prices relatively few projects can meet the criteria.

Our nation did not get ourselves into our present energy dilemma over-night, and we cannot extract ourselves from it at once. While it would be preferable to let the price of gas and oil seek their true level through deregulation, we recognize that immediate substantial increases could have a severe inflationary and economic impact on the United States. We do feel that controls should be gradually eliminated, however, in order to let the economics of the market place become effective. Realistic pricing of energy would have a much greater impact on resolving energy problems than governmental programs and regulations.

Until prices reach their true level, and people know the real value (or can recognize the cost savings) of undertaking energy conservation, it is therefore necessary to institute tax credits. These will motivate homeowners and businessmen to make major investments in energy conservation now when they are so desperately needed.

These measures should not be limited by a restrictive "laundry list" of permitted improvements. Basic construction and regional climatic conditions may require application of a wide range of alternatives. Walling glass windows with a northern exposure in Minnesota may cut energy consumption during winter months by 20 percent. Partitioning a room in an industrial building for storage space, where temperatures may be kept at lower levels, may cut oil use by 10-25 percent in each area modified. Placing a heat recovery system in a laundry (but not in a home) may save 10-15 percent in fuel.

Since tax credits are necessary, MCAA believes they should contain two elements:

- (a) credits should be granted on the basis of the amount of fuel saved.
- (b) the amount of energy saved can be converted to the equivalent barrels of oil.

MCAA INCENTIVE PROPOSAL

MCAA therefore proposes that on top of an investment tax credit, which can be set at whatever rate Congress deems appropriate, an "energy conservation tax incentive" be granted that would provide credits based on the amount of energy saved by the new installation or equipment. This would give owners a true "incentive" to invest in the most efficient improvements having the best energy conserving results or the higher quality equipment. It could also be granted on a sliding scale to encourage the conversion to more plentiful resources.

We have developed a proposal that will encourage energy saving investments through tax incentives based on the amount of capital expended and the total

amount of fuel saved. It can be applied to all building owners—residential, commercial and industrial . . . and is easily administered.

BASIC CONSIDERATIONS

Our proposal is based on the following considerations:

1. There is no shortage of know-how in the U.S. private sector to achieve substantial energy savings.
2. The tax method used should be sufficiently broad and flexible to encourage full use of the inherent ingenuity of the U.S. private sector, and should encourage innovation.
3. Incentives should encourage a total conservation effort in buildings and encompass a full range of improvements, including structural and equipment corrections and not be limited to the addition of solar equipment and insulation.
4. The incentives should be based on the principle that predictable results in energy savings can be calculated.
5. Energy savings can be accurately forecast by a qualified professional who has known expertise in this area.
6. A certification by a qualified professional will be as valid as a certification by a Certified Public Accountant.
7. The concept of tax incentives should be based on the principle that for each barrel of oil saved, an equivalent tax credit is given. (The equivalent can be applied to other fuels.)
8. The per barrel value of oil to the United States for tax purposes can be determined annually by the Secretary of Energy, Commerce or other government official, based on pertinent considerations, such as worldwide prices and the value of fuel savings to the national economy.

PROPOSAL

Our proposal is as follows:

Each homeowner or owner of an industrial or commercial building should be provided a basic tax credit based on the amount of capital invested. On top of this he should be given an energy tax conservation incentive credit based on the amount of gas, oil or petroleum-generated electrical energy (including natural gas generated energy) saved through improvements in existing buildings or their energy systems. This would include, but not necessarily be limited to the renovation or restructuring of the exterior or interior of buildings; the addition of solar or geothermal energy systems, heat pumps or insulation; replacement or improvements in mechanical or environmental systems, including piping, heating, cooling, ventilating, air conditioning, plumbing, electrical or duct work; and the testing and balancing of these systems.

The suggested method of determining the incentive is as follows:

(a) The total annual energy savings of an improved facility can be accurately calculated by qualified professionals. The amount of oil or natural gas (including electric power so generated or equivalent fuel) saved can be certified by a professional practicing in this field, such as certification by a Certified Public Accountant in the field of finance.

(b) The amount of energy saved can be converted to the equivalent barrels of oil.

(c) The Secretary of Energy (or a comparable Administration official) can each year determine the actual dollar value of a barrel of oil, based on worldwide prices, the value to the national economy of saving a non-renewable resource or other factors.

(d) The Internal Revenue Service can allow tax credits equal to the dollar amount of the number of barrels of oil saved.

(e) The credits can be applied annually for a specific number of years.

I have attached to my testimony proposed legislative language to show how this plan could be incorporated into the National Energy Act. (See: Appendix B.) An incentive to encourage a more rapid shift to coal, solar energy or other sources could be added.

ADVANTAGES OF PROPOSAL IN REVIEW

The advantages of this proposal for tax credits for energy conservation are that it:

1. Encourages maximum quality energy conservation as a national policy.

2. Gives credits for total energy conservation in buildings, rather than for partial steps.

3. Provides incentives on all types of buildings, including homes, commercial and industrial.

4. Stresses fuel savings; provides credit on the amount of fuel actually saved rather than just the amount of capital expended.

5. Assures accurate reporting due to required evaluation by qualified professionals.

6. Is flexible. The value of a barrel of oil for tax purposes can be established annually. The value can get high enough to stimulate conservation for the annual target objective in savings and low enough to avoid undue pressure on the U.S. Treasury.

7. Entrusts the work to people best qualified to judge energy efficiency and those who have gained their expertise by operating in a free competitive business climate.

MCAA recognizes that this is an unusual proposal. Yet, we believe a careful study will reflect its merits, workability and simplicity. Its effectiveness can be evaluated by comparing the total tax credits (or the claimed amount of equivalent barrels saved) against the actual reduction in consumption of oil and gas.

We also recognize that other methods may have merit. For example:

1. An additional investment tax credit of 10 percent might be offered homeowners and businessmen as an immediate incentive; then the "energy conservation tax incentive" might be granted on a deferred basis after the retrofit project has been completed and the actual amount of fuel saved proved through reduced meter readings or by presentation of fuel bills showing lower consumption. This would be similar to the present system of granting capital gains or losses on stock investments.

2. "Energy conservation tax incentives" might also be granted on a retrospective basis by calculating the reduction in the amount of fuel used per square foot per year, based on an average degree day for that area of the United States.

3. A standard for fuel consumption in typical establishments in different regions of the U.S. might be determined; however, this would be more difficult due to variations in energy consumption in similar buildings.

One advantage of 1 and 2 above is that they would provide owners incentives for continuing efficient maintenance and operation (energy management) of buildings. The benefits of a capital outlay can be lost rapidly through ineffective management and operation.

Although some type of administrative burden on the federal government is necessary to carry out any of these methods of granting tax credits for saving energy, we believe that the time involved and cost is justified by the overriding importance of saving energy. Energy conservation should be the ultimate priority for national survival.

ITEMS INCLUDED UNDER ALLOWANCE OF CREDIT

In regard to Part VI, Section 2061 "Changes in Business Investment Credit," MCAA strongly urges that regulations delineating the properties to be allowed tax credits be sufficiently broad to permit total renovation and improvements in structures and equipment and the innovations that are certain to appear as the momentum toward energy conservation increases.

The regulations should permit a wide variety of options, such as the restructuring of buildings to cut energy consumptions, for example, partitioning and replacement of glass with more heat resistant materials. They should also include wood burning, and biomass boilers and furnaces, as the Act now appears to permit.

SUMMARY

The most effective way to spur energy conservation in the private sector and among millions of American homeowners is to offer tax credits for renovation and retrofitting of buildings and equipment to save energy. Investment tax credits will spur energy conservation, but incentives to promote quality conservation improvement, based on the amount of fuel saved are also needed. Valid and effective methods for calculating these credits exist and can be implemented immediately by Congressional authorization.

Mr. Chairman, I want to thank you and your Committee on behalf of MCAA for an opportunity to present this statement.

I will be pleased to respond to your questions.

MECHANICAL CONTRACTORS ASSOCIATION OF AMERICA, INC.,
Washington, D.C., March 11, 1977.

Mr. JAMES R. SCHLESINGER,
Assistant to the President,
National Energy Policy Recommendations,
Washington, D.C.

DEAR MR. SCHLESINGER: We received your letter of March 3rd, requesting views on national energy policies, just as we were preparing the attached statement to Senator Henry M. Jackson.

As the major Association of the largest heating, ventilating, air conditioning, plumbing, and process piping contractors in the country, we are, of course, directly concerned with all aspects of our nation's energy problems.

We also serve on the Construction Industry Advisory Council of the Federal Energy Administration. Within this committee we have continually expressed our views on the matter of energy conservation.

In MCAA there is a wealth of knowledge among our members on the subject of energy. It is our business. We would be most happy to assist you and your staff to help our country solve its energy problems.

Please do not hesitate to call upon us.

Very truly yours,

WALTER M. KARDY,
Executive Vice President.

APPENDIX A

RECOMMENDATIONS FOR NATIONAL ENERGY POLICIES OF THE MECHANICAL
CONTRACTORS ASSOCIATION OF AMERICA, INC.

1. CONSERVATION

The conservation of energy is the most significant way to increase our energy supply. The Construction Advisory Committee of the Federal Energy Administration, on which MCAA serves, has observed that if everything possible were done to conserve energy in existing buildings, the amount of energy saved would roughly equal our current imports of foreign oil.

Industry estimates have shown that our nation already has 24 billion square feet of floor space in commercial, institutional and governmental buildings. Experts agree that these buildings, on the average, waste between 40 and 50 percent of the energy consumed. In addition, the United States has 113,048 manufacturing plants, which employ over 20 million people. These too waste, in some cases, up to 50 percent in energy.

Conservation is therefore not just a matter of installing more insulation and double glazing windows. There are other important areas involved, such as the efficiency of heating and cooling equipment, proper temperature control equipment, proper maintenance of burners, proper ventilation, and the installation of heat recovery equipment.

Please see the material in attachment A, which gives our detailed views on energy conservation and contains a tax incentive program for energy conservation.

Our energy conservation program was developed last year. We would now suggest combining the tax incentive program with some type of guaranteed loan program.

MCAA feels that the adoption of a tax/guaranteed loan program is crucial, if energy conservation is to take place on a large scale within the private sector.

Regarding loans for energy conservation, we are dismayed by the current shortfall of accumulated capital by manufacturing companies and real estate investors. Of monies which are available for capital investment, large amounts are being spent for air and water pollution control. Although necessary from a social view, such expenditures do not contribute in a real sense to growth of industrial capacity, which, in turn, produces more goods and jobs. It has recently been proposed that additional amounts of investment capital be directed to energy-conserving equipment. There is a serious question in our minds whether our manufacturing industries will be able to meet this demand for additional investment capital without a tax incentive, coupled with some type of government-insured loan procedure.

2. WASTE FOR ENERGY

Carrier Corporation made a study several years ago which indicated that if there were one hundred percent utilization of the nation's solid waste, this waste could be burned to produce one-third of the nation's heating and cooling needs.

The nation's electric utilities should be induced to burn solid waste to produce electricity, and the nation's gas utilities should be induced to utilize waste treatment plant sludge for the production of methane gas. These steps would solve both waste and energy problems.

The technical means to utilize all of the nation's waste are presently available. What is lacking is adequate capital, plus the incentives and assurances from the government. These are needed to induce utilities and private industry to undertake waste utilization for the production of energy. 3. 37 is a step in the right direction. (As an aside, the economically battered, but populous, Northeast may be situated atop a veritable gold mine of energy in the form of municipal wastes.)

Industry is turning more and more to waste utilization for energy production, with the use of waste product boilers, the burning of bark and scrap wood by plywood mills and furniture companies, and the burning by general industry of the fossil wastes resulting from normal production methods. In small communities an industry could burn municipal wastes. Further, in many areas of the country there are acres of scrub timber and brush. This can all be chipped and burned as fuel. By weight, wood has the BTU equivalent of two-thirds that of coal. It is a low sulphur, non-polluting fuel whose resultant ash has benefit as a soil enricher. Waste paper has the same fuel-producing capability as wood. (One wonders how much energy Washington's waste paper could produce.) We feel this trend should also be encouraged.

3. NUCLEAR ELECTRIC GENERATION STATIONS

This country has more technical knowledge about nuclear power generation than any other nation. Yet, we have fallen behind in plant construction, partly because of diversity of design and the resulting spiraling cost. Why does every nuclear station we build have to be a custom design, one of a kind installation? We should standardize modular reactors in set increments of capacity such as 1 million kw, 1½ million kw, 2 million kw. We should hold to basic designs for a number of determined years to standardize design, construction and safety techniques.

4. FOSSIL ELECTRIC GENERATION STATIONS

It is totally beyond the realm of reason to burn natural gas in electric stations in this era of energy shortages. The majority of the national electric stations should be burning coal. The only number six fuel oil that should be burned in these stations is that which is a byproduct of domestic oil refining and cannot readily be utilized in other critical industrial applications. Processed municipal solid waste should also be utilized as a significant portion of the fuel used.

Lastly, the design of fossil generating stations should also be standardized to minimize cost and time of construction. The basic design of these stations should be standardized in incremental sizes similar to that applied to nuclear stations above.

5. EXPANDED USE OF COAL

The nation should take full advantage of our abundant supply of coal. However, it must be readily available and useable. To accomplish this requires realistic and simultaneous development of practical mining (including strip-mining) regulations, safety requirements, and proper environmental protection. Ways must be found to desulfurize coal, economically, and techniques for the combustion of coal need to be developed. Finally, coal must, by legislation if necessary, replace oil and gas in appropriate industries and facilities, such as electrical power generators (described above). For longer range, there should be intensive research and development of coal to produce a substitute for natural gas.

6. SOLAR

In our opinion most advocates of solar energy are taking an overly sophisticated approach to its application. In the foreseeable future solar systems cannot economically produce significant amounts of electric power or really significant amounts of energy for commercial and industrial applications.

However, on the domestic scene basic solar hardware is now available "off the shelf". Almost every existing home could install two or four solar panels on

the roof or in the back yard to heat water for domestic hot water and comfort heating applications. In the Washington, D.C. area two to four panels, installed as described, could eliminate fifty to sixty percent of the cost of heating domestic hot water by preheating water before it is used in the conventional domestic hot water heater. Any surplus solar heated water can easily be circulated through inexpensive baseboard convectors to supplement an existing heating system. Large scale use of simple solar installations in the domestic area could make a significant reduction in the consumption of natural gas and number two fuel oil.

Further, there is a ready application for the same basic solar hardware installation in commercial and industrial installations for supplemental comfort heating and process heating.

Total utilization of solar energy for single source domestic heating and cooling should be left to the future.

We feel that with a little incentive the average homeowner would flock to domestic solar hot water heating.

Further, homeowners should be encouraged to insulate their homes following recommended national guidelines.

7. SYNTHETIC FUELS

We all know about biomass and other such propositions. The technology is readily available and only awaits incentives to private industry to develop these potentials. We believe emphasis should be placed on the production of methane gas and wood alcohol-methanol. Methane and methanol are the most desirable fuels, since they are clean burning. Methanol can be added to gasoline up to approximately fifteen percent per volume with little if any modification of existing internal combustion engines. We believe the federal government should enter into an arrangement with the oil companies, sometimes called energy companies because of their involvement with coal and uranium production, to develop a biomass program. We recommend the oil companies, since they have the capital, the technical capability and the means of distribution. We would like to repeat, for emphasis, that all the techniques to accomplish this program have been developed.

8. OIL, GAS, SHALE OIL

Many oil and gas deposits still exist in the U.S. and should be developed as rapidly as possible. All unreasonable impediments to offshore exploration and other development should be eliminated. Artificial restrictive pricing of gas and oil will have to be eliminated to allow these products to find their market value in relation to all other fuels. This should be done gradually, however, in light of the relatively short time span of the whole energy revolution.

Shale development should continue at a steady pace with governmental assistance and encouragement. Technology should bring down the price of shale oil to meet the upward price of conventional oil and other fuels.

9. AUTOMOTIVE USAGES OF OIL PRODUCTS

Current efforts to reduce the size of automobiles and increase gas mileage should be accelerated moderately. The gasoline tax should be gradually increased over the next four or five years to further encourage smaller cars and to help finance federal energy programs. Certainly the 55 mph limit should be maintained.

10. CONTINUING RESEARCH TO DISCOVER NEW SOURCES OF ENERGY

The answers to our energy problems may well be found in some yet undiscovered source of energy. The government should continue to assist the private sector in undertaking research into and the development of new, sometimes called "exotic", forms of energy, such as wind, geothermal, tides, laser fusion, photovoltaic, and others. Basic research that will promote the use of fusion and breeder reactors should continue to be supported.

SUMMARY OF RECOMMENDATIONS

In summary and by order of priority; MCAA recommends that this nation:
 1. Enter into a massive conservation program with tax incentives and guaranteed loans. This would primarily be directed at commercial and industrial in-

stallations as well as the domestic area. It would include the adoption of a tax credit/loan guarantee program to promote energy conservation in the private sector (See Attachment A).

2. Enter into a massive solid waste utilization program. This program has a two-fold benefit: One, it would utilize a now wasted source of energy that is close to the urban areas where fuel is consumed. Two, most of the major metropolitan areas are experiencing extreme economic difficulties, and this program would be a welcome economic stimulus.

3. Strictly limit automotive consumption of fuels.

4. Develop a standardized program for the design of nuclear and fossil fuel generating stations and encourage an accelerated construction program.

5. Develop and promote simple solar installations in homes and light commercial and industrial installations.

6. Develop existing domestic gas and oil deposits.

7. Accelerate coal field development. Immediately develop acceptable strip mine and mine safety laws. Undertake research to improve the use of coal.

8. Synthetic fuels—begin a concerted program to develop our oil shale reserves and methane and methanol from waste biomass products.

9. Continue research to develop new forms of energy, such as breeder reactors, fusion, wind, geothermal, tides and other "exotic methods".

APPENDIX B

SUGGESTED LEGISLATIVE LANGUAGE—SUBSTITUTION FOR PARTS I AND VI, TITLE II, OF PRESIDENT CARTER'S ENERGY PROPOSALS

Part — Tax incentives to foster the conservation of energy

(a) *In General.*—In order to encourage the conservation of energy, there shall be allowed to the owner of a commercial, industrial or residential building or structure, as a credit against the taxes imposed by Sub-title A of Title 26 of the United States Code, the following amounts:

(1) An amount equal to a percent of the cost of any energy conservation measure, as defined in Section 431 (4) of the Energy Conservation and Production Act of 1976, Public Law 94-385.

(2) An energy conservation incentive tax credit to be determined by the amount of energy conserved by such energy conservation measures as computed under subsection (b) of this part.

(b) The tax credit allowed under subsection (a) (2) of this section shall be computed as follows:

(1) The total annual energy savings anticipated from energy conservation improvements purchased and installed within the taxable year shall be determined and certified by a Registered Professional Engineer in the course of an energy audit, as provided for in Section 433 (3) of Public Law 94-385.

(2) The amount of energy, which will be saved due to the installation of energy conservation improvements, shall be expressed in its equivalent to barrels of oil to be saved.

(3) The Secretary of Energy under rules and guidelines which he shall establish, shall annually determine the value of a barrel of oil, taking into account the following factors: (A) the world-wide free market price at which oil has been commercially bought and sold within the prior years; (B) the value of such oil to the national economy; and (C) the fact that oil, as expended, is not replenishable.

(4) The credit shall be expressed in a dollar amount equivalent to: (A) the number of barrels of oil saved, as computed under subsections (b) (1) and (2); multiplied by (B) the per-barrel value of oil, as computed under subsection (b) (3).

The CHAIRMAN. Next, we will call Mr. Eugene J. Wingarter, executive director, National Solid Wastes Management Association.

STATEMENT OF EUGENE J. WINGARTER, EXECUTIVE DIRECTOR, NATIONAL SOLID WASTES MANAGEMENT ASSOCIATION

Mr. WINGARTER. Good morning, Mr. Chairman. I am Eugene Wingarter from the National Solid Wastes Management Association. With

me this morning is Mr. William Brasher on my right, general counsel; and on my left is Joseph Ferrante, the director of project development for the Energy Systems Division, Wheelabrator-Frye, Inc., in Hampton, N.H.

