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ENERGY EFFICIENCY: CAN TAX INCENTIVES REDUCE CONSUMPTION?

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY, NATURAL RESOURCES, AND INFRASTRUCTURE

OF THE

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ENERGY EFFICIENCY: CAN TAX INCENTIVES REDUCE CONSUMPTION?

THURSDAY, MAY 24, 2007

U.S. SENATE,
SUBCOMMITTEE ON ENERGY,
NATURAL RESOURCES, AND INFRASTRUCTURE,
COMMITTEE ON FINANCE,
Washington, DC.

The hearing was convened, pursuant to notice, at 2 p.m., in room SD–215, Dirksen Senate Office Building, Hon. Jeff Bingaman (chairman of the subcommittee) presiding.

Present: Senator Cantwell.

OPENING STATEMENT OF HON. JEFF BINGAMAN, A U.S. SENATOR FROM NEW MEXICO, CHAIRMAN, SUBCOMMITTEE ON ENERGY, NATURAL RESOURCES, AND INFRASTRUCTURE, COMMITTEE ON FINANCE

Senator BINGAMAN. Well, it is 2 o'clock. Why don't we go ahead and start? I am informed that Senator Thomas is not able to be here at today's hearing. There will be some others who come.

But we are going to have a little bit of a disjointed schedule because we have a vote scheduled at 2:15, and so about 2:20 I am going to have to recess the hearing and go over and vote and come back. So, we will have about a 10- or 15-minute recess at that time, and maybe wind up with some other Senators here when we return. But let me go ahead and make a few comments and just start and allow folks to testify.

This is a hearing of the Finance Committee Subcommittee on Energy, Natural Resources, and Infrastructure. We look forward to today's testimony on the issue of energy efficiency.

One of the most achievable and important goals of energy policy today is to improve the efficiency and productivity of our energy use. This involves closely examining how we are using energy in our industries, in our homes, the way we heat and cool buildings, the appliances and lighting we use, and the technologies we employ to maximize the benefit of the energy that we are using. I think this is knowledge which I am sure all of our witnesses are extremely familiar with.

Let me just indicate that our main focus today is on the tax provisions that are currently in law, or that perhaps should be in law, to incentivize more efficient use of energy. Specifically, let me mention some of those tax incentives. There's an Energy Efficiency Home Credit. This is section 45(l). It is for contractors who build energy-efficient homes. It is scheduled to expire at the end of 2008.

There is an Energy-Efficient Appliance Credit, section 45(m), for manufacturers of energy-efficient appliances. It is available for appliances manufactured in this calendar year, 2007.

There is a Commercial Builder Efficiency Credit, section 179(d), for commercial builders who incorporate energy-saving technologies into their commercial buildings. It will expire at the end of 2008.

There is a Non-Business Energy Property Credit, section 25(c), for individuals who purchase exterior doors, windows, insulation, heat pumps, furnaces, central air conditioners, water heaters, as well as qualified manufactured housing. It will expire the end of this year, 2007.

And there is a Residential Energy Efficiency Property Credit for individuals who purchase solar water heaters, solar electricity equipment, and fuel cell property.

I am hoping that part of the testimony today will be on how effective any of these provisions are, what we could be doing that could be more effective, which of these provisions are ineffective, and which need to be changed.

So our hope is that the Finance Committee will be able to put together energy legislation, energy-related tax legislation, sometime in the near future, and we need to understand these issues much better than we do today.

We have a great group of witnesses here. Let me just introduce the entire group here, and then we will just call on you in the order I introduce you.

Kateri Callahan is here, who is the president of the Alliance to Save Energy, a great organization I used to be associated with here in Washington, DC, and we thank her for being here. Stuart Thorn, the president of Southwire Company, from Carrolton, GA, thank you for being here. Sean Casten is president of Recycled Energy Development in Westmont, IL; then we have Dan Delurey, who is the executive director of the Demand Response and Advance Metering Coalition here in Washington. Chris Edwards, the director of tax policy studies at the Cato Institute, thank you for being here. And Doug Smith is the president of NanoPore in Albuquerque and a friend of mine for many years.

So let me start with Kateri. Why don't you go ahead and give us your views? If you can give us about 5 minutes of the most important points we ought to understand, then we will include your entire statement in the record.

STATEMENT OF KATERI CALLAHAN, PRESIDENT, ALLIANCE TO SAVE ENERGY, WASHINGTON, DC

Ms. CALLAHAN. Great. Thank you, Senator. I really appreciate you having me here today, and we have appreciated, for many, many years, your leadership at the Alliance to Save Energy.

We appreciate the opportunity to be here today to talk about how the Federal tax code can be used to reduce energy waste in the U.S. As you know, Senator, energy efficiency has proven over the past 30 years to be our Nation's greatest energy resource, and that is thanks in large measure to effective public policies that include tax incentives, standards, mandates, and effective building codes.

As a result of all of that, we now are using 40 percent less energy than we otherwise would if we had not taken those steps. We

would need 40 percent more energy to power today's economy than we are currently using. So, a lot has been done, and we think that there is still much, much more that can be done. If we use this effective tool kit of public policy, we can deliver more into the future.

Tax incentives are a critical element of comprehensive energy efficiency policy that we think is best effectuated if there are four key elements including tax incentives.

The first element is to support research and development of new energy efficiency technologies. Second is the tax incentives which allow for early adoption in the marketplace and help to create markets for advanced products and technologies. Third is public education to spur widespread commercialization. And, finally, the standards and codes that set the efficiency floor.

Tax incentives, we think, are the best mechanism for spurring initial markets because they address the price premiums that are typically attendant to new technology that enters the market at very low volumes. Tax incentives also are an important hook for educating the public about the benefits of energy efficiency.

As the committee considers these potential options, we think it is very important to make sure that the incentives are in place long enough for the technologies to become embedded or accepted in the marketplace. They also need to be reserved for only the most advanced technologies and products and they need to keep pace with a rapidly evolving and changing marketplace.

EPAct 2005 included a set of very important tax incentives, as you mentioned, for efficient homes, commercial buildings, appliances, and vehicles. And while these incentives have the potential to be market-transforming, they are not in place long enough, we do not believe, to accomplish this goal.

So we think that they need more time to work and that, particularly in the buildings sector, that you are going to have to look at multiple years in order to make the kind of market transformation we would like to see.

The Alliance supports the tax provisions that are included in the EXTEND Act, the Energy Efficiencies Act of 2007, which is cosponsored by you, Senators Snowe, Feinstein, and others.

The EXTEND Act seeks both to restore the time duration and the monetary levels of those energy efficiency tax incentives that were included when EPAct was originally approved by the Senate, and then subsequently they were changed. It also, in some instances, seeks to improve and expand upon those incentives.

The potential savings, Senator, that would come from the EXTEND Act, we think, are very important and should not be overlooked. Over the period of time between 2006 and 2020, those incentives, which we believe will be modest in cost to the government, are projected to reduce U.S. natural gas use by an amount equivalent to what is used by the States of California and New York; it would reduce peak electric demand by an amount equivalent to what is generated by 52 300-megawatt plants; it would save American businesses and consumers $93 billion in avoided energy costs; it also would avoid CO_2 emissions equivalent to taking about 142 million cars off the road for a year. So, it is a pretty large return, we think, for a relatively modest investment by the government.

Given the time constraints, I am only going to discuss the new incentives in the EXTEND Act, not the extensions of EPAct incentives.

First, the greatest immediate potential for energy savings is to improve our existing homes. The EXTEND Act would establish a new performance-based credit for whole-home retrofits, from about $800 up to $4,000 for a zero-energy-use home.

Because the new credit is going to require inspection and certification, there are also credits to build the infrastructure that will assure that there are trained people and the infrastructure in place to be able to provide those services.