We have submitted a prepared statement, sir, which I will abbreviate for you. I know the hour is late.

Very briefly, we are very enthused about the provisions in H.R. 8444 that provide for the added investment tax credit for recycling equipment. We think the inclusion of this provision by the House of Representatives for stimulating greater investment in resource recovery activities is a very positive initiative.

However, there appears to be some degree of oversight in drafting the language. We are suggesting clarifying language to the committee for consideration which will allow this investment tax credit to apply to the full range of resource recovery systems that are being contemplated today.

Very briefly, the language as originally included in the House version of the bill provides for the recycling tax credit for, basically, materials recovery equipment.

Another section of the bill has a provision to provide for the credit when a boiler is involved using alternate fuel substances.

There appears to be some degree of ambiguity, however, with the types of resource recovery systems that would involve not only materials separation and recovery, but also the ability to convert solid waste into a usable form of energy.

There are various methods used to convert solid waste into various forms of energy. One is to convert refuse directly into steam and to use the steam as a source of energy. Another alternative would be to process solid waste in such a form that it could be used as a direct fuel substitute offsite from the point where it is converted into a fuel substitute. We call this refuse-derived fuel. The third basic form would be to convert solid waste into a form of synthetic gas and use that gas for a source of energy.

We have met with, and hope to work with, members of the committee staff in refining the language of this section of the bill such that it will include all the various research recovery facilities that are being planned today.

I might add that the half-dozen facilities that we have in this country today that are actually recycling significant volumes of our municipal solid wastes, all use various forms of technology. If the provision is applied as written in the current version of the bill, some of these facilities would benefit; others would not.

We hope that the 60 to 80 large-scale municipal resource recovery systems that will be built over the next decade benefit equally from this tax incentive.

That is a brief summary of my recommendation to the committee. We would be pleased to answer any questions that you or other members of the committee may have.

The CHAIRMAN. Thank you very much, sir.

Senator Dole?

Senator DOLE. Just to clarify the term "resource recovery facility." How many are there? What is a resource recovery facility?

Mr. WINGERTER. There are several in operation today, Senator. One of them is in Massachusetts which recycles municipal solid wastes

from over a dozen communities. Mr. Ferrante's firm has built, owns, and operates a facility. I will let him just discuss that briefly for you. It is very typical of a resource recovery facility.

Senator DOLE. I would like to know how the tax credit works. What are the figures that were used based on? You mentioned 70 percent of residential and commercial solid waste is combustible and has on the average an energy content of 9 million Btu. When you talk about a million tons of solid waste, about how much are we really dealing with now?

That is the total amount, how much is currently being recovered?

Mr. WINGERTER. At the present time, it is in its infancy as I mentioned a moment ago. There are about a half a dozen facilities that you can point to today that are recycling a large volume of municipal solid wastes. It is contemplated over the next decade as land disposal costs increase, as land disposal regulations become more restrictive, that there will be anywhere from 60 to 80 facilities built around the country.

At the present time, we are actually recovering—

Senator DOLE. I want to project how much energy are we talking about saving?

Mr. FERRANTE. It would be in the realm of 30 to 40 million barrels of oil annually.

Senator DOLE. Not the 200 million?

Mr. FERRANTE. That is the total available energy content in municipal solid waste, approximately 20 million barrels of oil.

Senator DOLE. We are really talking about 30 to 40. That is a long way down the road.

What is it going to cost for this little bit of savings?

Mr. WINGERTER. It has a twofold benefit. All of these facilities not only provide the resource recovery function, but to the communities in which they are located, they provide a disposal function. All of the waste is taken to those facilities and is converted there. There is a residual fact that has to be disposed of, but that is much less than all other refuse that would have to be disposed if we did not have that facility.

We feel there is a likelihood of saving approximately \$1 to \$2 per ton on the cost of disposal, which would benefit directly the citizens of the community.

Senator DOLE. What is the cost? A 20-percent tax credit is significant. What is the cost of the program?

Mr. FERRANTE. Senator, if you would assume an average installation in capital costs ranges between \$50 and \$70 million on the number of projected plants in 1985. There were 50 of these plants, on the order of 260 plants, it would be \$84 million.

Senator DOLE. I know the program would be good for you. I just wonder if it is good for the taxpayers.

Mr. FERRANTE. As Mr. Wingertter indicated, there are two revenue streams associated with these resource recovery projects. One is derived from the sale of energy produced by this facility. The other is in the form of disposal fees charged to the communities.

If we are able to experience a tax credit associated with our private investment plants, that would be directly available to offset the disposal charges to the community.

For example, if we appreciate a \$1 to \$2 per ton savings based upon an investment tax credit, that \$1 to \$2 per ton savings would be available to the community using that facility. Take, for example, a 1,000 ton per day facility where annually a large urban county or municipality could be disposing of 350,000 tons per year. That would be a direct savings translatable to a \$400,000 reduction in their annual disposal costs.

That is how it would be translated to the taxpayer.

Senator DOLE. Is this going to be a permanent subsidy, or just something to get the technology started and accepted and then terminated?

Mr. WINGERTER. It would be applied one time to any facility. Of course, the facility's life cycle is 15 to 20 years. I would not view it as a direct subsidy. The benefit will accrue to the community over the life of the facility because of the lower net cost for the investment in the facility.

Mr. FERRANTE. In terms of the open-ended nature of the credit itself, there is a very key issue involved in the rapid implementation. The resource recovery projects, the discrepancy between the communities disposing at these new plants and existing disposal, existing land disposal alternatives, there is a price differential. To implement resource recovery in a rapid way, this incentive, this tax incentive, would reduce that gap and make it possible for more private capital investment in these plants and thereby use the tax incentive to accelerate, making use of this available energy resource which we are currently bearing.

It would not necessarily be an open-ended type of incentive; it would be very key in getting that implementation out, instead of deferring it.

Senator DOLE. Thank you.

Senator BENTSEN. Thank you very much, gentlemen, for your testimony.

[The prepared statement of Mr. Wingerter follows:]

STATEMENT OF EUGENE J. WINGERTER, EXECUTIVE DIRECTOR, NATIONAL SOLID WASTES MANAGEMENT ASSOCIATION

Mr. Chairman, Members of the committee, my name is Eugene J. Wingerter, I am Executive Director of the National Solid Wastes Management Association. We appreciate the opportunity to testify on the National Energy Act (H.R. 8444). Specifically we are concerned with an oversight in the language concerning the investment tax credit to encourage energy conservation through the recycling of solid wastes. The Association represents the entire field of waste management, including major companies who are developing and building full scale resource recovery facilities for the production of usable solid fuels and energy from solid wastes, as well as recycled material. The escalating costs of fossil fuels have added impetus to the development and application of new technology to utilize the latent energy in municipal solid wastes.

First, I would like to highlight the value of resource recovery as an energy source. Secondly, I would like to suggest a technical amendment to Title II part 6 section 2061 subparagraph (b)(7) dealing with investment credits, which would greatly encourage utilization of this energy source at a more favorable cost to the public.

Approximately 70 percent of residential and commercial solid waste is combustible, and has on the average an energy content of 9 million Btu's per ton. A ton of garbage is roughly equivalent to one barrel of crude oil or one-half a ton of high grade coal. The United States generated over 200 million tons of solid waste in 1976. If all this had been recycled it would have generated energy equivalent to 200 million barrels of oil or 3 percent of the nation's annual energy consumption.

Thus, encouragement of resource recovery would help to fulfill the stated goals of the National Energy Act; to reduce the nation's demand for oil—particularly

imported oil—and natural gas; and to encourage the use of coal and other fuels, and renewable energy sources. Solid waste is both an alternative fuel source, and a renewable energy source—since the garbage in this country shows no sign of disappearing in the near future. It is also directly compatible with the latest Federal policy on resource recovery Public Law 94-580 enacted by Congress on October, 1976.

A resource recovery facility derives revenues from two sources: from the sale of recovered energy and materials and from disposal charges to a community for disposing of its wastes at the facility. At present, the cost to dispose of a ton of garbage at a resource recovery facility is higher than historical costs for sanitary landfill. For this reason, resource recovery facilities are economically competitive in those areas of the country where the cost of disposal at a sanitary landfill is so high that the price of garbage disposal at a resource recovery facility becomes competitive with it.

An investment credit of 20 percent would lower the cost of garbage disposal at a resource recovery facility. In many areas of the country the lowered cost of disposal at a resource recovery facility would become competitive with the cost of disposal at a sanitary landfill. This would make it economically attractive for a community to dispose of its wastes at a place where that waste could be converted into energy, rather than burying those wastes in the ground.

H.R. 8444 recognizes that it takes 95 percent less energy to recycle an aluminum can than it does to manufacture one from virgin materials. H.R. 8444 grants an investment credit for "recycling equipment"—equipment recovering ferrous metals with a magnet and the like. It also grants an investment credit for a boiler which has been modified to accept solid wastes as a fuel. But the language has been so worded that part of a resource recovery facility which processes wastes into a solid fuel or energy—that is, into a direct energy source—has been excluded.

The investment credit was designed in the early 1960's to overcome investor hesitancy in making a capital outlay where a relatively high risk is involved. The high capital cost of a resource recovery facility and the fact that resource recovery is an emerging technology combine to make investment in a resource recovery facility just such an investor risk. Many communities and industries are presently considering the decision to build new resource recovery facilities but are hesitating in making this large investment. The effect of an increased investment credit would encourage cities and businesses to overcome that hesitancy. Such a financial incentive would substantially affect the economic feasibility of the project—a saving that would benefit the users of the facility.

Resource recovery is the type of alternate energy source whose development Congress seeks to encourage with this legislation. We do not believe that Congress intends to intentionally exclude those recycling facilities that convert solid waste into useful forms of energy through this restrictive definition of recycling equipment.

For this reason we respectfully urge the committee to favorably consider the following clarifying amendment. Change Title II Section 2061(b) (2) (7) to read as follows—

"(7) *Recycling equipment.*—The term 'recycling equipment' means any equipment which is used exclusively in the recycling of solid waste or to sort and prepare solid waste for recycling or for use as a fuel, including equipment defined in section 4998(b)(1) (A) and (B) (and the basis for plans and designs for equipment described in such subparagraphs (A) and (B)) used in on-site burning of such solid waste."

We appreciate the opportunity of appearing before the Committee today and would be pleased to provide any additional information the Committee may desire with deliberations on this matter.

Senator BENTSEN. Our next panel will be Mr. Robert Rex, president, Republic Geothermal; Mr. Domenic Falcone, vice president, Geothermal Resources International; Dr. Carel Otte, president and manager, Union Geothermal Division, Union Oil Co. of California.

Gentlemen, if you will present your testimony in sequence, we will take your testimony for the record. Please summarize it, because of limitations on time. Please identify yourselves as you start to speak.

**STATEMENT OF ROBERT REX, PRESIDENT, REPUBLIC
GEOTHERMAL, INC.**

Mr. Rex. I am Robert Rex, president of Republic Geothermal Co. We are an independent producer and one of the more aggressive ones. In drilling, we have been the leading independent in the last few years in geothermal footage.

Our major competitors are Union Oil Co. represented by Dr. Otte on the right, who was the leading geothermal company in footage drilled. The second is Reynolds Tobacco.

The key point that has to be considered in looking at the geothermal resources in the United States is first it is an extraordinarily large resource in terms of the total resource base. It is roughly 20 times as large as the recoverable energy from nuclear power using uranium and thorium and breeder reactor technology.

The problem is it is a very diffused, low-grade resource. It first was developed in the higher energy density as dry steam. The next resource about to be developed in this country is hot water. The third, and a ramification of hot water research, which is hot, dry rock—excuse me, the geopressure resource, or the geothermal resource on a sedimentary basis with associated methane.

The third major resource is the hot, dry rock resource, which is a national resource for every State from Texas to Maine and from Washington and Alaska, throughout the midcontinent to Wisconsin, are certainly major States with this type of potential.

What is happening in practice as we look at the economics and look at the marketplace, and our company has practical experience in understanding what it takes to get projects financed, is that we find that hot water resource is developed at the marginal threshold of economic potential.

The projects are priced at the break-even competitive price with an alternative supplier of electricity. The alternatives of the geothermal resource are in the actual marketplace—nuclear power and imported fuel oil. As in actual practice, what happens is that we are having problems competing against uranium as a fuel because the uranium carries a 22-percent depletion allowance.

Utilities perceive uranium as a more reliable fuel than geothermal energy. The FPC and the State public utility commission give a greater profit for utilities for operating a nuclear plant than they do a geothermal plant.

We find, in actual practice, that the utilities perceive geothermal energy as being riskier than hydrocarbon or alternative fuels. This means that they are asking the steam supplier to hold harmless the utility for the cost of the powerplant as part of the fuel supply contract.

What essentially has happened is the powerplant itself is in jeopardy, considered in jeopardy, and keyed to the fuel supply. So that utilities and normal utility financing is rarely available and in many cases is rejected as an adjunct of geothermal development. The market is clearly there.

What is possible at this point in time is—if there were modifications in H.R. 8444 for the investment tax credit for geothermal facilities

to include the turbine generator portion of the system, it would then become possible to finance powerplants through independent financing and lease the powerplants to utilities.

What we see actually happening is, first, H.R. 8444 is a disincentive for geothermal development. It will set it back sharply, as it now stands.

Second, ERDA has quite clearly stated this is a major resource. The figures for oil displacement in the next 20 years is usually on the order of 200 to 500 million barrels per year. It could be considerably larger if it were used for space heating industrial facilities and large municipal buildings, and we see quite clearly that the marketplace itself puts competitive pressure on this energy resource and makes it impossible for it to compete unless it gets equal treatment under the tax laws.

Its competitors—in this case uranium, which is a clear-cut competitor—has a 22-percent depletion allowance, and unless geothermal has that, it is a handicap. There is no way that the prices can be pushed up to any high level, no margin for exorbitant profits. The energy density in hot water resources are less than 0.7 of a percent of the energy density of petroleum. You are dealing with a very diffuse, low-grade resource that can compete, given comparable treatment, with alternatives.

The heart of our position essentially is, if we were given this equity and treatment, and we were allowed to be developed as an independent industry, the resource will develop. There are independent companies as well as oil companies who feel that this particular resource is developable and who will bring it into the marketplace.

We are a very competitive society, and handicaps will essentially abort this energy.

Thank you.

Senator BENTSEN. Thank you.

STATEMENT OF DOMENIC J. FALCONE, VICE PRESIDENT, GEOTHERMAL RESOURCES INTERNATIONAL

Mr. FALCONE. Mr. Chairman and members of the committee, my name is Domenic J. Falcone. I am vice president of Geothermal Resources International, Inc., of Los Angeles, Calif.

Before I get started, I would like to thank Senator Hansen for his kind support of tax legislation to help the geothermal industry before he left this morning.

My company has been involved in the geothermal exploration and development business since 1960. It was one of the first companies ever to have explored and developed in The Geysers steam field in California.

Despite that development, the company was still unable to raise sufficient risk capital and long-range financing necessary to continue development. Some of the problems involved as far as raising that capital and financing was a lack of a clear tax law regarding the deductibility of intangible drilling costs and the depletion allowance.

Additionally, the industry itself has a very high risk potential in the drilling of exploratory wells.

The third major drawback is the length of time involved before the company begins to receive a return on its investment.

We have recently gotten involved in the coal industry, because the coal industry seemed to have a few of these kinds of problems better in hand, especially the depletion allowance and the ability to find and define the reserves and it seems that the revenue recognition comes on a little sooner in the coal industry than it does in the geothermal industry.

The only sort of revenues that our company has had over these years has been from the leasing of large pieces of equipment to airlines and oil companies. We have no interest in oil or gas.

We wish to acknowledge support for the President's and the House's treatment of intangible drilling costs, and we concur with Senator McClure and Senator Gravel in their suggested treatment of intangible drilling costs and resource depletion.

The House energy bill as submitted has fallen short on the depletion allowance. It does not allow equal treatment with other energy sources.

In the past, new and important national resource industries, including oil and gas, have received tax incentives in their startup stages. Even now, coal gets a 10-percent depletion; uranium gets 22-percent depletion. They probably represent the chief competition for risk capital and investment in the geothermal business.

Both of these natural resources have depletion without a cost ceiling on it. Oil and gas for small producers also is allowed a 15-percent depletion without a ceiling. We therefore support Senators McClure and Gravel in the manner in which they wish to treat the depletion allowance, and certainly recommend that this committee support the lifting of the cost ceiling and the increase of the percentage for depletion in the geothermal part of the bill.

Geothermal energy is not just an electricity-generating resource, as witness The Geysers of California. Space heating and air-conditioning are both viable alternatives in Alaska, Oregon, and Idaho. Food processing and refrigerated warehousing are future uses in Nevada, Oregon, and Idaho and the geopressured zones in Louisiana and Texas appear promising for electrical utilization later on. These uses of the resource require further incentives than the House has offered in the Energy Act.

Due to the lack of knowledge and confidence in geothermal reservoirs, primary users of the resource are reluctant to build their facilities for the use. In order to justify taking the risk on the reservoir, the energy percentage credit should be expanded to all buildings and facilities, both for electric and nonelectric uses.

I have some suggested legislative language that I would like to insert at this point.

Senator BENTSEN. We would be pleased to have it.

[The material referred to follows:]

PROPOSED AMENDMENTS TO H.R. 8444, THE NATIONAL ENERGY ACT—GEOTHERMAL ENERGY AMENDMENTS

1. Amend the title of section 2073 to read: "22-percent Depletion Allowance in the Case of Geothermal Deposits".

2. Amend subsection (a) of section 2073 to read:

"(a) General rule.—Subparagraph (A) of section 613(b) (1) is amended to read: '(A) sulfur, uranium, and geothermal deposits; and'."

3. Amend subsection (b) of section 2073 to read:

"(b) Section 613 (relating to percentage depletion) is amended by adding at the end thereof the following new subsection:

'(e) Geothermal deposit defined.—For purposes of this section, the term "geothermal deposit" means a geothermal reservoir consisting of natural heat which is stored in rocks or in an aqueous liquid or vapor (whether or not under pressure).'"

4. Amend paragraph (3) of section 2072(b) so as to strike out the material within the parentheses in sub-subparagraph (ii) of section 57(a)(11)(D), as it would be added to the Code thereby, and substitute therefor the following: "as defined in section 613(e)".

5. Amend subsection (b) of section 2061 so as to strike out the text of paragraph (4) of section 48(1), as it would be added to the Code thereby, and substitute therefor the following: "The term 'advanced technology property' means equipment which uses solar, geothermal, or wind energy to provide heat, cooling, or electricity."

EXPLANATION OF PROPOSED AMENDMENTS

Amendments 1-4 would return the depletion allowance in the case of all forms of geothermal deposits, as defined in the bill, to 22 percent, which is the present rate applicable under the Code to "steam" at The Geysers. The amendments would eliminate the ceiling on the depletion allowance provided in the House-passed bill, which was placed at the equivalent of the adjusted cost basis of the property. The effect of Amendments 1-4 would be to place geothermal deposits into approximate parity with other forms of energy resources in respect of income tax treatment.

(Amendment No. 4 is an adjustment to a cross-reference in section 2072, which deals with intangible drilling and development costs. It would have no substantive effect on the provisions of section 2072).

Amendment No. 5 would extend the business investment tax credit, designed to encourage new energy technology, to any equipment which uses solar, geothermal, or wind energy to provide heat, cooling, or electricity. The present bill limits the credit to such equipment which is used in connection with an existing building or an existing industrial or commercial process. It is believed that, at the present state of development, virtually all equipment that is to be installed for the use of solar, geothermal, or wind energy will qualify within the scope of "advanced technology property" as intended by the authors of the bill.

Mr. FALCONE. My written statement is also submitted.