The Alliance also supports a number of additional incentives that are not included in the EXTEND Act. We support tax incentives for super-efficient refrigerators, clothes washers, and dishwashers. These were negotiated as part of the standards that are in your energy efficiency bill. We think that those standards will work best in combination with these tax incentives for the manufacturers. We also support negotiated tax incentives for the purchase of efficient electric motors.

Second, we support an extension of the hybrid and advanced diesel vehicle credits that are in EPAct, as well as lifting the volume cap that is now imposed on the manufacturers.

Third, we support a modified version of the 10-percent investment tax credit for combined heat and power systems that are under 50 megawatts, and a credit, as I said, for the efficient motors.

So, in conclusion, the Alliance believes that the tax code is an important policy tool for driving energy efficiency in the U.S., and when it is combined with these appliance standards, equipment and vehicle standards, efficient building codes, and research and development, that the result will be immediate assistance to Americans who are dealing right now with spiraling energy costs, an ever less-secure energy future, and the dire environmental consequences that are stemming from our production and use of energy.

Thank you, Senator.

Senator BINGAMAN. Thank you very much. I appreciate your testimony.

[The prepared statement of Ms. Callahan appears in the appendix.]

Senator BINGAMAN. Mr. Thorn, go right ahead.

STATEMENT OF STUART THORN, PRESIDENT, SOUTHWIRE COMPANY, CARROLLTON, GA

Mr. THORN. Mr. Chairman, I am Stuart Thorn. I am president and CEO of Southwire Company, which is headquartered in Carrollton, GA. Incidentally, last night we just won Georgia Family Business of the Year Award for the State.

Senator BINGAMAN. Congratulations.

Mr. THORN. Thank you. I am also a member of NEMA's board of governors. NEMA is the leading trade association in the United States, advancing the interests of 430 electrical manufacturers of a wide range of electro-industry products.

While a vast array of energy efficient technologies exists, their use in the marketplace is limited, and tax incentives would help the market transform to a wider use of these technologies.

We appreciate this opportunity to testify on energy efficiency tax incentives that would complement S. 1321, the Energy Savings Act of 2007, which was just recently favorably reported out of the Senate Committee on Energy and Natural Resources.

NEMA believes that legislative action on tax incentives in the commercial, industrial, and utility sectors will materially enhance our Nation's productivities in years to come.

Specifically, we are urging the adoption of four recommendations. Our first recommendation is that Congress enact extensions to the commercial building tax deduction, EPAct 2005, section 1331, to provide a reasonable time horizon for potential builders and investors to avail themselves of the incentives.

Our experience in working with the energy efficiency industry indicates that this current incentive has been instrumental in increasing the energy efficiency of lighting retrofits in existing buildings.

However, the current expiration date makes the effective periods of such short duration that it effectively precludes the use of the incentive for new buildings. Therefore, the duration of the provision should be extended to 2014 so investments, especially in new buildings, will occur.

In addition, the provision is currently interpreted by IRS as unlikely to be used for retrofits other than lighting, or for government-owned buildings, or to encourage on-site renewable electric generation, which were all intended by Congress in EPAct 2005. Therefore, the policy provisions that would self-implement these applications are needed.

Our second recommendation relates to motors used in the industrial sector. NEMA has worked with the American Council for an Energy Efficient Economy, ACEEE, over recent months to develop a new tax incentive proposal to accelerate adoption of premium, efficient electric motors.

Electric motors consume 65 to 70 percent of the electrical energy used in commercial and industrial motor-driven systems like pumps, fans, and compressors. The NEMA-ACEEE proposal provides for a tax credit for the purchase of qualified energy efficient motors that meet or exceed certain energy efficiency standards. The tax credit would expire on the effective date of proposed new Federal energy efficiency standards for these motors.

Our third recommendation relates to the electrical utility sector. We are proposing to accelerate depreciation schedules for certain more efficient electric transmission, distribution, and metering equipment that would be placed in service by electric utilities. This would promote transformation of the Nation's electric grid into a more energy-efficient and reliable platform.

The EPAct 2005 tax incentives included a tax life reduction for transmission assets used at 69 kV or more from 20 to 15 years; however, lower-voltage transmission and distribution were not addressed in EPAct 2005.