Thank you.

Senator BENTSEN. I have had the pleasure of going down to North Island, New Zealand and seeing the geothermal installation there. It develops about 16 percent of the power for North Island.

Dr. Otte?

Dr. OTTE. Senator Bentsen and Senator Dole, I have previously submitted a statement in support of geothermal legislation. Because of the time constraints, I do not want to read it, but I have a smaller, more abstract statement of three pages which I think will take about 3 minutes.

With your permission, I would like to submit it for the record.

STATEMENT OF DR. CAREL OTTE, UNION OIL CO. OF CALIFORNIA.

Dr. OTTE. Mr. Chairman and members of the committee, my name is Carel Otte. I am president of the Geothermal Division of Union Oil Co. of California. I am appearing in support of the legislation to provide production incentives for the development of geothermal energy resources. I have been actively engaged in geothermal work since 1962 and have personally participated in both research and operating activities in most of the major geothermal areas of the country. I have also been active in scientific and geothermal industry association affairs and I am chairman of the Advisory Committee on Geothermal Energy of the U.S. Energy Research and Development Administration.

Steam and hot water from the Earth's crust are readily available in many places, primarily in the Western United States, while the geopressured areas of Louisiana and Texas hold significant promise for the future. Geothermal energy has the potential of providing environmentally acceptable, domestic energy in important amounts. However, only insignificant quantities of these geothermal resources will ever be developed or produced without adequate tax incentives.

I have previously submitted a statement in support of geothermal legislation which is attached hereto. Because of time constraints I shall not read the statement in its entirety but request that it be included with these remarks which I shall make very brief.

In the early part of these hearings there was a great deal of discussion of the need for, and lack of, production incentives. In response to questioning by this committee as to what production incentives were contained in the President's national energy plan, administration spokesmen pointed to the incentives proposed for the development of geothermal energy, and endorsed the additional incentives approved by the House of Representatives.

The incentives for geothermal development proposed by the administration as part of the national energy plan, are clearly insufficient to accomplish the purpose. Recognizing the need for additional incentives, Senator Gravel introduced S. 1961. This bill is similar to the Fannin bill, S. 2608, of last year, approved by this committee and passed by the Senate, which would have provided for geothermal development the same type of tax treatment as that provided other wasting assets. This provision was included in the energy title that was dropped in conference from the Tax Reform Act of 1976.

S. 1961 would provide the immediate expensing of intangible drilling costs as proposed by the administration, and in addition it provides a 22-percent deduction against geothermal income.

The House bill, H.R. 8444, provides for expensing of intangible drilling costs and purports to provide 10 percent percentage depletion for geothermal energy resources. Unfortunately, it does not in fact do so, for there is included an unprecedented limitation that has the effect of changing the percentage depletion allowance to a slightly more liberal form of cost depletion than that now available. The effect is to make the legislation clearly inadequate to accomplish the desired result of spurring the development of geothermal energy. If effective legislation is to be enacted, the limitation to recovery of costs must be eliminated.

Even without the cost limitation, percentage depletion of 10 percent would not be sufficient to attract investment. The rationale for 10 percent was stated to be that that is the amount of percentage depletion available to coal. However, geothermal exploration and development differs from the mining of coal in several respects. The first is that it is relatively novel and unknown to investors, it has no proven record of production—except the Geysers area which is unique in that superheated steam occurs close to the surface—and, therefore, to investors it represents a much more hazardous undertaking than the mining of coal.

Second, exploration is still in the very early stages, and finding the geothermal resources is very difficult. Consequently, geothermal exploration involves high risks whereas the location of vast deposits of

coal is known so that there are not significant exploration hazards. In the third place, even after geothermal energy resources have been identified, located, and made ready for production, a long lead time is required because geothermal energy can be used in significant amounts only for the production of electricity at a powerplant built at the site of the resource; whereas coal can be mined and shipped to wherever needed. The construction of powerplants requires a matter of years with the permit approval process often taking longer than the construction itself.

It is essential that the depletion deduction provided be sufficient in amount to attract investment for the development of geothermal resources. For the reasons stated, 10 percent is not adequate, and we urge that the committee approve the 22 percent deduction contained in S. 1961.

One final point. An additional 10-percent investment credit has been proposed for "energy property" including "alternative energy property." The term "alternative energy property" as defined in the House bill refers to the production of energy by geothermal power, but is unclear and does not include all of the equipment and facilities required for the production and generation of electricity from geothermal energy resources. Inclusion of such equipment and facilities would serve to encourage the faster development of those resources as alternatives to oil and gas generation. We urge that this be done, and I have attached to my statement an appropriate amendment to accomplish this purpose.

In conclusion, Mr. Chairman, we urge that this committee once again approve the production incentives for geothermal resources contained in S. 1961.

Thank you.

Senator DOLE. I guess what you are suggesting, you would be on a par with any incentives for the nuclear field?

Mr. REX. That is correct.

Senator DOLE. Are we talking about an inexhaustible supply of geothermal?

Mr. REX. It is just the opposite. In any particular reservoir, you are talking about a very short life for that portion of the reservoir. You have to develop many wells over the life of a powerplant.

For example, we are looking at hot water resources in the Imperial Valley. Let me take a specific case, the East Mesa field, a Federal lease. The average reservoir life of a given reservoir zone that is being developed is 12 years, then it will be exhausted for its heat content, and even that will take recycling of water.

So you have to develop multiple reservoir zones, maintain a series of wells to be drilled over the life of the powerplant.

So we are talking about a very rapid exhaustion.

The reason it is viable is the resource is large, so you leave undeveloped locations to drill later and develop later.

Senator DOLE. If it is short term, is it worth the cost?

Mr. REX. The answer is a marginal competitive energy resource. The point is, it can be substituted for imported oil at a price that is less than the cost of imported oil.

In other words, we are talking about competing in the \$8 to \$9 to \$10 a barrel cost range for the hot water resource. We are talking about powerplants whose cost is half the cost of a nuclear powerplant.

So it is a lesser capital investment and the fuel price is less than imported oil.

But the point is, because of the marginal price economics it is extremely sensitive to this tax treatment, because of the risks associated with the resource. If it were highly profitable, all of the major oil companies instead of only a handful would be in it. We would have no problem getting insurance or bank money.

As it is, the utilities themselves view it as a very risky undertaking and it is extremely sensitive to the technological sophistication of the companies involved.

Senator DOLE. What is the projected cost of the recommendation made by the panel?

Mr. REX. The projected cost in the East Mesa field is a net increase of income from this one field of \$800 million to the Federal Treasury, if the tax incentives are advanced. In other words, it is not going to cost the public; they are going to make money on it, the reason being, without these tax treatments, the size of the resource developed will be about 200 megawatts. The potential with the treatment is about 1,000 megawatts. Out of this one field, the Federal Government gets royalties and they get corporate taxes. If you calculate the difference in the increased income from the 800 megawatts to become competitive with the proposed changes, that revenue to the Federal Government is, at minimum, \$800 million of 1977 dollars and a maximum of \$1.5 billion.

What is going to happen, the Government is not losing money by the geothermal tax treatment. Essentially, it is shifting major blocks of natural resources across an economic threshold by the tax incentive.

Senator DOLE. Assuming that is true, but eliminating all of those profits that the Government is going to receive, what it is going to cost to expand the tax credit, and the other things you suggest?

Mr. REX. It has no net cost. This is the grave error in the House committee document, in the pamphlet for H.R. 8444. It is an error. It says there is a cost; there is no cost in this resource because there is such a large proportion of it that now belongs to the Federal Government that it becomes commercial and it yields royalties, and it will yield corporate taxes because this is a substitute for imported oil.

When you are dealing with a marginal resource, it crosses the threshold and with the public sector from the taxes there is a net gain. This is a misconception.

What has happened in all of the analysis by Treasury and by some of the House staff to date has been focusing on just the consequences of the deduction. They do not ask what are the consequences of the reduction in the elasticity of supply.

Geothermal energy has an enormous elasticity of supply. It is extremely sensitive to whether or not you can compete; net elasticity of supply, it completely overwhelms by more than a factor of 10 the saving or the loss to the Treasury.

It is that error that has permeated a lot of our thinking in the last 4 or 5 years that has resulted essentially in the tax structure.

Senator DOLE. Does everybody share that view?

Mr. OTTE. Yes; I would endorse. Basically the proposals are success oriented, as came out this morning in this discussion when Senator Long was questioning the gentleman from the oil shale group. These proposals hear are success oriented; they are not subsidies.

In that case, it is not a direct cost to the Government. It is an investment incentive and private enterprise will put up the money to develop these resources and if they are not successful, they may not benefit from them. It is only when they are successful and have an income that the depletion allowance becomes effective. The intangible write-off is, of course, a tax deferral aspect, not either way it is being treated. You are always allowed to write off your tax investment. Either you capitalize it and do it over a period of time or you do it immediately. In any event, it is shifting. It is not a gift, in that sense.

This is the beauty. I recognize that depletion has been a bad word. It is not very popular at the present time, but it has been success oriented, so it only becomes effective if the group that puts up the money is successful in the enterprise.

As Dr. Rex has indicated, if there is a question between development and nondevelopment, a successful development will be a taxpaying entity, although there will be a certain portion of the income that will be set aside. It will be a taxpaying entity, and as such will contribute to the revenue of the Federal Government. Besides that, there will be increased employment and also the labor force, the working force will be taxpaying bodies. The whole thing would be a net gain.

Senator DOLE. I think the thing I do not understand—maybe you could supply it for the record—if it is going to be all that successful, why are all of these things necessary?

Mr. REX. There is a difference between being successful and being highly profitable. The profit levels are marginal. But once you cross the threshold of acceptable profitability, you find a few companies who have extremely low overhead and run very tight operations who can make money on it, but that may be 1 in 10 that can do it. Witness the number of companies who are active in this field. We know our own company's competitive edge is strictly a matter of very tight cost control, very tight overhead control.

We can operate at levels that many of our competitors cannot.

What we are saying is that there is a very small profit margin in this business, and if you are technologically very sharp, you can make it. But you can only make it if you can compete, and what we are saying is we have to be able to compete with the alternatives, which are uranium and imported fuel oil.

Mr. FALCONE. I believe Treasury is on record as saying if depletion and the intangibles were treated the way we are suggesting at the present time, the cost would be, by 1985—this is only relating the costs pertaining to those deductions and allowances—\$179 million.

That does not count, of course the revenues on the opposite side, which I believe Treasury has also indicated would be far in excess. Therefore, the tax receipts would be much greater than the potential tax expenditures otherwise.

Senator DOLE. I want to understand. If we are going to be so successful, maybe we should double it.

Mr. REX. The key issue right now is that most of the revenues from the geothermal operation goes to the tax-receiving entities; 75 percent goes to the Federal Government and about 25 percent goes to State and local governments.

They are the beneficiaries of this resource, if you will just look at the total cash flow.

Senator DOLE. Thank you.

The CHAIRMAN. Gentlemen, you have a very strong advocate of geothermal energy in Senator Packwood. He is absent today, but if I were you I would consult with him and encourage him. Unless I am missing my guess, he will be leading the charge to do more with geothermal energy.

I am also very much interested in developing geothermal resources. As you know, we have tremendous potential in Louisiana. Thank you very much.

[The prepared statement of the preceding panel follows:]

STATEMENT OF DR. ROBERT W. REX, PRESIDENT, REPUBLIC GEOTHERMAL, INC.

SUMMARY

1. The Energy Research and Development Administration projects that in 20 years, 5 percent of our Nation's electrical energy use could be supplied by geothermal power. This could save 255 million barrels of imported oil each year and add \$3.8 billion to our annual balance of payments in terms of current dollars.

2. All hot water resources are developed at a marginal threshold of profitability. Genuine tax incentives are needed to spur the expanded use of geothermal energy, if the ERDA projections are to be reached. Without proper incentives, there may be little or no development.

3. The tax provisions of H.R. 8444 fail to provide incentive for geothermal development and may actually provide the impetus to shift capital away from geothermal development.

(a) Inclusion of geothermal equipment in a category of alternative energy property, eligible for the additional tax credit, is practically worthless since turbine and post-turbine equipment, the greatest portion of geothermal investment, are specifically excluded.

(b) Inclusion of geothermal property as energy property (also eligible for the additional tax credit) is likewise of little value because of the requirement that such energy property implement existing property.

(c) Application of the minimum tax to excess geothermal intangible expenses would curtail capital availability because a minimum of five years is required to produce income from a successful geothermal well.

(d) Ten percent depletion limited to cost does not make geothermal competitive with its chief competitor—nuclear energy—which enjoys a 22 percent depletion allowance unlimited by cost.

4. Geothermal development could compete effectively in the market place with other energy sources with the following incentives:

(a) All geothermal equipment should be included in the definition of alternative energy property.

(b) The minimum tax should not apply to geothermal wells until the first year the wells produce income, with the excess intangible drilling costs carried forward to that time to be applied against income from the wells.

(c) To insure equal treatment with uranium, percentage depletion in the amount of 22 percent, or a deduction against income in lieu of depletion, should be permitted for geothermal wells, unrestricted by cost.

STATEMENT

Mr. Chairman and members of the committee, my name is Robert Rex and I am President of Republic Geothermal, Inc. We at Republic Geothermal, and in the geothermal industry generally, want to thank you for affording us the opportunity to discuss in this forum geothermal energy development and how it will be affected by the tax provisions contained in the energy bill.

Republic Geothermal is a pioneer in geothermal resource development and has been the leading independent in exploratory drilling in the last two years. As such, we feel we have the background and expertise to comment on the attempts made in the tax provisions of H.R. 8444 to provide incentives for the development of new energy resources, particularly those intended to spur geothermal development.

To be quite candid, we feel that the bill, as passed by the House, not only fails to provide incentives for geothermal development but actually may provide

the impetus to shift capital away from geothermal development, or at least into the hands of the major oil companies who have not exhibited great enthusiasm for developing alternate energy sources.

One of our biggest problems is getting the serious consideration of important decision makers such as yourselves. In a recent three hour major network TV documentary on energy, geothermal energy was lumped in the so-called "dream category" of energy resources. And, I must admit, in my travels around the country, many important people have exhibited a total lack of knowledge of geothermal energy, its past record, and its potential. But geothermal energy is no dream. Ask the people of San Francisco practically all of whose electricity is supplied by geothermal energy. In other countries such as Japan, Iceland, New Zealand, Italy, and Mexico geothermal energy is put to important uses.

The Energy Research and Development Administration does not consider geothermal energy a dream. It projects that in 20 years, 5 percent of our nation's electrical energy use could be supplied by geothermal power.

But exploitation of the full potential of geothermal energy will remain a dream if provisions concerning geothermal energy, such as those contained in the tax provisions of H.R. 8444, are embodied in the final legislation. There simply will be no incentives to attract the capital necessary to explore and drill the wells and build the structures required to transfer this resource into useable energy.

The most important point I can leave with you today is that all hot water resources are developed at a marginal threshold of profitability. Accordingly, genuine tax incentives are needed to spur the expanded use of geothermal energy, if the ERDA projections are to be reached. Without proper incentives, there may be little or no development.

An examination of the relevant so-called "incentives" for geothermal production shows why they will have exactly the opposite effect.

GEOHERMAL EQUIPMENT AS ALTERNATIVE ENERGY PROPERTY

A supposed boost is given to geothermal energy by including equipment used in the production of geothermal power in the highly prized category of alternative energy property for which either a credit against the business users tax or an additional 10 percent investment tax credit can be taken.

However, what the tax code writers giveth they taketh away; for the definition specifically excludes turbines or equipment beyond the turbine stage. Since nature has conveniently agreed to serve as our boiler (for which we do not seek a tax credit) most of the critical geothermal equipment is found at the turbine or post-turbine stage and the value of this equipment is at risk if the wells deplete too rapidly to amortize the investment.

The tax incentive, therefore, does not add up to much when our turbines, transformers, turbogenerators and switch gear, cooling tower, condensers and probably a variety of other equipment are not covered.

Our hydroelectric friends, also included in this section, find themselves in the same dilemma.

Perhaps we both suffer from guilt by association, being lumped also in this section with nuclear power, not exactly the darling of the energy world.

GEOHERMAL EQUIPMENT AS ENERGY PROPERTY

Notwithstanding a failure to qualify as alternative energy property, under the tax "incentives" of the bill, property may still qualify for the additional 10 percent investment tax credit if it is "energy property", which includes four categories in addition to alternative energy property. One such category of energy property is advanced technology property. Advanced technology property includes equipment which uses geothermal energy to provide heat, cooling, or electricity in connection with an existing building or an existing industrial or commercial process.

After this laborious search we were disappointed to find that probably no geothermal equipment would qualify under this section unless, of course, we could cart existing major industrial plants closer to the known geothermal areas.

If I have passed the point of proper decorum before this august body, please forgive me: it's just that it is absolutely ludicrous to call these provisions incentives for the production of geothermal power.

INTANGIBLE DRILLING COSTS

The proposed intangible drilling cost section (Section 2071 of H.R. 8444) is listed under the chapter heading "Energy Tax Incentives" in the House Ways and Means Report on H.R. 6831, which was the predecessor of H.R. 8444. It will have the exact opposite effect on independent geothermal operators.

Intangible drilling costs for geothermal development are treated identical to those incurred for oil and gas development under the provisions of H.R. 8444. As such, (1) costs can be expensed, rather than capitalized and (2) the amount expensed over an amount based on a ten-year amortization would be tax preference income to the extent this sum exceeded income from geothermal wells.

First of all, as this Committee is well aware, the tax preference item for intangible drilling costs does not apply to corporations. Thus, the giant corporations will be free from such a tax while small operators and their investors will be subjected to it.

Second, oil and gas wells, upon completion, may immediately produce income to apply toward the excess drilling expenses and hence escape the tax. Geothermal wells do not have that luxury; it takes a minimum of five years to produce income from a successful well. Under the proposed tax structure, incentives necessary to attract risk capital would be significantly diminished by the minimum tax. This feature could seriously curtail or eradicate a fledgling industry.

DEPLETION

The final "incentive" for geothermal production under H.R. 8444 was to grant the industry a 10 percent depletion allowance, notwithstanding an appellate court case which held that the product of a taxpayer's geothermal steam wells was a gas and subject to the then applicable 27½ percent depletion allowance. (Now 22 percent.)

It is not so much the ignominy of being lumped in the 10 percent category with sodium chloride and wollastonite as it is not getting the same treatment as our natural competitor and sister resource, uranium, which receives a 22 percent depletion allowance.

At this point I would like to bury, once and for all, the contention that we compete with coal. To the contrary, in most of the known geothermal areas of the West, coal would not be permitted to be used even with pollution control and abatement equipment because of local air emission standards.

Our chief competitors are imported oil and nuclear power, the latter of which I have termed our sister resource with, I believe, good reason.

Few people realize that geothermal energy is fossilized radioactive energy. It is decaying, escaping and exhaustible. To be useable, it must be extracted by use of sophisticated technology. Man can speed up nature and make artificial geothermal energy in nuclear reactors utilizing fission as well as ordinary radioactive-decay to make heat. The main difference is that the natural process is safe (no dangerous fission products) and leaves the decay products underground.

Geothermal energy has also managed to earn one more severe restriction— not imposed on other energy sources—by having its depletion limited to cost.

WHAT INCENTIVES COULD SPUR

I have vented my frustrations at what the so-called tax incentives do not do for geothermal power. Let me now take a moment to tell you what proper incentives could do. They could be the catalyst to supply, according to ERDA, 5 percent of our electrical energy needs in 20 years. This could save 265 million barrels of imported oil each year and add \$3.8 billion to our annual balance of payments in terms of current dollars.

The U.S. Geological Survey says that there are sufficient reserves to at least double ERDA's predictions.

Geothermal resources are not limited to the West. A recent Washington Star article carried the headline "Scientists Look to Geothermal Power for the East", specifically referring to the Ocean City and Delmarva Peninsula areas. Liquid dominated geothermal resources, known to exist in the West, may also exist on the Atlantic Coast. Geopressured geothermal resources are located in the Gulf Coast States, the Pacific Seaboard, Alaska, Oklahoma and the Williston Basin (South Dakota and Montana). The areas for potential development of hot dry

rock geological formations are the Atlantic Seaboard, the Appalachians, the Great Lakes states, the entire mid-Continent, and the West Coast—practically the entire United States.

Magma with potential for power production is found in Hawaii, Alaska, the Cascade Mountains (Washington, California and Oregon) and probably New Mexico and Wyoming.

What I am trying to demonstrate is that geothermal energy is a national resource. It's right here under our feet. It's convertible into useable energy and it is not a dream.

THE NEEDED INCENTIVES

We believe we could compete effectively in the marketplace for the capital needed to bring in a significant new clean geothermal energy supply if the industry received the following incentives:

1. All geothermal equipment should be included in the definition of alternative energy property.

2. Corporations and independent operators should be treated alike with regard to the application of the minimum tax to intangible drilling expenses. The minimum tax should not apply to geothermal wells until the first year the wells produce income, with the excess intangible drilling costs carried forward to that time to be applied against income from the wells.

3. To insure equal treatment with uranium, percentage depletion in the amount of 22 percent, or a deduction against income of 22 percent in lieu of depletion as was reported out by this Committee last year and passed by the Senate, should be permitted for geothermal wells, unrestricted by the cost basis of the property.

We thank you for having had the opportunity to appear before you today. We stand ready to assist you and your staff in any way possible.

TESTIMONY OF DOMENIC J. FALCONE, VICE PRESIDENT, GEOTHERMAL RESOURCES INTERNATIONAL, INC.

Mr. Chairman and members of the committee, I have previously submitted testimony on the proposed Energy Tax Act of 1977 concerning that part of the Act dealing with intangible drilling costs deductions and depletion allowances for the operator of a geothermal steam exploration and development company. In my previous testimony I supported certain concepts in H.R. 6831 and advocated different treatment for others, like the depletion allowance. I have supported both Senator McClure's and Senator Gravel's legislation, S. 655 and S. 1961.

Some of the problems in the geothermal industry have developed because of the tax inequities already existing in the tax laws. Additional problems are caused by the lack of incentives for the ultimate user of the geothermal resource, be it for electric or nonelectric use. There exists in the current proposed Act a method which, if expanded to cover a wider range of equipment, could help mitigate this problem. I am referring to Section 4998 in which Section 4996 Property is defined and Section 2061 in which an Energy Percentage credit of an additional 10 percent is applied to Section 4996 Property. I believe that most people in the geothermal industry as well as researchers who have studied the potential of geothermal resources agree that the resource will be more widely utilized for nonelectric purposes.

The language of Section 4998 limits the credit to self-used energy and not to all facilities for both electricity and nonelectric uses. This type of limitation will do nothing for accelerating the efforts of the companies involved in attempting to solve some of the nation's energy concerns by bringing on-line this alternate energy source as early as possible.

I believe that this Committee should recommend that this additional credit be applied to all facilities to be used in both electric and nonelectric end uses of geothermal energy under all conditions. This suggested approach has the endorsement of all of the industry members with whom I have had contact, as well as a number of industry committees and councils.

I wish to once again thank the Committee for allowing me this opportunity to submit testimony on this very important Energy Tax Bill of 1977.

STATEMENT OF DR. CAREL OTTE, UNION OIL CO. OF CALIFORNIA

Mr. Chairman and members of the committee, my name is Carel Otte. I am President of the Geothermal Division of Union Oil Company of California. I am appearing in support of legislation to provide production incentives for the development of geothermal energy resources. I have been actively engaged in geothermal work since 1962 and have personally participated in both research and operating activities in most of the major geothermal areas of the country. I have also been active in scientific and geothermal industry association affairs and I am Chairman of the Advisory Committee on Geothermal Energy of the U.S. Energy Research and Development Administration.

Steam and hot water from the earth's crust are readily available in many places, primarily in the Western United States, while the geopressed areas of Louisiana and Texas hold significant promise for the future. Geothermal energy has the potential of providing environmentally acceptable, domestic energy in important amounts. However, only insignificant quantities of these geothermal resources will ever be developed or produced without adequate tax incentives.

I have previously submitted a statement in support of geothermal legislation which is attached hereto. Because of time constraints I shall not read the statement in its entirety but request that it be included with these remarks which I shall make very brief.

In the early part of these hearings there was a great deal of discussion of the need for, and lack of, production incentives. In response to questioning by this Committee as to what production incentives were contained in the President's National Energy Plan, Administration spokesmen pointed to the incentives proposed for the development of geothermal energy, and endorsed the additional incentives approved by the House of Representatives.

The incentives for geothermal development proposed by the Administration as part of the National Energy Plan, are clearly insufficient to accomplish the purpose. Recognizing the need for additional incentives, Senator Gravel introduced S. 1961. This bill is similar to the Fannin bill, S. 2608, of last year, approved by this Committee and passed by the Senate, which would have provided for geothermal development the same type of tax treatment as that provided other wasting assets. This provision was included in the Energy Title that was dropped in conference from the Tax Reform Act of 1976.

S. 1961 would provide the immediate expensing of intangible drilling costs as proposed by the Administration, and in addition it provides a 22 percent deduction against geothermal income.

The House bill, H.R. 8444, provides for expensing of intangible drilling costs and purports to provide 10 percent depletion for geothermal energy resources. Unfortunately, it does not in fact do so, for there is included an unprecedented limitation that has the effect of changing the percentage depletion allowance to a slightly more liberal form of cost depletion than that now available. The effect is to make the legislation clearly inadequate to accomplish the desired result of spurring the development of geothermal energy. If effective legislation is to be enacted the limitation to recovery of costs must be eliminated.

Even without the cost limitation, percentage depletion of 10 percent would not be sufficient to attract investment. The rationale for 10 percent was stated to be that that is the amount of percentage depletion available to coal. However, geothermal exploration and development differs from the mining of coal in several respects. The first is that it is relatively novel and unknown to investors, it has no proven record of production (except in the Geysers area which is unique in that superheated steam occurs close to the surface), and therefore, to investors it represents a much more hazardous undertaking than the mining of coal.

Second, exploration is still in the very early stages, and finding the geothermal resources is very difficult. Consequently geothermal exploration involves high risks whereas the location of vast deposits of coal is known so that there are not significant exploration hazards. In the third place, even after geothermal energy resources have been identified, located, and made ready for production, a long lead time is required because geothermal energy can be used in significant amounts only for the production of electricity at a powerplant built at the site of the resource; whereas coal can be mined and shipped to wherever needed. The construction of powerplants requires a matter of years with the permit approval process often taking longer than the construction itself.

It is essential that the depletion deduction provided be sufficient in amount to attract investment for the development of geothermal resources. For the reasons stated 10 percent is not adequate, and we urge that the Committee approve the 22 percent deduction contained in S. 1961.

One final point. An additional 10 percent investment credit has been proposed for "energy property" including "alternative energy property." The term "alternative energy property" as defined in the House bill refers to the production of energy by geothermal power, but is unclear and does not include all of the equipment and facilities required for the production and generation of electricity from geothermal energy resources. Inclusion of such equipment and facilities would serve to encourage the faster development of those resources as alternatives to oil and gas generation. We urge that this be done, and I have attached to my statement an appropriate amendment to accomplish this purpose.

In conclusion, Mr. Chairman, we urge that this Committee once again approve the production incentives for geothermal resources contained in S. 1961.

Thank you.

**DRAFT AMENDMENT TO CLARIFY DEFINITION OF "ALTERNATIVE ENERGY PROPERTY"
AS IT PERTAINS TO THE USE OF GEOTHERMAL RESOURCES**

Page 453, lines 20 to 23: Strike the entire subparagraph and substitute the following therefor:

"(C) equipment and facilities used: (i) In the generation of electrical energy by nuclear or hydroelectrical power, or (ii) In the production of geothermal resources and the generation of electrical energy therefrom; but excluding in both cases any equipment and facilities used in the transmission or distribution of such electrical energy," * * *

SUPPLEMENTAL STATEMENT OF DR. CAREL OTTE, UNION OIL CO. OF CALIFORNIA

Mr. Chairman and members of the committee, my name is Carel Otte. I have been actively engaged in geothermal work since 1962 and have personally participated in both research and operating activities in most of the major geothermal areas of the country. I have also been active in scientific and geothermal industry association affairs. I am President of the Geothermal Division of Union Oil Company of California and I am Chairman of the Advisory Committee on Geothermal Energy of the U.S. Energy Research and Development Administration.

I am appearing in support of S. 1961. This bill is similar to the Fannin bill, S. 2608, of last year, which would have provided for geothermal development the same type of tax treatment as that provided other wasting assets. Steam and hot water from the Earth's crust is readily available in many places, primarily in the Western United States, while the geopressured areas of Louisiana and Texas hold promise for the long-range future. Geothermal energy has the potential of providing environmentally acceptable, domestic energy in important amounts. The geothermal industry is very pleased that the President has proposed in the National Energy Plan to confirm to geothermal drilling a tax deduction for intangible drilling costs.

While we heartily endorse this proposal and urge its adoption we believe that there should also be allowed the deduction from gross income derived from geothermal properties that is provided in S. 1961. This would recognize the clear scientific evidence that geothermal energy is an exhaustible or wasting natural resource (Appendix B) and would put it on an equivalent basis with other wasting assets such as, for example, strip-mined coal with which it is in competition for central station power generation.

If geothermal energy is to make the substantial contribution to domestic U.S. energy which it is capable of making within the last quarter of this century, it is imperative that encouraging tax legislation be enacted and that appropriate tax incentives be provided. Without such incentives, the tremendous amounts of capital required for geothermal energy production will simply not be available. At the present time geothermal development is being held back by lack of investment and by high costs which make it non-competitive with other energy sources.

The outlook for geothermal energy production has been studied extensively by various Governmental and non-Governmental groups and the consensus emerging from these studies is that there is the geological opportunity to delineate geothermal resources to support 20,000 megawatts of electrical generating capacity by 1985. Such capacity—equal to 5 percent of current national electrical

capacity—represents the equivalent of 250 million barrels per year of low sulphur crude oil. However, resource development to support this capacity is estimated to require investment ranging in excess of \$10 billion.

There are great economic barriers which this industry must overcome: the tremendously high costs of drilling for geothermal deposits in hard rocks, with high temperatures and corrosive fluids; the very large capital investments required over several years before revenues can begin for a geothermal project; the requirement for drilling many replacement wells at each development site to maintain a constant stream of energy; and the present discouraging Federal income tax controversy.

It is inconceivable that, given our present energy crisis, this nation should not make every reasonable effort to develop available domestic energy resources, particularly when the costs of doing so are so small. Enacting the legislation we are supporting would result in a loss of Federal revenue estimated at less than \$20 million for the first year in which it is fully effective. This amount would rise significantly over the years only if there is substantial increased development of geothermal resources, which would, of course, be the objective of the legislation; and which would result in taxes collected far in excess of the cost of the tax incentive provided. And these are taxes which will not be collected if the desired development does not occur.

We are satisfied that if legislation similar to that of section 2004 of the Tax Reform Act of 1976, as it was passed last year by the Senate, the so-called Fannin bill, is enacted into law, there will be provided sufficient incentive to attract the necessary capital investment to create a new industry providing significant amounts of sorely needed energy in future years. Without incentives of this type the future development of geothermal energy remains clouded.

I have attached a statement giving a brief background on geothermal energy development (Appendix A). It is urged that the legislation now incorporated in S. 1961 be approved for the third time by the Senate, and this time be enacted into law.

APPENDIX A

ATTACHMENT TO STATEMENT OF DR. CAREL OTTE

BRIEF HISTORY OF GEOTHERMAL ENERGY DEVELOPMENT

The only major U.S. geothermal energy development is The Geysers field located about 90 miles north of San Francisco in California's Sonoma County. The development began in 1960 with a 12.5 megawatt generating plant. In 1973, it became the largest geothermal development in the world, with a capacity of 400 megawatts. The installed generating capacity now exceeds 500 megawatts, sufficient to supply electrical requirements of a city of 500,000; an additional 400 megawatts is now under construction. The Geysers eventually is expected to achieve a capacity of more than 2,000 megawatts, but it will have required more than 25 years to achieve it.

Other areas which have promise for early development in the near future—given the needed incentives—are in North central New Mexico and the Imperial Valley of California, and active exploration is also being carried on in other parts of California and New Mexico and in Nevada, Oregon, Idaho, Utah and Arizona. The geopressured areas of Louisiana and Texas hold promise for the longer range future.

PRACTICAL UTILIZATION AND POTENTIAL ROLE IN NATIONAL ENERGY PICTURE

Geothermal energy undoubtedly has the potential for a fairly wide range of use in coming decades, and even today in some nations it is utilized for space heating and industrial process heat, such as in the New Zealand paper industry. However, the immediate and near-term practical use in the United States is and will almost certainly continue to be primarily for electrical power generation. A pound of steam from the earth is indistinguishable from a pound of steam from a fossil-fuel-charged boiler and has been proven to be as effective in powering conventional electrical generating equipment.

But there are tremendous economic barriers which this industry must overcome: the tremendously high costs of drilling for geothermal deposits in hard rocks, with high temperatures and corrosive fluids; the very large capital invest-

ments required over several years before revenues can begin for a geothermal project; the requirement for drilling many replacement wells at each development site to maintain a constant stream of energy; and the present discouraging Federal income tax treatment.

The projected investment for developing resources to support 20,000 megawatts of generating capacity includes the costs of drilling at least 1,200 exploratory wells and 8,000 development wells at a minimum cost of \$750,000 per well, or a total of \$6.9 billion in 1977 dollars in drilling costs alone. Depreciable investment in hook-up facilities will add another \$3 billion, bringing the total investment requirement to about \$10 billion. Moreover, a like investment will be required for replacement production wells and facilities through the approximately 30-year operating life of each development as the resource depletes.

TAX CONSIDERATIONS

It is extremely unlikely that the goal of 20,000 megawatts of geothermally-generated electric power will be achieved unless encouraging tax legislation is enacted and tax incentives thereby clearly established.

At the present time the Federal income tax treatment of geothermal well costs and production is in doubt. The Circuit Court of Appeals in the *Reich* and companion cases (*Reich et al. v. Commissioner*, 454 F. 2d 1157 (9 Cir. 1972), affirming 52 T.C. 700 (1969)) held that geothermal energy in The Geysers field is an exhaustible natural resource and is entitled to depletion under existing law. In spite of this decision and the clear scientific evidence that geothermal energy is an exhaustible natural resource, the national office of the Internal Revenue Service is disallowing intangible drilling cost treatment and percentage depletion in respect of all geothermal activity and has announced its intention to press its position in the courts.

As a fledgling industry, geothermal energy must compete with the lowest cost alternative energy available to electric power utilities. In the West, where geothermal resources are most prevalent, the alternative is low-cost, strip-mined coal. Loss of percentage depletion and the right to deduct intangible drilling and development costs for geothermal energy would mean that the major portion of the geothermal resources would be non-competitive with coal and other alternative sources of energy which have the benefit of more favorable tax treatment. As a result, the nation's geothermal resources would remain largely undeveloped.

APPENDIX B

DEPLETION OF GEOTHERMAL RESOURCES

It has been scientifically established that geothermal resources do deplete, and this conclusion has been accepted not only by scientific writers but by the courts on the basis of evidence presented. In the case of *Reich et al. v. Commissioner of Internal Revenue*, 454 F2d 1157 (9 Cir. 1972), affirming 52 T.C. 700 (1969), the first question considered by the United States Court of Appeals for the 9th Circuit was stated by the Court as follows: "(1) Are the taxpayers' reserves of geothermal steam an exhaustible natural resource?"

The Court affirmed the decision of the Tax Court that geothermal steam in the Geysers area was depletable. A copy of the decision is attached. In pertinent part the Court stated:

"The principal factual dispute between the parties before the Tax Court concerned the nature and exhaustibility of the steam reserves at The Geysers. After reviewing extensive documentary evidence and hearing expert testimony from geologists and engineers, the Tax Court made these findings of fact: --

"Geothermal steam is a gas. The geothermal steam at The Geysers is contained within a closed reservoir in a finite amount with no significant liquid influx to or boiling within its confines. The geothermal steam at The Geysers is an exhaustible natural resource which has depleted and is continuing to deplete.

"Our review of the record convinces us that ample evidence supports this factual conclusion."

The reasons why geothermal energy is depletable may be summarized briefly. *Depletion in Geothermal Reservoirs.*—Geothermal energy, unlike solar energy, is a finite resource. It takes geological time periods of several hundred thousand years for a geothermal field to mature or for the magma to heat the surrounding rock and fluids by conduction, but it takes only 50-100 years to extract its useful energy. In another 100,000 years or so, a depleted geothermal field may be ready

again for exploitation. None of the major geothermal fields known so far have been abandoned but these reservoirs do show partial depletion and depending upon their age this is significant.

Heat Depletion.—Rock is a poor conductor; it is a good insulator. In a mature geothermal field, like the Geysers, the heat being transferred from the magma is roughly the same as the heat being lost at the surface due to conduction, and is about 64 million BTU per hour.

In the Geysers, the current production is about 9 million pounds per hour of steam. This corresponds to a heat extraction rate of 11,000 million BTU per hour. Thus, the heat extraction is about 170 times the heat recharge. In other words, the heat extracted in one year is equivalent to the heat released by the magma in 170 years! This number is expected to increase as the installed capacity of the Geysers increases to four times the present amount.

Mass Depletion.—In the foregoing, we limited our discussion to the depletion of heat energy. Water is the medium through which heat is extracted and all indications are that water also depletes. The rate of water depletion will depend on the location of a geothermal reservoir in relation to the surface topography and the subsurface hydrology. The cold outside water may move into the hot water aquifer as soon as hot water is withdrawn, or it may not move at all. If the same amount comes in as goes out, pressure in the reservoir would not decline, but that is not in line with the experience.

Major geothermal reservoirs have shown a decline in pressure with time, indicating water depletion. Ramey¹ studied the shallow zone of the Geysers and plotted pressures against cumulative production clearly showing a decline in pressure. Ramey and Whiting² carried out a similar study on the Wairakei, New Zealand field (Figure 3) indicating depletion. Celati, et al³ discuss pressure decline in Larderello, Italy.

Since it is established that geothermal resources are exhaustible, it is the job of the scientists to insure that a particular geothermal resource will last as long as the project life of the particular generating facility using the energy product. This is of critical importance.

Since steam cannot be transported the generating plant must be built at the geothermal site, and it is totally dependent upon the energy produced at that site. Therefore, the economics of the situation requires that the geothermal field be capable of producing enough energy to supply 100 percent of the needs of the generating facility throughout its life. For example, if the life of the facility is projected at 35 years, the scientists must insure that the geothermal field will produce sufficient energy to supply the facility for 35 years, i.e., the field must not be exhausted before the 35 years have expired. This determines the rate of extraction of the geothermal energy.

The experience at the Geysers field with respect to the drilling of wells to replace depleted wells may be enlightening.

Year	Wells drilled to replace depleted wells	Installed generating capacity (kilowatts)
1972.....	1	192,000
1973.....	1	302,000
1974.....	2	412,000
1975.....	7	467,000
1976.....	6	502,000
1977 (to date).....	6	502,000

It will be noted that replacement wells were needed in earlier years, but that as production continues more wells are needed.

THE CHAIRMAN. Next we will call Mr. Stanley W. Schroeder, director of legislative services, Gas Appliance Manufacturers Association.

¹ Henry J. Ramey, Jr.: "A Reservoir Engineering Study of the Geysers Geothermal Field, Mar. 1, 1968," submitted as evidence, *Reich et al. v. Commissioner of Internal Revenue*, 1969 Tax Court of the United States, 52 T.C. No. 74, 1970.

² R. L. Whiting and H. J. Ramsey: "Application of Material Energy Balances to Geothermal Steam Production, *Journal of Petroleum Technology*," vol. 21, July 1969, p. 893.