From the perspective of the utility customer, most outages are related to distribution problems. We support broadening the same

tax life reduction for lower-voltage transmission as well as distribution assets which will increase system reliability, reduce congestion charges, and increase energy efficiency in the grid.

Advanced metering is a technology that enables energy savings and peak-load reduction. Since advanced metering is largely an information technology product, the tax life here should be reduced from 20 to 5 years, which is more in line with the technology life.

Finally, our fourth recommendation relates to outdoor lighting. The American Society of Heating, Refrigeration, and Air Conditioning Engineers' (ASHRAE) 2001 standard referenced in EPAct 2005's commercial buildings tax deduction did not include most outdoor lighting applications.

However, ASHRAE's more recent 2004 standard includes these applications, making an outdoor lighting tax provision practical and appropriate. The affected equipment would be required to achieve lighting efficiency 30 percent better than ASHRAE 90.1, 2004, which would be an equivalent energy savings basis as the EPAct 2005 provision of 50 percent better than ASHRAE 2001 for indoor systems.

Thank you very much.

Senator BINGAMAN. Thank you very much.

[The prepared statement of Mr. Thorn appears in the appendix.]

Senator BINGAMAN. Mr. Casten, why don't you go ahead? Then, after you finish your testimony, I am going to run and vote and we will take a short recess.

Go ahead.

STATEMENT OF SEAN CASTEN, PRESIDENT, RECYCLED ENERGY DEVELOPMENT, WESTMONT, IL

Mr. CASTEN. First, I would like to provide just a brief background on our company. Recycled Energy Development is dedicated to the profitable reduction of greenhouse gas emissions. We accomplish that goal by recycling waste energy from industrial facilities into high-value electric power.

Our projects are fuel-free. They save substantial money relative to the grid. We have identified $350 billion worth of market opportunity, comprising roughly 200 gigawatts of power.

The triple win presented by those in terms of lower energy costs for society, lower energy costs for hosts, and lower emissions, are all largely blocked by State and Federal regulations that provide differential incentives to the dirtiest and most expensive power sources.

Let me provide a little bit of background on that. Our principals at RED have 30 years of experience deploying these projects. Collectively, we have installed 250 projects, comprising about $2 billion worth of total capacity, a little over 10,000 megawatts of combined thermal and electric capacity. The least efficient of the projects we have done was 60-percent efficient; the most efficient were effectively infinite, since they recovered waste fuel.

The relevant point I would make there is that $2 billion is very small relative to a $350 billion opportunity, and that took us 30 years. The reason for that delay is that those projects were all deployed in the face of substantial regulatory head winds.

A few examples. Many utilities have punitive interconnect and stand-by rates that subsidize utilities at the expense of their customers. We provide capital guarantees to the individual who wants to build an inefficient central plant connected by miles of transmission, but no equivalent protections for the person who wants to build a more efficient plant closer to the load, which means that the individual who wants to deploy the more efficient lower-cost technology must put up all their capital at risk.

Perhaps most significantly, there are a host of societal benefits that come from deploying efficient generation close to the load: deferred transmission and distribution, voltage stabilization, reliability, and emissions reduction, to name just a few.

Without exception, none of those values are associated with any kind of financial payment. I am a firm believer, certainly in my own business, that you get what you reward, and we are not rewarded for doing the right thing.

I do not raise these issues to suggest that the finance committee has the wherewithal to address all these issues, but I think you can take a few modest steps to level the playing field.

One, I would second Ms. Callahan's suggestion that you support the investment tax credit which has been introduced by Representatives Terry and Inslee in the House. I know that you sponsored this legislation in the Senate a few sessions ago and it did not pass.

It passed the House and the Senate in 2005 but did not make it through committee due to some inaccuracies in the scoring. It has been re-scored and come in at a much more modest number which is more accurate, and I would encourage you to adopt that legislation in the Senate.