³ R. Celati, P. Squarci, L. Tam, and G. C. Stefani: "Analysis of Water Levels and Reservoir Pressure Measurements in Geothermal Wells," "Proceedings, United Nations Symposium on the Development and Use of Geothermal Resources," San Francisco, May 20-29, 1975, vol. 3, p. 1593.

STATEMENT OF STANLEY W. SCHROEDER, DIRECTOR OF LEGISLATIVE SERVICES, GAS APPLIANCE MANUFACTURERS ASSOCIATION, ACCOMPANIED BY JOHN P. LANGMEAD

Mr. SCHROEDER, Senator Long, Senator Dole, with me today is Jack Langmead, director of technical services.

The Gas Appliance Manufacturers Association includes the manufacturers of gas and oil furnaces, gas boilers, burners, direct space heating, industrial forced air, infrared heating, and controls. Our members manufacture approximately 95 percent of all the gas-fired products sold in this country in these areas.

These firms have survived in the marketplace as a result of their knowledge of the safe and efficient use of energy. They would like to offer their observations based on this knowledge.

We believe there are several areas of substantial energy conservation opportunities that have been overlooked. The first of these is the residential energy credit.

If you look at the list of qualified energy conservation expenditures included in the administration proposal, in the House-passed version, you come up with two things. There is insulation in there. That, we certainly applaud. But for the homeowner to try to do something about his heating unit, there is nothing except four specific measures for retrofitting his existing heating unit: Adding flue dampers, intermittent ignition devices, clock thermostats and/or replacing the burners of furnaces.

We believe Congress will be overlooking the tremendous possibilities of actually letting that homeowner replace his existing furnace with a furnace that includes one or more of these energy-saving possibilities, or even other energy-saving possibilities.

Additionally, offering the possibility of buying a furnace that is properly sized after he has done his home insulation job—we think that that ought to be at least available for consideration for the homeowner. We are not saying he is going to take that option in every case. There will be some cases where it would make sense to make a simple retrofitting change, but he should have that option because otherwise we think that he is going to be pushed down the retrofitting path by the credit, because the credit means money to him. We think he should have a chance to look at the option of a new energy-saving heating unit.

There are areas in which some of these retrofit measures are not really worth very much; particularly simply replacing burners on gas furnaces will not save energy and reducing the input of energy to the furnace can even waste energy. Mr. Langmead will be glad to explain that to you, if you have any questions.

There are some advantages in the new furnace option. I think one of the principal ones is safety. Improper installation of a retrofit device in the field can cause fire, explosion or asphyxiation. Of course, that is personal tragedy to the homeowner. It is hard to put that on the scale of values. To the furnace manufacturer, even though he has nothing to do with the modification of the furnace that he sold 5 years ago that is out in the field, it means product liability exposure. The way product liability claims are going these years, if someone was hurt he sues everybody in sight, including the furnace manu-

facturer, the fellow who made the installation, the controls manufacturer and probably the utility, anybody who is subject to the deep pocket theory—you sue everybody in sight. We think this may be particularly damaging to small manufacturers, and it is appalling to note that possibly the Government itself may be pushing the homeowner down this path of field retrofit rather than giving him the chance of going to the safer measure of buying the new furnace which has been completely engineered for safety to include these devices and can be installed relatively simply by a few connections compared to the myriad of connections and analyses that must be made to adapt a retrofit device to an existing furnace in the field.

There are actually, I believe, 85 furnace manufacturers that are no longer in business, so the possibility of actually checking with them to find out the specifications on their furnace would not even exist.

On the cost, on comparing retrofitting versus a new furnace, we find, looking at some of these costs, that there will be areas where they are comparable. We find that utility programs are even pointing out in some cases that the option of retrofitting will not be available. It will not make any sense to the homeowner to do it.

His furnace is too old. Its useful life does not make it worth a candle to do that. Under this list as it exists now, he is not given the possibility of using his investment tax credit for a new energy-saving furnace.

We think on an installed cost basis, the two items can actually be very comparable. The GAMA memorandum attached to our statement, tries to set out some of the comparative costs and some of the energy-saving potentials that are available. If we look at the possibility of an average furnace costing \$650, only about 20 percent of that if you use the House figure, or \$130 of the credit, would be used for the new furnace credit.

On the assumption that every taxpayer would be allowed up to \$400 worth of tax credit, there is no way that he can go beyond that tax credit limit, so the question of how many people will use the credit and how many will not use it, is a little bit less relevant than if you had a situation where the tax credit would be open ended.

The timing of this, we think, is important. We think—we know there will be minimum efficiency standards required of the industry in a few years, but in the meantime, until those standards are mandatory and are required on all new furnaces, the retrofitting will be the only game in town, the only option open to the consumer for getting the credit if he wants a more efficient heating unit.

Therefore, we think that the credit for the entire furnace should be included at the outset so when Federal programs that are being pushed around the country are started—the State programs are started—that all of these programs will have that option in there, at least for his consideration.

We believe, and we have asked in the amendments that we suggested here that the list be made open ended. There will be other items that can be added to that list. The House has open ended its list. We think this makes good sense.

You might ask the question why, if in the next couple of years the mandatory standards for minimum efficiency are in there and there is also a possibility that the credit be extended to complete furnaces at a later time, as an addition to that list are we asking for the credit now.

The problem is, with the workload that the Energy Administration is going to have, there are going to be some priorities. The items on the list that the Congress says you ought to look at are the ones that are going to be acted on first; the others are going to be dealt with at a later time.

We feel, if this energy program is going to get off to a fast start, here is one thing that will start it off, and we have offered, on pages 5 and 6 of our statement, some proposed language that would give anybody who has some good ideas an opportunity to qualify.

I would like to turn briefly to the second item, and that is the business investment credit for specially defined energy property and there are two things that come to mind.

There is a misdirection in this list which goes to the concept of giving the business tax credit for the recovery of wasted energy while seeming to avoid the concept of not wasting the energy in the first place. The manufacturers in this business have spent a lifetime trying to make more efficient facilities, and we think that they ought to be given an opportunity to try their best to do that, and we think that the purchaser of the equipment will be better off in many cases where he puts in new equipment instead of just adding on more and more things to his existing equipment and that are getting older and older.

We note also something disturbing in the House version of the bill, and that is the business credit would be limited to industrial or commercial processes.

That, frankly, overlooks the whole area of the heating of that industrial facility itself. We feel that if there is a principal purpose test being used in conjunction with the commercial process, that you foreclose the opportunity of actually installing energy saving measures in the heating of all these facilities. So with these two suggestions, we hope that the Senate will make up for some of the deficiencies of the administration and the House bill.

That concludes my statement. We would be pleased to try to answer any questions?

The CHAIRMAN. Senator Dole?

Senator DOLE. I just have a general question. We were all told that this problem is "the moral equivalent of war." I understand the need for tax credits. Maybe they should be expanded if you are going to start in some areas. You have to expand if you are going to start in some areas. You have to expand it to every conceivable area where somebody might save energy. Then you pay them for doing what they ought to have done in the first place.

In effect, you subsidize their energy costs through tax credits in every conceivable form. I do not know whether that is what the President had in mind, or not. I thought the problem was trying to conserve energy and to find more energy sources. The administration did not address production; we hope to do that.

I do not know how we can do that by just tossing tax credits to everybody who walks in.

Mr. SCHROEDER. The administration proposal does include minimum efficiency, mandatory efficiency standards for residential appliances. This is one avenue different from the tax credit approach.

What we have found in the commercial field is that the consumer looks very closely to the initial cost of the item that he has paid for and to get him to pay that extra amount for the more efficient one, he can use any kind of help he can get. The investment credit will help him on it.

Senator DOLE. The Government, in effect, will be paying part of the bill for him. I assume, if it were somebody who did not have any income tax, it would be a refundable tax credit, so we would be sending a check to the person who did not pay taxes.

I just wonder how far this can go. How many incentives do you have to build into the program to get people to do what they should do in the first place?

Mr. LANGMEAD. I think one point on that should be made. In many cases there are marginal situations where retrofitting of a furnace may save on the energy costs of that unit, maybe 10 percent or 8 percent per year. That would be given a tax credit under the bill as written.

There are many other cases where you could, for about the same cost, replace with a properly sized, more efficient, piece of equipment that included several things that would save maybe 20 percent.

Now, you have encouraged the homeowner, by a tax credit, to take a step immediately to save 10 percent, and he has invested in that installation. He will then try to use it for a number of years, longer than he would have had there been no tax credit for the retrofit.

What we are saying is please put things on an equal basis so the cost-benefit relationship can be made by the homeowner. He may, in fact, in many cases decide to retrofit and then use the equipment for a longer period of time even though a more efficient retrofit of his home would have been replacement of the furnace, because he would save more energy over the long haul.

We just ask that the homeowner's options remain equal.

Senator DOLE. I understand what you are saying. I just do not understand the theory.

Mr. SCHROEDER. There is one aspect of this. As the new furnace minimum efficiency standards of those are set and met, the price of those furnaces will have to be increased to include those additional energy-saving measures, and therefore, it would be somewhat more of a burden for the low end of the population, the low-income end of the population, because they no longer would have available the cheapest furnace they could possibly buy. They will be forced to pay a minimum amount. All of those furnaces would have that level of efficiency included.

The price of these furnaces will have to reflect energy use improvements required by the standards. If you think that perhaps the Government made it necessary for the homeowner to pay more, then maybe you could justify that the Government would help him with investment credit on the purchase of that furnace.

Senator DOLE. Thank you.

The CHAIRMAN. You made a very good statement, and there is some very good material here that deserves careful study. I will try to see that it is all considered.

Thank you.

[The prepared statement of Mr. Schroeder follows:]

STATEMENT OF STANLEY W. SCHROEDER, DIRECTOR LEGISLATIVE SERVICES,
GAS APPLIANCE MANUFACTURERS ASSOCIATION

SUMMARY

(1) The best use of the residential tax credit may be to give a homeowner the option to replace (not retrofit) an existing residential furnace or boiler with a new energy-saving heating unit.

(2) The best use of the business tax credit may be to encourage replacement with energy-saving units in commercial or industrial facilities rather than try to recapture wasted heat with add-on equipment. Energy saving in space heating, and not only in manufacturing processes, should be encouraged.

STATEMENT

By way of introduction, I am Stanley W. Schroeder, Director of Legislative Services of the Gas Appliance Manufacturers Association (GAMA). With me is John P. Langmead, GAMA's Director of Technical Services. The Gas Appliance Manufacturers Association has thirteen divisions including manufacturers of gas and oil furnaces, and gas boilers, burners, direct space heating, industrial forced air, infrared heating, and controls. Our members manufacture approximately 95 percent of all the gas-fired products sold in this country in these areas. These firms have survived in the marketplace as a result of their knowledge of the safe and efficient use of energy. They would like to offer their observations based on this knowledge.

GAMA believes that the pending legislation has overlooked opportunities for substantial national energy conservation in the residential energy savings credit and in the business investment credit for "specially defined energy property."

Residential energy credit

In looking at what the Administration proposal and the House have listed as qualified energy conservation expenditures under proposed new Section 44C of the Internal Revenue Code, we applaud providing a credit for home insulation, but are concerned that when the homeowner turns to improving his heating unit his options will be limited to four specific measures for retrofitting existing heating units; namely, by adding on flue dampers, intermittent ignition devices, clock thermostats and/or replacing the burners of furnaces.

What has been overlooked is the possibility of replacing his old furnace with a new furnace that will include one of more of these listed measures or other energy conserving features, and additionally offers the possibility of having a properly sized furnace suited to the heating requirements of the home after the benefits of insulation have been taken into consideration. Incidentally, one of the retrofit measures in the House passed legislation will be worthless to many homeowners—namely replacing burners on gas furnaces will not save energy and simply reducing the input of energy to the furnace can even waste energy.

Advantages of the "new furnace option"

A. *Safety to the Consumer.*—There is serious concern that improper installation of add-on retrofit measures to furnaces out in the field can cause fire, explosion or asphyxiation of the homeowner and his family. To the homeowner this is personal tragedy. To the furnace manufacturer, even though he had nothing to do with the modification of his furnace out in the field by someone else, it means involvement in product liability lawsuits, which because of the "deep pocket" theory are likely to result in verdicts that can mean financial ruin to small manufacturers. It would be a bitter irony if the Congress in an honest attempt to help the homeowner reduce his energy bills and the Nation's energy consumption, steered him down only the retrofitting path when there were safer ways to go.

B. *Cost to the consumer and manufacturer.*—Retrofitting an old furnace can be much like filling potholes when a new road surface might cost no more and provide a smoother, longer lasting surface. Sometimes patching potholes is a good idea; other times it is not. Utility programs exploring furnace retrofit possibilities have found that a substantial number of furnaces out in the field are not suitable for retrofitting. For many that are approaching the end of their useful life, retrofitting will provide no useful return on investment. The bottom line is what have you got for your money. We believe that in many cases, if he had the option, the homeowner would find that a new furnace is cost competitive

with retrofitting—on an installed cost basis or would be competitive if the residential energy credit were available for replacement as well as retrofit.

The attached GAMA Memorandum on the "New Furnace Option for Homeowners" was worked up with reference to the Administration Bill on the House side. While better data will be forthcoming as times goes on, the Memorandum sets forth some useful estimates of the comparative costs and energy savings potentials of both the retrofitting measures and new furnace options as well as the outside limits of the possible effects of each on the Federal Revenues. Obviously, no taxpayer could get more than the \$400 tax credit (under the House bill) which he must allocate for both insulation and "other energy conserving measures." Actually, if we assume that the average energy saving replacement gas furnace will cost around \$50, only \$130 of this credit would be used (if a flat 20 percent rate were allowed). This \$130 would help the homeowner to purchase more efficient home heating equipment. Inasmuch as about 1 million gas furnaces are normally replaced in this country annually, this would provide a substantially opportunity for the residential energy conservation program to get off to a fast start. It would provide an immediate incentive, rather than wait until new furnaces are produced to get the minimum efficiency standards that will be mandated in Title I of the National Energy Act. Historically, most homebuilders of large housing developments have installed the cheapest model they could purchase and will probably continue to do so. That leaves existing homeowners, replacing furnaces in their own homes, who are likely to be the best market for the more efficiency furnaces. If this potential market becomes a reality it will be a tremendous incentive to research and development within the industry.

Timing and priorities

We note that the House-passed bill has an open-ended energy tax credit provision (which we hope the Senate will also do) so that other items can be added to the list that the Secretary of Energy specifies as being of a kind that increase the energy efficiency of the dwelling. There is no doubt in our minds that furnace replacement by a unit with improved seasonal efficiency should end up as one of the items on that list. However, it is quite obvious that items listed specifically by the Congress in the Act will receive first priority in scheduling the Energy Agency's workload before the Energy Agency even begins to focus on what other items should be on the list.

If furnace retrofitting has a one or two year head start over replacement furnace, many consumers who are anxious to move ahead with home heating improvements will have to do so without a chance to consider what may be some of their best options. Having spent their money for retrofitting they will understandably delay replacement with a new seasonably efficiency furnace thereby delaying the national movement towards energy conservation.

Suggested amendment

GAMA, therefore, respectfully requests that the list of items specified for the residential energy savings credit include:

"() Heating units that replace or supplement existing heating units, incorporate one or more of the items in this list or other energy-saving components and provide a substantial energy saving to the residential user;

In addition, in order to insure that other energy-saving measures have a chance of being considered, the list should be open-ended by adding as the last item:

"() An item of a kind which the Secretary specifies by regulations as increasing the energy efficiency of the dwelling."

Business investment credit for specially defined energy property

GAMA would like to point out an apparent misdirection of effort contained in the list and qualifications for "specially defined energy property" available for the proposed business energy-saving credit.

Most of the items on that list could be categorized as waste heat recovery equipment. This overlooks the other way of conserving energy—not wasting it in the first place. Much expertise among GAMA Members could make this a significant area of national energy saving—if the list is made open-ended and not limited by principal purpose tests that foreclose energy saving opportunities. The House Bill, for example, limited the items listed to applications connected with an industrial or commercial process, thereby overlooking the energy savings possibilities in heating the industrial or commercial facility itself.

Suggested amendment

Add to the list of "specially defined energy property":

"() Heating units that replace or supplement existing heating units and provide a substantial energy saving to the commercial or industrial facility;

"() any other property of a kind specified by the Secretary by regulations; the principal purpose of which is reducing the amount of energy consumed in any existing industrial or commercial facility and which is installed in connection with an existing industrial or commercial facility that is not subject to energy use limitations contained elsewhere in this Act."

With such language the smaller industrial and commercial facilities would receive a significant assist to convert to energy-saving heating units.

As with the residential energy conservation credit the Secretary's approval would be needed for items to be added to the list. We are asking for a chance to make our case to the Secretary and that he not be limited by misguided principal purpose limitations imposed by the Congress that would fail to recognize available energy conservation possibilities to avoid wasting heat in the first place.

Thank you for the opportunity to share our insights. We would welcome any questions you may have.

A CASE FOR A "NEW FURNACE OPTION" FOR HOMEOWNERS IN APPLYING THE RESIDENTIAL ENERGY-SAVING CREDIT SEC. 1101, H.R. 6831

Issue: New vs. retrofit (furnace).

Position: Homeowner should have option to use residential energy conservation credit for a new, safe, energy-saving furnace or boiler rather than be influenced by credit to retrofit his existing furnace.

1. Costs to consumer (installed) will be comparable. Estimated average cost of new energy-saving furnace of \$650 compares favorably with estimated average cost of retrofitting old furnace for \$500.

2. Energy savings will be comparable (better in most cases). The variety of potential combinations of features that can be incorporated in new furnaces to make them 20 percent or more efficient than contemporary furnaces will compare favorably with energy savings by retrofitting.

National energy savings from replacement could be 260 trillion Btu during the duration of the credit (through 1982). Extent of retrofitting activity (and therefore the national savings) are unknown.

3. Furnace replacement market offers quick-start opportunity for national energy program. Approximately 1 million units are replaced each year. Credit would help homeowners buy energy efficient furnaces rather than conventional replacements. Difference is likely to be within \$75 to \$175.

4. Revenue cost over life of the credit (thru 1982) for replacement with energy saving furnaces would be 1/8 the revenue cost of retrofitting all existing furnaces—Replacement—4,350,000 units at \$130 equals \$566 million. Retrofit—34,000,000 units at \$100 equals \$3,400 million. Obviously either replacement or retrofit would use up only part of the \$400 maximum credit being considered.

5. Consumer is far ahead with new furnace. Safety: Field retrofitting—unless done properly—can be hazardous; new furnace is engineered and installed as a coordinated unit; no duplicate costs for fixing up old furnace and then having to replace it in a few years anyway; and desire to get his money back out of retrofitting may cause consumer to defer replacement.

- NEW FURNACES -
INSTALLED COSTS
 and
ENERGY SAVINGS (estimated)

	Furnace Size (Btu)*				
	80,000	100,000	120,000	150,000	200,000
Conventional Furnace	\$ 485	\$ 540	\$ 560	\$ 675	\$ 865
Deluxe Furnace (with <u>intermittent ignition device and two-stage gas valve</u>)	\$ 565	\$ 615	\$ 645	\$ 730	\$ 975
Deluxe Furnace (with <u>automatic vent damper, intermittent ignition device, four-speed motor, permanent cleanable filter, printed circuit, 20-year guarantee</u>)	\$ 630	\$ 675	\$ 730	\$ 850	\$1,225

use est.
\$650

*Average home has furnace size of from 100-120,000 Btu capacity. With proper weatherproofing and sizing for normal space heating needs, this average furnace size required will probably go down to the 80,000 Btu furnace size level.

RETROFITTING FURNACES—INSTALLED COSTS (ESTIMATED)

Modification	Material cost ¹	Installation time (hours) ²	Total cost ³
(a) Flue damper (and second valve for safety).....	\$97	2	\$252
(b) Intermittent ignition device.....	53	3	198
(c) Reducing burner orifice.....	1	2	107
(d) 2-stage valve to adjust flame size.....	50	2	104
(e) Flue restrictors blastgate for furnace and water heater.....	17	1½	155
Combination of (c) and (e).....			187
Combination of (a) and (e).....			329
Combination of (a), (b), and (c) [assume \$500].....			557

¹ Cost of purchases by Michigan Consolidated Gas Co. These costs will vary depending upon stage in distribution system at which purchase is made.

² Average time of installations by employees of Michigan Consolidated Gas Co. in Detroit. Time for independent contractors will vary.

³ Average of bids for dozen independent contractors surveyed by Michigan Consolidated Gas Co.

SUMMARY OF ENERGY SAVINGS (PERCENTAGE IMPROVEMENT IN FUEL USE EFFICIENCY)

Energy conserving measures	As retrofit device	As part of a new furnace or boiler
GAS-FIRED HEATING SYSTEMS		
(Single modifications)		
Those listed in H.R. 6831:		
1. Replacement burner:		
(a) Only reduction of firing rate.....	(1)	-----
(b) Burner orifice plus baffle modifications (to improve heat transfer).....	3.0	3.0
2. Automat. vent damper.....	18.22	18.2
3. Intermittent ignition device (IID).....	8.1	8.1
4. Clock thermostat.....	5-16	5-16
Those not listed in H.R. 6831, but have been tried by Michigan Consolidated Gas Co.:		
5. chimney size restrictor.....	2-5	(²)
6. Two-stage gas valve.....	(¹)	(¹)
7. combination: Chimney size restrictor (5.); plus burner orifice reduction (1.1); plus furnace baffling (1.b).....	5-10	-----
New Furnaces/boilers:		
8. 40 sec. fan-on delay; 160 sec. fan-off delay.....		6.0
9. 6 percent increase in steady-state efficiency from 75 to 81 percent.....		4.3
10. Sizing down from 125,000 Btu/per hour furnace to 80,000 Btu/per hour.....		2.5
11. Direct vent or isolated combustion system.....	10.2	10.2
12. Power burner.....		14.4
13. Combinations:		
Automatic vent damper (2.) plus IID (3.).....		23.5
Power burner (12.) plus IID (3.).....		21.0
Direct vent or isolated combustion system (11.) plus IID (3.).....		18.7
Direct vent or isolated combustion system (11.) plus vent damper (2.).....		21.8
Power burner (12.) plus direct vent or isolated combustion system (11.) plus IID (3.).....		19.7
Power burner (12.) plus offcycle air restriction plus IID (3.).....		-----
OIL FIRED HEATING SYSTEMS		
(Single modifications)		
Those listed in H.R. 6831:		
1. Replacement burner.....	12.0	-----
2. Automatic vent damper.....	11.2	11.2
3. Clock thermostat.....	5-16	5-16
New furnaces/boilers:		
4. 40 sec. fan-on delays; 160 sec. fan-off delay.....		6.0
5. 5 percent increase in steady-state efficiency.....		11.6
6. Sizing down from 125,000 Btu per hour furnace to 80,000 Btu per hour furnace.....		3.0
7. Direct vent or isolated combustion system.....	7.8	7.8
8. Offcycle air restriction.....		6.8
9. Combination: Automatic vent damper (2.) plus direct vent or isolated combustion system (7.).....		14.0

¹ Negative—up to \$40 per year; increased operating cost to consumer.

² On national average.

³ Would be included by responsible installs at time of installation.

⁴ Negative—up to 5 percent operating cost increase to consumer.

ENERGY SAVINGS POTENTIAL BY RETROFITTING RESIDENTIAL CENTRAL HEATING SYSTEMS

I. RETROFIT DEVICES FOR FURNACES LISTED BY ADMINISTRATION FOR RESIDENTIAL ENERGY CREDIT, SEC. 1101 (SEC. 44B(c)(4) IRC)

Item	GAMA comment	Energy savings	
		GAMA best estimate	Michigan consumer program ¹
<p>“(A) a replacement burner for a furnace which burner is designed to reduce the firing rate or achieve a reduction in the amount of fuel consumed as a result of increased combustion efficiency.”</p> <p>Suggested technical amendment—revise to read:</p> <p>“(A)(1) For an oil furnace or boiler, reduction of the firing rate by use of a replacement burner with increased combustion efficiency, and</p> <p>(2) For a gas furnace or boiler, reduction in the firing rate by replacement of orificas and modification of flue baffling to improve heat transfer efficiency.”</p>	<p>Usefulness is limited to oil-fired furnaces. Reduction of firing rate for gas-fired furnaces—without redesign of furnace to minimize excess air-flow—will result in increased consumption of energy due to reduced operating efficiency and greatly increased electrical consumption.</p> <p>(Translation: Furnace and blower will have to stay in oncycle longer to make up for reduced level of heat output.)</p> <p>(1) This language clarifies intent with regard to oil furnaces or boilers.</p> <p>(2) This language clarifies the fact that improved heat transfer (not increased combustion efficiency which is already at 100%) may be achieved by gas furnaces and boilers.</p>	<p>Oil-fired—12 percent.</p> <p>Gas-fired (negative). Potential increase in operating cost (gas plus electricity) up to \$40 per year.</p> <p>12 percent</p> <p>3 percent (assuming existing furnace is sized 25 percent over the proper size needed to take advantage of night setback saving.)</p>	<p>10.0 percent (flame size was reduced by making burner orifices smaller.)</p> <p>(GAMA questions whether any net energy savings. See GAMA comments.)</p>
<p>“(B) a device for modifying flue openings which will increase the efficiency of operation of the heating system.”</p> <p>Suggested amendment—Revise to read:</p> <p>“(B) equipment for increasing the seasonal efficiency of the heating system by reducing the loss of heated room air through the heating system.”</p>	<p>Vent (stack) dampers may be useful in parts of the country to cut down the escape up the chimney of warm air from the heating unit or surrounding heated room air—during “off” portion of heating cycle.</p> <p>The same results can be achieved by isolating the combustion system from the heated space.</p> <p>Techniques for isolating the combustion system include:</p> <p>(1) Use of direct vent type furnaces that duct combustion and draft dilution air directly from outside and have no draft hood and thus avoid loss of heated room air in both on and off cycles.</p> <p>(2) Use of power combustion type furnaces which do not have a draft hood and thus avoid furnace-induced loss of heated room air during the off cycle. (3) Enclosing the furnace in a closet and ducting combustion and dilution air from the outside directly to the closet. This avoids furnace induced loss of heated room air. (4) Use of vent restrictor which properly sizes the venting system for the volume of flue gases to be handled. If the original vent was oversized, this change would minimize loss of heated room air during both the burner-on and burner-off cycles.</p>	<p>(a) Vent dampers:</p> <p>18.2 percent (gas-fired furnace/boiler with 75 percent steady-state efficiency).</p> <p>11.2 percent (oil-fired furnace/boiler with 82 percent steady-state efficiency).</p> <p>(b) Direct vent or isolated combustion system, 10.2 percent. Power combustion, 14.4 percent.</p> <p>24 percent.</p>	
<p>“(C) an electrical or mechanical furnace ignition system which replaces a standing gas pilot light”.</p> <p>(E) a clock thermostat”.</p>	<p>The energy savings potential of any intermittent ignition device (IID) will vary depending upon the length of time the heating system is in the off-cycle. Results of night set-back of thermostat will vary in different cities around the country.</p>	<p>8.1 percent</p> <p>5 to 12 percent (night set-back from 65° F to 60° F), 9 to 16 percent (night set-back from 65° F to 55° F).</p>	<p>3 percent (this percentage is low because survey includes only winter months.)</p>

ENERGY SAVINGS POTENTIAL BY RETROFITTING RESIDENTIAL CENTRAL HEATING SYSTEMS—Continued

II. RETROFIT DEVICES NOT LISTED BY ADMINISTRATION

Item	GAMA comment	GAMA best estimate	Energy savings	
				Michigan consumer program ¹
Chimney size restrictor (blastgate)	Useful only where chimney is oversized (such as required by old Detroit ordinance for burning coal).	2 to 5 percent (on a national average).....	20 percent.	(see GAMA comment.)
Two-stage gas valve.....	Purpose is to adjust flame size to reflect changing weather conditions.	(Negative.) Zero to minus 5 percent on a cost basis because of additional blower operation time required.	10 percent.	
Combination: Chimney size restrictor reducing burner orifices, plus furnace baffling to reduce excess combustion air.	Combination has greater potential where chimneys are oversized (as in Detroit).	5 to 10 percent (on a national average).....	25 percent.	

¹ Michigan Consolidated Gas Co.—based on study in Detroit during September 1975 to March 1976 heating season.

ENERGY SAVINGS POTENTIAL BY RETROFITTING RESIDENTIAL CENTRAL HEATING SYSTEMS

III. NEW FURNACE/BOILER POTENTIAL ENERGY SAVINGS

[GAMA's best estimate of energy utilization efficiency improvements that are predicted by testing, engineering studies and computer simulations of nationwide climatic conditions arrive at these national average figures for energy savings]

Item	Energy savings—GAMA's best estimate (percent)	
	Gas-fired	Oil-fired ²
1. Vent damper.....	18.2	11.2
2. Direct venting or isolated combustion system.....	10.2	7.8
3. Intermittent ignition device (IID).....	8.1	(³)
4. Clock thermostat.....	5-16.0	5-16.0
5. Power burner (blower supplies the combustion air).....	14.4	(³)
6. 40-sec fan-on delay; 160-sec fan-off delay.....	6.0	6.0
7. 6 percent increase in steady-state efficiency.....	4.3	11.6
8. Sizing down from a 125,000 Btu/hr. furnace to an 80,000 Btu/hr. furnace.....	2.5	3.0
9. Off-cycle air restriction.....	(⁴)	6.8
Combinations:		
10. IID and vent damper.....	23.5	(³)
11. IID and power burner.....	21.0	(³)
12. IID and direct vent or isolated combustion system.....	18.7	(³)
13. Vent damper and direct vent or isolated combustion system.....	21.8	14.0
14. IID and power burner plus direct vent or isolated combustion system.....	19.7	(³)
15. IID and power burner plus off-cycle air restriction.....	24.6	(³)

¹ 75 percent steady-state efficient reference atmospheric combustion furnaces.

² 80 percent steady-state efficiency reference power combustion furnaces.

³ Not applicable.

⁴ No test results available of these combinations.

NATIONAL ENERGY SAVINGS ESTIMATES—IF NEW REPLACEMENT FURNACE/BOILERS WOULD RECEIVE THE RESIDENTIAL ENERGY TAX CREDIT

ASSUMPTIONS

- (1) Average furnace has input capacity of 100,000 Btu/hr.
- (2) Average days used per year—230 (5,500 hours).
- (3) Average use per day 20 percent (1,100 hours).
- (4) $1 \times 3 = 110$ million Btu per year per furnace.
- (5) Natural gas price of \$2 per million Btu. Annual operating cost equals $\$2 \times 110 = \220 .

I. Consumers' dollar savings

20 percent fuel savings equals \$44 per year per furnace per boiler.

Ultimate savings when 34 million units are replaced with energy saving furnace/boilers equals \$1,496 million per year for homeowners.

II. Nation's energy savings

110 million Btu per year per furnace multiplied by 20 percent fuel saving equals 22 million Btu savings per year per furnace.

These energy savings would be cumulated as national energy savings, as follows:

Heating season	Energy-saving furnaces produced for replacement (units)	Total in homes	22,000 Btu × savings/furnace	National annual energy savings			
				Btu (trillions)	Cubic feet (billions)	Barrels of oil (millions)	Kilowatts (billions)
1977-78.....	100,000	100,000	do.....	2.2	2.14	0.37	0.65
1978-79.....	250,000	350,000	do.....	7.7	7.52	1.31	2.26
1979-80.....	1,000,000	1,350,000	do.....	29.7	29.00	5.08	8.70
1980-81.....	1,000,000	2,350,000	do.....	51.7	50.44	8.84	15.15
1981-82.....	1,000,000	3,350,000	do.....	73.7	71.97	12.60	21.59
1982-83.....	1,000,000	4,350,000	do.....	95.7	93.46	15.97	28.04
Total national residential heating bill savings during period of residential energy credit.				260.7	254.58	44.17	76.39

REPLACEMENT OF FURNACES

[Estimated]

	1973	1974	1975	1976
(a) Furnace shipments ¹	1,719,500	1,476,300	1,185,800	1,554,400
Boiler shipments.....	146,700	122,600	88,100	109,100
Total.....	1,866,200	1,598,900	1,273,900	1,663,500
(b) New gas househeating customers and conversions ²	784,300	712,500	526,600	486,100
(c) Potential replacement market ³	1,081,900	886,400	747,300	1,177,400
Percent of total shipments.....	60	55	60	70

¹ Statistical releases of Gas Appliance Manufacturers Association.² Gas househeating surveys of the Department of Statistics, American Gas Association.³ Estimated use 1,000,000 per year.*Maximum residential tax credit for new furnaces compared to retrofitting existing furnaces*

I. New furnaces:

Estimated average cost of new furnace incorporating energy-saving devices.....	\$650
Tax credit for homeowners.....	\$130
Number of furnaces replaced annually (est.).....	1,000,000
Maximum total residential tax credit:	
Availability of energy-saving furnaces (heating season):	
1977-78.....	Units 100,000
1978-79.....	250,000
1979-80.....	1,000,000
1980-81.....	1,000,000
1981-82.....	1,000,000
1982-83.....	1,000,000
Total.....	4,350,000
At \$130.....	\$566,000,000

II. Retrofitting furnaces.

Installed costs:

Flue damper.....	\$252
Intermittent ignition device.....	198
Reducing burner orifice.....	107
Total.....	557
Estimated composite cost reduced to.....	\$500
Tax credit for homeowners.....	\$100
Number of conventional furnaces in existence (est.).....	34,000,000
Maximum total residential tax credit, assuming all will be retrofitted during 6-yr. duration of tax credit.....	\$3,400,000,000

AMENDMENT

(Sec. 1101 [Sec. 44B(c) (4)] Other Energy-Conserving Components * * *

At the end of Sec. 44B(c) (4) (F) add, "(G) heating units that replace or supplement existing heating units, incorporate one or more of the items included in (A), (B), (C) and (E) or other energy-saving components, and provide a substantial energy-saving to the residential user."

The CHAIRMAN. Next, we will hear from Mr. Bernard H. Falk, president, National Electrical Manufacturers Association.

**STATEMENT OF BERNARD H. FALK, PRESIDENT, NATIONAL
ELECTRICAL MANUFACTURERS ASSOCIATION**

Mr. FALK. Thank you, Mr. Chairman and Senator Dole.

I realize, as I begin here, that I am one among many witnesses who appeared before you today to discuss loss of tax revenues and compensation for energy savings, but we feel that the energy savings that we will be talking about in the case of cost-benefit ratios are so significant—

The CHAIRMAN. Why do you not have them put that chart up here?

Mr. FALK. We are here to shed some illumination, if you will, on energy savings in the lighting field. The United States uses about 74 quads of total energy per year, or basically the equivalent of 35 million barrels—

The CHAIRMAN. I cannot see that. Why do you not move it over? I like demonstrations, to see what you are talking about—perhaps you know that.

I have instructed the staff, when we discuss tariff bills, to give us a sample so that we know what we are voting on.

Mr. FALK. Lighting represents 5 percent of the total use of energy in this country, approximately $3\frac{1}{2}$ quads. Our estimate, and one with which we believe ERDA officials concur—is that energy consumption for lighting can be reduced by 30 percent through comprehensive conversion to more efficient light sources and lighting fixtures.

Thus, stated in optimum terms, increased lighting efficiency offers an opportunity to save the Nation approximately 1 quad of energy per year—or the oil equivalent of 500,000 barrels of oil per day.

If one assumes that 20 percent of the total possible lighting conversion could be accomplished each year, the annual savings in oil equivalent would be 36.5 million barrels and dollar savings would be about \$480 million.

The conversion that we are talking about is (1) in residential dwellings from incandescent lighting to fluorescent lighting and (2) in commercial and industrial buildings, from incandescent and mercury lighting to fluorescent, metal halide, and high-pressure sodium lighting.

In this chart shown to your right—and we have these demonstrations of each of these light sources—the left-hand scale of the chart is the measure of efficiency of light sources in the same sense as miles per gallon in one's automobile. It is evident that conversion from incandescent and mercury lighting to the three most efficient lighting sources—fluorescent, metal halide and high-pressure sodium—will provide significant energy efficiency improvement.

Residential lighting accounts for about 20 percent of total indoor lighting. Conversion of residential buildings from incandescent to fluorescent lighting could be expected to occur principally in kitchens, bathrooms, laundries, and other utility-recreational areas.

Assuming that 20 percent of existing dwellings converted from incandescent to fluorescent lighting per year, we are talking about a savings of approximately 3.5 million barrels of oil equivalent annually.

Commercial and industrial buildings account for 80 percent of total indoor lighting. It is here that the greatest opportunity for very significant energy savings exist.

We estimate that in such buildings now using incandescent lighting, conversion to metal halide or high pressure sodium systems would reduce energy consumption by 75 percent. Conversion from fluorescent lighting to metal halide or high pressure sodium lighting would reduce energy consumption by 50 percent, and if all existing mercury lighting systems were converted to high pressure sodium lighting, we estimate that there would be a savings of 36 million barrels of oil equivalent.

If high efficiency lighting offers such obvious potential for energy savings, it is logical to ask why it has not been more fully exploited by residential, commercial, and industrial consumers, and frankly, we do not have a good answer to that question.

The technology has been available for over a decade. There have been thousands of successful conversions at demonstrable energy savings; and high efficiency lighting is readily available from a large number of competitive manufacturers. Yet, the statistics of high efficiency lighting usage remain discouragingly low.

Metal halide and high pressure sodium lighting, combined, accounted for only 3 percent of lighting kilowatt-hours in 1975.

It is obvious that natural economic forces, which usually could be expected to accelerate conversion, are not getting the job done. We believe there are three principal roadblocks: inertia, lack of education, and lack of finances.

Despite the discouraging level of public resort to lighting conversion, it is noteworthy that the FEA has recognized the energy saving potential of conversion to high-efficiency lighting. In November 1974, FEA issued lighting and thermal operations guidelines which are shown in the table included on page 8 of the written statement.

In July 1977, FEA issued a rule that identified energy conservation measures which can be implemented in existing residential or commercial buildings and industrial plants, pursuant to the Energy Conservation and Production Act.

Explicitly included as an energy conservation measure was language essentially identical with the amendments that we are suggesting for your consideration.

Our association believes that this recognition by FEA of the energy conservation that will be yielded by conversion to high-efficiency lighting gives strong support for the tax incentive measures we are advocating today.

Tax credits for energy conservation measures inevitably mean loss of tax revenue. In the case of credits for lighting conversions, it is difficult to estimate revenue loss because the number of conversions cannot be readily estimated. Nevertheless, NEMA believes that the following overview analysis may serve as a helpful guide.

The electrical contracting industry estimates that about \$240 million was spent in 1975 on labor and materials for lighting conversion in existing buildings. Assuming (a) that this figure is also a valid estimate for 1978, and (b) that approximately 10 percent of such expenditures would qualify for either a residential tax credit or a business energy credit, the revenue loss would be \$24 million.

Against this admittedly rough estimate of revenue loss should be placed our estimate that 20 percent annual conversion of total possible conversion would yield savings of 36.5 million barrels of oil equivalent, or \$480 million.

It is our estimate that for every dollar lost in tax revenue, we would be seeing an annual saving of 1.5 barrels of oil, or approximately \$20. The \$1 loss occurs only once. The \$20 savings would occur year after year.

In view of the very substantial energy conservation potential offered by the utilization of more efficient lamps lighting fixtures, we recommend that lighting be explicitly included along with the various other measures specified as eligible for tax benefits under the National Energy Act.

Our statement indicates the specific language we would suggest there. Thank you.

The CHAIRMAN. Thank you very much. Senator Dole?

Senator DOLE. That was an excellent statement.

I have the same difficulty trying to understand—maybe it is necessary to pay people to do these things, but are there not provisions in the law that would eventually eliminate it? Are there not some mandatory lighting source laws in place?

Mr. FALK. Not that I am aware of, Senator. I believe perhaps what is being suggested is that GSA is mandating for its own Government buildings certain measures which are referred to here which suggest these conversions.

Senator DOLE. Maybe it is not mandated, but there is a mandate that somebody come up with some new standards.

Mr. FALK. I believe the Senate has reported out of its Energy Committee an authority to set standards for industrial conservation measures, and lighting, I believe, is included potentially as one of the areas in which such authority is vested.

Senator DOLE. I guess I have difficulty in trying to reconcile those areas. Another committee, not this committee, has indicated that after a certain year we could not have gas guzzlers. There is no subsidy involved for not having a gas guzzler. You can do that by legislation; I do not know why you cannot eliminate a lot of the other inefficient sources by legislation.

Mr. FALK. The difference here, here we are looking for a stimulus for a conversion. We are not talking about new buildings, new structures here. We are talking about existing buildings, and if you will, a continuation of gas guzzling would be the equivalent of the 1975 automobile and what happens in 1982.

This, in essence, would be an effort to stimulate the conversion to a more efficient method.

Senator DOLE. Do you have any evidence on whether it will stimulate conversion?

Mr. FALK. I think there has been a sense of disappointment in this. As I indicated in my statement, we have about 5 percent structures that are in existence today using the higher efficiency lamps.

Senator DOLE. Without the incentives that you provide and the recommendations you make?

Mr. FALK. We can give you some specific illustrations of specific installations where the economics are in evident payoff where you get a paycheck in a year or 2 years. We were doing a little calculations, frankly, before I testified. Suppose we were to redo this room, and I guess the payoff period would be 5 to 6 years. To some, that might be attractive; to others, less attractive.

What we are suggesting is this added incentive to start moving in the right direction.

Senator DOLE. I do not think you mentioned, are those little tags—just so the record will show—the cost for each one of those?

Mr. FALK. As I understand it, those appear to be typical costs to large industrial and commercial buyers of the various types of these bulbs. I believe reading from left to right as it faces you, the incandescents are 37 cents—interestingly enough, average life of about 1,000 hours; mercury is about \$11 with an average life of approximately 25,000 hours; the fluorescent, \$1.45 with an average life of 20,000 hours; the metal halide, \$23 with an average life of 15,000 hours; and high pressure sodium, \$32 with an average life of 24,000 hours.

Senator DOLE. I guess your statement reflected that, but I did want it in the record.

Mr. Falk. I am glad you asked that question because our written statement did not reflect that. We did a little homework this morning.

Senator DOLE. That is all.

Senator CURTIS. I had to preside over a luncheon, and I did not get to hear your testimony. We thank you for your appearance here.

[The prepared statement of Mr. Falk follows:]

STATEMENT OF BERNARD H. FALK, PRESIDENT, NATIONAL ELECTRICAL MANUFACTURERS ASSOCIATION (NEMA)

SUMMARY

1. The Lighting Equipment Division of NEMA requests that Title II of H.R. 8444 be amended to give tax credits for conversion of high efficiency lighting systems: In residential dwellings, from incandescent lighting to fluorescent lighting; and in commercial and industrial buildings, from incandescent and mercury lighting to fluorescent, metal halide and high pressure sodium lighting.

2. The potential for energy savings through such conversions is significant. NEMA estimates that maximum possible conversion could reduce energy consumption for lighting by about 30 percent, or one quad (500,000 barrels of oil equivalent per day).

3. Assuming that 20 percent of maximum possible conversion were in fact achieved, energy savings would amount to 36.5 million barrels of oil equivalent per year.

4. Conversion of existing lighting systems to high efficiency systems has been negligible to date—presumably because of builder and owner inertia, lack of knowledge about energy conservation in lighting, and/or inability to finance conversion. Tax incentives, NEMA believes, would significantly stimulate high efficiency conversions.

5. In July 1977 the Federal Energy Administration by regulation explicitly recognized conversion to high efficiency lighting as an "energy conservation measure."

6. Loss of tax revenue is difficult to estimate because the number of actual conversions, and the dollar amounts involved, are difficult to estimate. Assuming, however, that there were an actual 20 percent conversion of total possible conversion loss of revenue might be about \$24 million. This loss, compared with the estimated energy savings of 36.5 million barrels of oil equivalent, yields a very favorable cost-benefit ratio.

STATEMENT

My name is Bernard H. Falk, President of the National Electrical Manufacturers Association (NEMA), the principal trade association of electrical products in the United States. I am presenting this statement on behalf of the Association's Lighting Equipment Division, which is broadly representative of U.S. manufacturers of both lighting fixtures and electric lamps, the latter commonly referred to as "bulbs" or "tubes." A list of the Division's members is attached as Appendix A.

The Lighting Equipment Division, in common with NEMA itself, is wholly in accord with the President's call for a comprehensive national program of energy conservation. To that end, we wish to stress the significant energy savings that can be obtained by utilizing lamps and their associated lighting fixtures which are more efficient than today's conventional lighting but which, unfortunately, are not being utilized to nearly their potential. This high efficiency lighting equipment provides illumination equal to existing recommended lighting levels, yet it consumes far less electrical energy. It is with the intent of urging legislation to stimulate fuller utilization of this modern, more efficient and presently available technology that we appear before you today.

Title II of H.R. 8444, the Energy Tax Act of 1977, contains many constructive and potentially effective incentives for energy savings in residences and commercial and industrial buildings. NEMA is recommending to this Committee that another incentive be added to Title II to provide tax incentives for conversion to high-efficiency lighting equipment.

4. The potential for energy savings

The United States uses about 74 quads total energy per year, the equivalent of 34.9 million barrels of oil per day. (A quad is a quadrillion BTU's.) Lighting represents a substantial 5 percent of that total, approximately 3½ quads. A conservative industry estimate—and one with which we believe ERDA officials concur—is that energy consumption for lighting can be reduced by 30 percent through conversion to more efficient light sources and lighting fixtures. Thus, stated in optimum terms, increased lighting efficiency offers the opportunity to save the nation approximately one quad of energy per year—or the oil equivalent of 500,000 barrels of oil a day.

A 500,000 barrel per day oil equivalent saving (at \$13 a barrel) is \$6.5 million daily, or \$2.4 billion per year. If one assumes that 20 percent of total possible lighting conversion could be accomplished each year, the annual savings in oil equivalent would be 36.5 million barrels and dollar savings would be \$480 million.

The conversion we are talking about is (1) residential dwellings—from incandescent lighting to fluorescent lighting, and (2) in commercial and industrial buildings—from incandescent and mercury lighting to fluorescent, metal halide and high pressure sodium lighting.

In the chart shown below the left hand scale is the measure of efficiency of light sources in the same sense as miles per gallon in one's automobile. It is evident that conversion from incandescent and mercury lighting to the three most efficient lighting sources—fluorescent, metal halide and high pressure sodium—will provide significant energy efficiency improvement.

Some light sources convert electricity into light much more efficiently than others

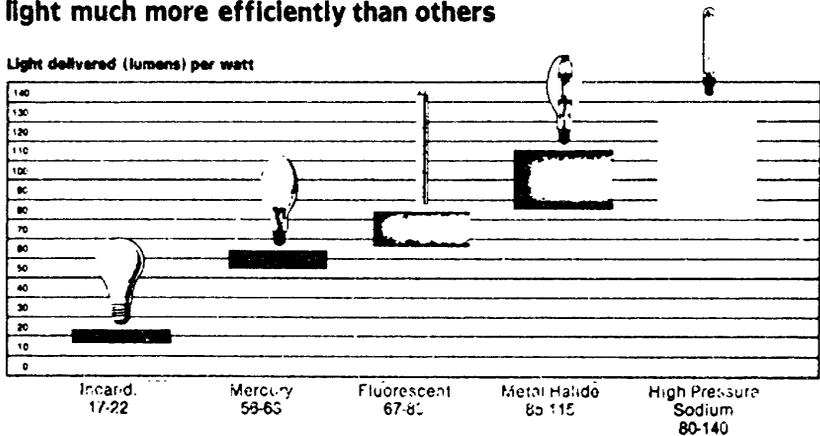


CHART 1

The corollary of increased efficiency is reduced energy consumption to light the same space to the same level of illumination for the same length of time. The chart below shows the annual kilowatt hours consumed in lighting a space of 10,000 square feet at an illumination level of 100 foot candles, using various types of light sources (based on 4,000 burning hours per year).

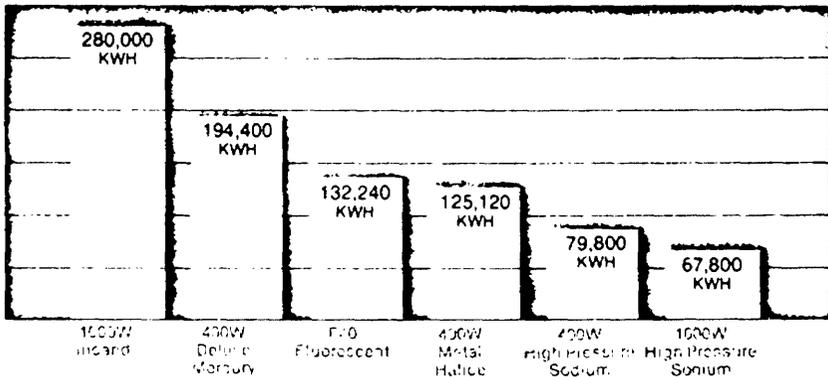


CHART 2

(a) *Residential conversion.*—Residential lighting accounts for about 20 percent of total indoor lighting. Conversion of residential buildings from incandescent to fluorescent lighting could be expected to occur principally in kitchens, bathrooms, laundries and other utility-recreational areas. Typically, we believe, about 500 watts of incandescent lighting are used in these areas. Conversion to fluorescent lighting would reduce this figure to approximately 200 watts. A 300-watt consumption reduction, on the conservative basis of 500 burning hours per year, in all 70 million U.S. dwellings would, thus, yield a saving of over 10 billion KWH per year. (One barrel of oil equivalent is required to produce 600 KW.) This is an optimum estimate, of course, which would not nearly be realized. Assuming, however, that 20 percent of existing dwellings converted from incandescent to fluorescent lighting per year, we are talking about a savings of approximately two billion plus KWH or 3½ million barrels of oil equivalent annually.

(b) *Commercial and industrial conversion.*—Commercial and industrial buildings (including public buildings) account for 80 percent of total indoor lighting. It is here that the greatest opportunity for very significant energy savings exists. We estimate that in such building now using incandescent lighting conversion to metal halide or high pressure sodium systems would reduce energy consumption by a factor of four. Conversion from fluorescent lighting to metal halide or high pressure sodium lighting would reduce energy consumption by 50 percent. If all existing mercury lighting systems were converted to high pressure sodium lighting, we estimate that there would be a saving of 36 million barrels of oil equivalent.

In sum, while it is admittedly difficult to quantify with precision the energy savings in KWH and oil equivalent which could be achieved by conversion of lighting systems, one thing is clear: Savings would be significant, from the outset and cumulatively for the long term.

2. The present under-utilization of high efficiency lighting

If high efficiency lighting offers such obvious potential for energy savings it is logical to ask why it has not been more fully exploited by residential, commercial and industrial consumers. We do not have a good answer to that question. The technology has been available for over a decade; there have been thousands of successful conversions at demonstrable energy savings; and high efficiency lighting is readily available from a large number of competitive manufacturers. Yet the statistics of high efficiency lighting usage remain discouragingly low. Metal halide and high pressure sodium lighting, combined, accounted for only 3 percent of lighting kilowatt hours in 1975.

It is obvious that natural economic forces, which usually could be expected to accelerate conversion, are not getting the job done. We believe there are three principal roadblocks:

Inertia.—The homeowner and many residential builders are neither aware of conservation opportunities nor, at this point, willing to change their habits. Even moderately large businesses, after the facts are explained, often simply just don't do anything.

Lack of education.—After twelve years of effort by lamp manufacturers and the lighting equipment industry the penetration of the two most efficient light sources, metal halide and high pressure sodium, is, as noted above, only 3 percent of total kilowatt hours used for lighting. Apparently we are not getting our message through, particularly to small business, despite intensive marketing initiatives by industry members.

Lack of finances.—We believe that many users are unable to make the necessary initial investment.

3. FEA endorsement of high efficiency lighting

Despite the discouraging level of public resort to lighting conversion, it is noteworthy that the Federal Energy Administration has recognized the energy saving potential of conversion to high efficiency lighting. In November 1974, FEA issued Lighting and Thermal Operations Guidelines which contained the following table for relamping opportunities:

TABLE 3.—RELAMPING OPPORTUNITIES

[All costs are figured at 3/kWh. The annual savings include normal ballast loss]

Change from—	To—	To save annually	
		Amount	Kilowatt-hours
Office lamps (2,700 hr./yr):			
1 300-W incandescent	1 100-W mercury vapor	\$14. 58	486
2 100-W incandescent	1 40-W fluorescent	12. 00	400
7 150-W incandescent	1 150-W sodium vapor	70. 80	2, 360
Industrial lamps (3,000 hr./yr):			
1 300-W incandescent	2 40-W fluorescent	18. 69	623
1 1,000-W incandescent	2 215-W fluorescent	48. 51	1, 617
3 300-W incandescent	1 250-W sodium vapor	54. 18	1, 806
Store lamps (3,300 hr./yr):			
1 300-W incandescent	2 40-W fluorescent	20. 55	685
1 200-W incandescent	1 100-W mercury vapor	7. 92	264
2 200-W incandescent	1 175-W mercury vapor	20. 10	670

In July 1977 FEA issued a rule (Energy Measures and Energy Audits—Energy Measures List, 42 FR 37795) which identifies energy conservation measures which can be implemented in existing residential or commercial buildings and industrial plants, pursuant to the Energy Conservation and Production Act. Explicitly included as an energy conservation measure was:

"(k) Efficient lighting fixture or lamp in a residential or commercial building or industrial plant, which is one which: (1) Replaces an incandescent fixture or lamp with a type of lighting system including fluorescent, mercury vapor, metal halide, and high pressure sodium or ellipsoidal reflector lamps; or (2) Replaces a mercury vapor fixture or lamp with a high pressure sodium lighting system."

NEMA believes that this recognition by FEA of the energy conservation that will be yielded by conversion to high efficiency lighting gives strong support for the tax incentive measures we are advocating today.

4. Estimated loss of tax revenue

Tax credits for energy conservation measures inevitably mean loss of tax revenue. In the case of credits for lighting conversions it is difficult to estimate revenue loss because the number of conversions cannot be readily estimated. Nevertheless, NEMA believes that the following overview analysis may serve as a helpful guide.

The electrical contracting industry estimates that about \$240 million was spent in 1975 on labor and materials for lighting conversion in existing buildings. Assuming (a) that this figure is also a valid estimate for 1978, and (b) that approximately 10 percent of such expenditures would qualify for either a resi-

dential tax credit or a business energy credit, the revenue loss would be \$24 million. Against this admittedly rough estimate of revenue loss should be placed our estimate that 20 percent annual conversion of total possible conversion would yield savings of 38.5 million barrels of oil equivalent, or \$480 million. This cost benefit ratio speaks for itself.

5. The amendments requested

In view of the very substantial energy conservation potential offered by the utilization of more efficient lamps and lighting fixtures, we recommend that lighting be explicitly included along with the various other measures specified as eligible for tax benefits under the National Energy Act.

(a) *Title II, part I, section 2011.*—Add a new subparagraph between present subparagraphs (vi) and (vii) of proposed Section 44 (c) (4) of the Internal Revenue Code of 1954, stating: "Converting from incandescent lighting to fluorescent lighting."

(b) *Title II, part VI, section 2061.*—Add a new item between present Items (K) and (L) of Section 2061 (b) (5), stating: "Conversion to energy saving lamps and/or more efficient lighting systems."

We submit that these recommended amendments offer a potential for energy conservation which merits their inclusion in the lighting of energy conservation measures presently included in the Energy Tax Act of 1977.

MEMBER COMPANIES IN THE NEMA LIGHTING EQUIPMENT DIVISION

Abolite Lighting, Inc., a wholly owned subsidiary of the Jones Metal Products Co.	The Kirlin Co. Lightolier, Inc.
Canrad Hanovia, Inc.	McPhilben Lighting, a Division of Emerson Electric Co.
Chicago Miniature Lamp Works.	Metalux Corp.
Crouse-Hinds Co.	The Miller Co., Inc.
Day-Brite Lighting Division, Emerson Electric Co.	National Service Industries, Inc., Lithonia Lighting Division.
Duro-Test Corp.	North American Phillips Lighting Corp.
General Electric Co.	Paramount Industries, Inc.
GTE Sylvania, Inc.	Perfect-Line Manufacturing Corp.
Guth Lighting, Division of Sola Basic Industries.	Pfaff & Kendall.
Hapco Division, Kearney-National, Inc.	Sola Electric Division, Dutch Boy, Inc.
Hubbell Lighting Division, Harvey Hubbell Inc.	Westinghouse Electric Corp.

Senator CURTIS. The next, and the last, witness, James Dole Davidson, chairman, National Taxpayers Union.

Mr. Davidson, you have been around here and you know the time pressures we have been working under. The committee has gone right through the luncheon hour; some of us had commitment we had to take.

We are delighted to have you here, and your contribution will mean a great deal to the printed record that we have to carry to the Senate in regard to this proposal. You may proceed.

Senator DOLE. We have left the taxpayers until last.

Senator CURTIS. Not only symbolic, but a normal practice here. I regret it, but it is true.

You may proceed.

STATEMENT OF JAMES DALE DAVIDSON, CHAIRMAN, NATIONAL TAXPAYERS UNION

Mr. DAVIDSON. Mr. Chairman, I represent some 1 million Americans organized through National Taxpayers Union and affiliated local groups in all 50 States. As a nonpartisan, consumer oriented movement, we are deeply concerned with the bread and butter issues which affect the life of the average citizen. Senator Roth has been gracious enough

to describe NTU as "the most necessary lobby we have." We are, in from all walks of life are becoming ever more alert to the dangers of any case, embarked upon an increasingly popular mission. Americans runaway government spending and political manipulation of the economy. It is to represent these Americans that I am here to oppose title II of the so-called "Energy Program," H.R. 8444.

Much could be said to dispute the nature of the alleged "energy crisis." And much has been said. Sober observers representing all degrees of political opinion have questioned just about every substantive aspect of the administration's case. Even the intellectual origins of the "energy crisis" have proven embarrassing upon close examination. A critique by Lewis H. Lapham, editor of Harper's which appeared in that magazine's August issue, reveals the distortions and confusion at the heart of the original agitation for an energy program. National Taxpayers Union has distributed a copy of this article to each Member of Congress. We feel that the more thoroughly and carefully Congress investigates the specifics of the alleged crisis, the more obvious it will be that the facts tell one story and the proponents of the energy program another.

There is no need for panic on energy. Conventional supplies, including petroleum and natural gas are still far more plentiful in the world than it is fashionable to admit. While we at National Taxpayers Union don't claim to know what the eventual limits might be, we can be sure that Dr. James Schlesinger doesn't know either. All that is known for certain is that only a small fraction of the areas where oil might exist have been explored. And it is only through actual exploration that reserves can be "proven" and anyone can speak authoritatively about what supplies are available.

Examination of the proven reserves does not reveal a bleak picture. They now stand at 657 billion barrels, greater than they have ever been. These reserves are almost twice as great as they were in 1967 and three times greater than in 1957. And there is substantial excess capacity on existing wells. With U.S. annual consumption of oil now a smaller percentage of proven reserves that it has been for most of this century, there is no danger of running out of oil in the near future. For the time being, at least, there is actually a glut of oil on the world markets.

There is no "energy crisis." But we do face two separate crises which jointly effect the availability of energy to the American people. On the one hand, there is a monetary crisis, caused by inflationary, deficit spending, which has eroded the value of the U.S. dollar and brought on an unprecedented disorder in the world monetary system. This has raised the price of oil. And, if inflation worsens, it may limit the availability of otherwise ample supplies to the U.S. market. Second, there is a general crisis in American life brought on by Government regulations and tax policy which have a particularly adverse effect in the energy field. Excessive political manipulation and price controls of basic energy stocks have created distortion in the market detrimental to the energy consumer.

There is not time here to analyze both of these crises in full detail, so I shall confine myself to some general remarks about their impact on energy.

The monetary crisis arose from the repeated failure of Congress to confine expenditures to a level which can be financed by a toler-

able rate of taxation. Incessant budget deficits not only inflated the cost of living in America, they also destroyed the international monetary structure. So much money was created without backing that it was no longer possible to settle America's international debts with gold. On August 15, 1971, Richard Nixon "closed the gold window" at the Federal Reserve. This left foreign central banks without recourse to enforce fiscal and monetary responsibility in America.

The results are clearly seen in the process of Federal budget deficits since 1971, which have led to severe inflation. Under such conditions, international trade is disrupted. As Carter Henderson, codirector of the Princeton Center for Alternative Futures put it:

At issue is the advanced country's use of the printing press to create dollars, pounds and other intrinsically worthless fiat currencies, which are then exchanged for the developing countries' valuable and frequently irreplaceable raw materials. * * * The OPEC countries have chosen indexing to offset the declining exchange value of Western currencies. The 1973 quadrupling of the quantity of these currencies needed to buy a barrel of OPEC crude, for example, was an illustration of simple, brute force indexing by which years of inflation were wiped away by a single 400 percent price increase. * * *

As the oil producers have made clear themselves, the price American consumers must pay for oil is higher because of inflation. We pay a premium equal to the expected deterioration in the value of the dollar. Thus the negative interest rate on all dollar holdings increases the relative price of oil.

When "funny money" is disrupting international trade, the increasing insolvency of almost all the world's countries places severe strains on banking institutions. In the short run, to be sure, the existence of these difficulties gives large banks an opportunity to maximize their earnings by lending billions at high interest rates to finance the trade imbalances of the countries in the worst financial condition. Large American banks have done exactly that, and are now owed from \$42 billion to \$70 billion by underdeveloped countries.

The seriousness of the situation is underlined by the fact that even the low figure—\$42 billion—is more than the banks could lose and remain solvent. This connects directly to the alleged "energy crisis" as was pointed out by Senator Jacob Javits in a recent Senate speech. Said Senator Javits:

"There is an urgent need for the most drastic conservation policy in oil on the part of the United States—the largest importer of oil—to materially reduce the imbalance in international payments resulting from these imports. The danger is so great that even gasoline rationing cannot be ruled out as a last resort.

While we appreciate Senator Javits' candor in confirming that the "energy crisis" is not an energy crisis, we believe that it is time for Congress to face up to monetary disorder by a reform of the monetary policy, not by proposals, such as those in H.R. 8444, which would treat some of the symptoms of monetary disorder by raising taxes and reducing the American standard of living. Senators Curtis and Byrd on this committee have proposed more fundamental reform which would restore value to the dollar by constitutionally eliminating deficit spending. If the Government were content to live within the formidable productive capacity of the American economy, sufficient, stability would be restored to make the dollar a dependable unit for international trade. This would restore order to international currency

movements, and relieve the pressure for reduced American living standards.

It is no coincidence that America's past "energy crises" have arisen in periods of monetary instability when high inflation, combined with politically imposed price controls, have led to overconsumption of energy and underinvestment in new energy production. In 1919, after the substantial currency inflation of World War I, Government experts claimed we would be out of oil within 20 years. The Bureau of Mines sent experts to Scotland on an urgent mission to develop a crash program to extract shale oil. Shortly thereafter, in 1920, the Secretary of the Navy called for immediate nationalization of the oil industry as the only remedy for the "oil shortage". In 1946, another "shortage" was purported to be on the horizon. Economists such as John Kenneth Galbraith urged that wartime controls be continued on the petroleum industry to "combat" this problem. This bad advice was rejected by Congress, and within a few years, another "energy crisis" had been forgotten.

The current alleged "crisis" could also be solved by elimination of the political manipulation of energy markets and some sensible changes in tax policy. In particular, the rollover provisions on capital gains tax, which now apply to private homes and vessels used in fishing, should be extended to all productive investments. This would lead to a rapid modernization of the American capital plant, and thus to increasingly efficient use of energy. Newer industrial equipment is generally more energy efficient than that it replaces, a factor which has contributed to a decline in the energy consumption per dollar of real GNP since 1920. It fell from 140,000 Btu's per 1958 dollar in 1920 to about 90,000 Btu's in the 1950's. This ratio has stabilized somewhat, perhaps because of the low level of investment in new equipment in recent years.

Antiquated production facilities in this country are far more energy consuming than the newer equipment in use in countries such as Germany and Japan, which have far more enlightened capital gains tax policies. In Germany, for example, the average ton of steel is produced using 33 percent less energy than is consumed for the same purpose in America.

At the very least, Congress should adopt a capital gains rollover in the energy area to encourage the investment necessary to develop and deliver energy. Congressman Jacobs of Indiana has introduced such a proposal, the Freedom of Energy Investment Act of 1977. When combined with an elimination of all energy price controls, such an approach would allow stockholders to make capital available, through a free market mechanism, to finance development of some of the tremendous energy resources available to us. In this country we have the means to reduce energy costs to the consumer by introducing competition from alternative energy sources. Automobiles, for example, can be powered by methanol and ethanol. With the farmers of America able to produce more grain than can be sold as food, all that is lacking to make alcohol power practical is the investment capital. The capital gains rollover would free that capital, and thus bring the full inventive abilities of the American people to bear in solving energy distribution problems.

The proposals which this committee is considering as part of H.R. 8444 would do nothing to solve the energy distribution problem, and would, in fact, worsen it.

The oil and gas use tax will squander billions in capital and unnecessarily raise the living costs of the average American. Oil and gas should remain the preferred fuels as long as they are the most economic. They are certainly cleaner to burn than coal. Coal-fired powerplants account for 50 percent of the sulfur dioxide in our air. And even the coal industry's best friends acknowledge that doubling coal production will be a difficult and costly challenge. Drainage from coal mines has polluted some 6,700 miles of streams in this country with sulfuric acid. In this century alone, some 100,000 men lost their lives in coal mines. It is wrong to require that utilities and industries shift prematurely to coal.

The decontrol of natural gas and oil would yield sufficient supplies to allow a gradual, economic transfer to other sources at such time in the future when such a changeover makes sense. As time passes, new technologies and the exploitation of new energy sources may prove Dr. Schlesinger's forced conversion totally unnecessary. Congress should not force the waste of \$60 billion to \$100 billion in capital against such a prospect.

The proposed gas guzzler tax is equally unjustifiable. The American people, who work hard for the standard of living they enjoy, are entitled to drive a car which meets their needs. The gas guzzler tax is a political attempt to eliminate the large family car. With the price of fuel rising and mileage standards already mandated by the Federal Government, there is no need for further penalties on large cars. If manufacturers are effectively prohibited from producing large vehicles, the effect might be to keep large-car drivers using older, less efficient vehicles. In the end, this might result in waste, rather than reduce it.

The crude oil equalization tax is another dismaying example of the type of proposal which has all of the disadvantages of allowing the market price to rise, but none of its advantages. Consumers are to pay more for petroleum. But there is to be no incentive to increase production. Simply allowing the free market to function would eliminate the need for such a tax. Experts writing in the public interest suggest that if the domestic price of energy had been allowed to rise to the world price level, oil imports would be only 28 percent of their current level. Much of the increased production would come from otherwise depleted wells.

But that won't happen if H.R. 8444 is enacted. As has been the case so often in the past when Government intervened, the unnecessary crisis would likely become permanent. National Taxpayers Union asks the members of this committee not to rush to pass this legislation, not to raise taxes and reduce our living standards without taking ample time for deliberation over the many alternative possibilities, a few of which I have suggested here.

You are told, of course, that there is no time to stop and think. "This is the moral equivalent of war." And what is that? We have heard the phrase over and over, but what is the "moral equivalent of war" anyway? William James, from whom President Carter borrowed the phrase, defined "the moral equivalent of war" as nonmarital suffer-

ing, something which involves "discomfort and annoyance, hunger and wet, pain and cold, squalor and filth." We at National Taxpayers Union do not believe that the American people deserve to have "discomfort, pain, squalor, et cetera" imposed upon them by their own Government. I hope that the members of this committee agree, and that you will defeat title II of H.R. 8444.

Senator CURTIS. Mr. Davidson, I want to commend you on your statement. You have some very sound principles in there and a lot of common sense.

I would like to ask you specifically about this wellhead tax. That is no small matter, is it?

Mr. DAVIDSON. No, indeed.

Senator CURTIS. Do you have at your fingertips how many billion dollars are involved?

Mr. DAVIDSON. I have seen different estimates. They all range in the \$10 billions, at the very least. We are talking here about a situation where the capital which would be yielded by a normal price increase would be diverted away from protective activity into the Government coffers, where it would probably be put to no good use—if you pardon my skepticism.

Senator CURTIS. In other words, it is estimated that \$1.879 billion in 1978, then it jumps to \$6 billion, then \$11 billion, then \$14 billion. That would have a greater impact, just one proposal, than the advent of the income tax.

Mr. DAVIDSON. Certainly, if you look at the original income tax, it did not cost that much money in the beginning.

Senator CURTIS. In dollars.

Mr. DAVIDSON. Yes.

The silly thing about it, if I may say so, is that the effect has been in the past—if we look at the history of so-called energy crises—that whenever price controls were proposed in a period of high inflation, had a drying up of production in this country. This is normal and predictable thing. If we remove the price control then the price would rise, perhaps to the level the administration would move it to artificially through taxes. But a higher price would also induce tremendous production.

After the end of the Second World War, the additional production brought on by the elimination of controls brought us two decades of mountiful energy at a lower cost.

Senator CURTIS. If we vote the price rise, the consumer would pay more and he would get more?

Mr. DAVIDSON. He would get more.

Senator CURTIS. If we take it away in taxes, he pays more and gets less. He pays the price, but gets no expansion of the production of energy.

Mr. DAVIDSON. If I may say so also, this is sort of a subsidy to the OPEC cartel. We have seen the studies which show that American demand for foreign oil would decline if controls were removed.

I would like to suggest that the committee, before going forward to pass this legislation, call witnesses to resolve the contradictions in testimony between the experts on the outside who claim that the additional price incentives would produce tremendous new supplies and the ad-

ministration, which claims to know down to the last grain of sand, what resources exist in the entire world.

Senator CURTIS. The independents and the wildcatters and risk takers have found new fields of oil, and they always have come up with surprises that the geologists had not counted on.

Mr. DAVIDSON. If we look at the history again—which I admonish everybody to do—we see in the end of the 19th century, the U.S. Geological Survey using the same type of erroneous analyses that Dr. Schlesinger is pushing on this committee today. They claimed they had investigated all the sand deposits; they knew what existed in America.

They could guarantee that no oil would be found in Texas.

The CHAIRMAN. When was that?

Mr. DAVIDSON. In the 1890's. That was their prediction. They testified that no oil could be found in Texas.

We see the same thing here today.

You pointed out that less than 5 percent of the surface area of this country has been explored. I know there are many areas where the geologists have thought that perhaps there was only a marginal, or slight, chance of energy production where wildcatters have gone in, sunk a well at considerable expense, and yielded tremendous reserves.

In fact, if you look at the entire reserves in this country, counting the total number of wells, the wildcatters have produced more than 50 percent of our reserves, going into areas where the geologists claimed—

Senator CURTIS. These people who speak with such absolute authority that they know how much is in reserve reminds me of the story of the individual who wrote the letter to the Patent Office and wanted a list of all the inventions that had not been invented yet.

Mr. DAVIDSON. Exactly.

If I may point out something else, as an attendee listening to the witnesses who came before me this morning and this afternoon, I have noticed that many, many people are calling for special privileges from this committee; for waivers and in some cases for equity to try to iron out the imbalances which are built into a market system when the Government starts to intervene here and intervene there.

Many of them have made good cases. But I would point out that the best way of rationing these resources is still the market system— which it was in the beginning.

We could save lots of energy in this country if we converted all powerlines to silver and gold because they have less resistance than copper, but I think what we have to do is to look at price.

We just heard from a gentleman who wants to convert from a 30 cent to a \$32 light bulb. Of course he could save energy doing that, but the most sensible way to preserve the standard of living which we have worked for and which we deserve is to allow the market to operate and let the people solve their own problems rather than being dictated to by Washington.

Senator CURTIS. There is one specific I would like for you to explain and elaborate on a little bit. That is your proposal for a rollover of capital gains in order to replenish the industrial equipment of the Nation. How does that work?

Mr. DAVIDSON. It would work the same way that we see it working in the housing field. One of the things happening in this country, unfortunately, is that ever since the inflation rate rose above 3 percent, the only way the average middle-class individual had to accumulate capital was investing in static investments, such as the house. The house just stands there and does not produce jobs except in the original building of it. It does not produce anything useful. It represents static capital.

We have a rollover provision in the law that means when you sell a house you do not have to pay capital gains if you roll over and buy a bigger house. The same thing applies in the case of vessels which are used for fishing.

Of course, because of this everybody who has his wits about him; who is trying to get ahead in the world, is accumulating capital primarily by investing in houses as opposed to investing in productive enterprise.

You do not have to pay a capital gains tax elsewhere in the world. Countries which have done the best in the last 25 years in terms of productivity, investment and economic growth are those which have no capital gains taxes, or capital gains taxes which apply only to speculators, as is the case in Japan. Only persons who have sold only 20 issues of stock in a year begin to pay capital gains tax.

There are no punishing capital gains tax in Germany where they have great productivity. There is essentially no capital gains tax. What we need in this country is the same policy—which would end what is, in effect, a subsidy to the current uses of capital.

If you have money in a plant in time of inflation, and you sell that plant that money is going to be taxed away and given to the Government. You may keep that plant in operation longer than you would if you could take the money, roll it over and put it into new equipment that would provide more jobs and greater productivity.

Senator Long has mentioned the tariff question here. One of the reasons we have a tariff problem in this country is the other countries in the world have been outproducing us in terms of investment. We have capital plants which are very antiquated compared to the ones in Japan and Germany. They can stamp out the steel and the other things much more efficiently.

Senator CURTIS. Your proposal would be, as we sell or dispose of a capital asset, there would be no capital gains tax if we reinvest it in new equipment.

Mr. DAVIDSON. It would only obtain if the individual took money out of investment and used it for some other purpose.

Congressman Jacobs of Indiana has offered such a proposal. As I envision it, if we allowed the energy companies here to raise the prices to the level that they would obtain in a free market, this would run up the value of the stock of all of the major energy companies. Then the holders of the stock could liquidate, sell the stock if they wanted to, and start the methanol distillery that does not exist today because the capital markets are starved for capital.

Senator CURTIS. Thank you very much.

The CHAIRMAN. Let me compliment you on a very eloquent statement, Mr. Davidson. I would like to have had every member of this committee here for it. You made some very telling points.

It is my view that we really should, and probably would not have as much of an energy crisis today if we had, let the free market operate. You make that point in your statement.

Of course, I could not help but notice when the President made his state of the Union address that he said it was absolutely unthinkable to deregulate natural gas. I do not like to be critical, but that is something he declared himself for when he was a candidate for office.

That is one of the few things in his speech that drew some applause. I looked around to see who was applauding—it was some congressional pages. Sweet little fellows, but most of them have not had any education in economics, not at the college level. I did not see anybody except a few pages who applauded for that. I think they were looking for some point to show, to demonstrate, their affection for the President, and that seemed a logical time, so they applauded for him.

If we are able to do anything by freeing the economy, by letting people go ahead and charge what the going market price is, we would probably solve the problem. It would create some problems, but it would solve a lot more than it would create.

It seems to me perhaps we should go ahead and vote for this tax but not rebate it, but rather send it back to the producer to spend it in the way that could get the most energy production and perhaps stimulate conservation in a more effective way.

It appeals to me to use that money to help guarantee some loans, either through something like the Reconstruction Finance Corporation, through private industry, or by the private banking system, to help do as much as we can to attract new investment.

I do, incidentally, find a tremendous appeal in what you say about letting people put their capital in an area where it is needed without charging a capital gains tax at that point.

I do agree that it is counterproductive to impose a capital gains tax on investments taken from an area where capital is not so badly needed and put into an area where it is badly needed.

Mr. Davidson. I am glad to hear you say that, Senator. From what I have heard of the administration's so-called tax reform proposal, they are going to try to eliminate the differential treatment for capital gains altogether, which would go in the wrong direction and cause a tremendous falloff in the stock market, because people would rush to take their gains before it came into effect.

Also, you would see something that has been noticed in Canada. When they had no capital gains tax in Canada there were a tremendous number of wildcatters in western Canada who took advantage of this. The individuals were not like the major oil companies who in essence developed the fuel and keep it. The majors do not sell their wells, so they do not have any capital gains problem. The individual wildcatter is the one who has found so much of the reserves that we have in this country. He would be the one who would be hurt by this higher capital gains tax.

In these other proposals that we have coming from the administration, there are other things that will do nothing but reduce the incentives to discover new energy.

I have said time and time again, and the evidence has shown in the long run, that the benefit of a high price is that it is only temporary.

If you have a higher price in time of shortage, that price has to go down in the future. If you have a high tax in a time of shortage, you have a guaranteed shortage in the future, and you have a further high tax.

We are talking about \$5 billion or \$6 billion in a natural gas field being purchased by consumers every year and the Energy Administration, through taxes, is going to cost these people \$10 to save them from the supposed deprivation of the \$5 billion or \$6 billion, which is bad arithmetic.

The CHAIRMAN. Nobody has told us what it is going to cost us when we become bankrupt, which is where we are heading. Can you give us some advice on what it is going to cost us when the world no longer accepts our money.

Mr. DAVIDSON. We are seeing right now some of the skirmishing compared to what is going to happen in the future when the big battle develops. We see the threat somewhere off in the distance, like a cloud. Some day the OPEC countries may not accept our paper money and we already see the type of stringency which is being suggested as a means of reducing the living standards of the average American.

Suppose we cannot purchase the other raw materials that we need, the tungsten and the bauxite and what have you. We would be in a situation where we would be continuously forcing down the living standards of the average American to try to find substitutes or gerry up some system to transfer to, let's say, aluminum or steel or some other less affected use for whatever the purpose may be, and there is no solution in the long run, because in the end you have a worthless currency. People stop taking it.

The best thing, to get back to what Senator Curtis proposed, is to put our own financial house in order, so that our currency is good around the world. Then we do not have to worry about dickering with the economy the way we are trying to which is impossible in the long run.

Even if we had divine geniuses running the Energy Administration, or angels, they would be unable to organize everybody's life the way they would have to in order to make this international debt structure good, because the thing is going to come down anyway.

The CHAIRMAN. I would like to know a little bit about your credentials. Mr. Davidson, has economics been your educational background?

Mr. DAVIDSON. I took a few economics seminars and I have read widely in economics. I took one seminar under John Hicks at Oxford, the Nobel Prize winner. I do not think I came away with all of his views.

The CHAIRMAN. Thank you very much for a very thoughtful and eloquent statement. I wish we could have had more Members here to hear your statement. I will try to see to it that they read it. I am sure Senator Curtis will do likewise.

You made a very useful contribution to these hearings.

Mr. DAVIDSON. Thank you, Senator.

The CHAIRMAN. The hearing will stand in recess until 9 o'clock tomorrow morning.

[Thereupon, at 1:40 p.m. the hearing in the above-entitled matter was recessed to reconvene Tuesday, September 13, 1977, at 9 a.m.]