The second piece is to encourage efficient electricity and heat production at biofuel facilities. I know you have had a passion for efficiency throughout much of your career and an interest in biofuels, and this is a chance to link the two. We currently, in this country, have a massive construction of ethanol plants. In my business, we think of them as "thermal loads."

Those thermal loads present a unique opportunity to install very high-efficiency power plants at every one of those facilities, but there is a problem with respect to the fact that the corn belt and the coal belt largely overlap.

When the Clean Air Interstate Rule and Clean Air Mercury Rules and recent Supreme Court decisions hit, we are projecting that the price of power in coal-intensive States is going to go through the roof. However, that does not allow us to deploy capital now in places where the price of power is artificially low by virtue of grandfathered coal plants that are not yet compliant with those standards.

We have drafted legislation, which I would be happy to provide to you and your staff, that would provide a production tax credit to bridge the gap and ensure that we get high-efficiency power plants installed in the parts of the country that are going to be most heavily hit by the price shocks that will follow CAIR and CAMR compliance.

I can provide details of that legislation, but at a broad level the impact would be to benefit rural communities, bolster the grid, lower power costs, reduce energy consumption, and, most interest-

ingly, end the debate about whether or not ethanol is net positive or net negative, because a perfectly thermally balanced Cogen plant at an ethanol facility would displace as much or more fossil fuel upstream from much dirtier power plants as all the fuel that went into the ethanol up to that point.

I would close with my observation at the start, that you get what you reward. If we reward the right things in society, we will get the right behavior. Certainly my company, and I am sure our competitors, stand prepared to deploy significant private sector capital into this space, provided we get the rules right.

Thank you for your time.

Senator BINGAMAN. Thank you very much.

[The prepared statement of Mr. Casten appears in the appendix.]

Senator BINGAMAN. Why don't we go ahead and recess here for 10 or 15 minutes. We will then proceed with Mr. Delurey's testimony. Thank you.

[Whereupon, at 2:23 p.m. the hearing was recessed, reconvening at 2:35 p.m.]

Senator BINGAMAN. Why don't we start up again? Sorry for that interruption. I am glad Senator Cantwell is here with us for this second part of this hearing.

Why don't we go ahead with you, Mr. Delurey? Thanks for being here.

STATEMENT OF DAN DELUREY, EXECUTIVE DIRECTOR, DEMAND RESPONSE AND ADVANCE METERING COALITION, WASHINGTON, DC

Mr. DELUREY. Thank you, Mr. Chairman. My name is Dan Delurey, and I serve as executive director of the Demand Response and Advance Metering Coalition, otherwise known as DRAM. DRAM is the trade association for companies that specialize in providing technologies and services in the area of demand response and the smart grid.

Demand response is the term that refers to the business and policy area whereby electricity customers reduce their peak electricity use in response to price signals and other incentives.

Demand response addresses the fact that, in order to have a smart grid, we need to have smart rates, smart prices, and smart technologies that provide both customers and utilities with new options for how to manage electricity. That is unfortunately not what we have today.

Under our present system, the vast majority of customers, and almost all residential customers, pay no more for electricity on the hottest summer afternoon when the electricity system is strained and the cost to produce electricity is extremely high than they do in the middle of the night on a spring or fall day.

That is obviously not a smart system, especially when having only a percentage of those customers modify their peak use could prevent liability problems and lower prices for all customers on the system.

In the context of the smart grid, there really cannot be a smart grid without demand response and smart technologies; it is how the smart grid touches the customer, and it is the foundation upon which the smart grid will be constructed.

In order to employ demand response, it is necessary for two things to happen. First, customers must be provided with time-differentiated price options and/or other incentives to reward them for modifying their on-peak usage. That is largely a job that the States have to tackle, admittedly.

Second, technology must be in place that allows electricity usage to be measured in time intervals instead of the present system where usage is measured cumulatively and all kilowatt hours are treated equally. That information has to then be communicated to utilities, customers, and other parties in a timely fashion.

Federal support for these technologies, in ways similar to that which has been provided to energy efficiency, renewable energy, and other areas for many years, will go a long way towards making the smart grid a reality.

I will have some specific recommendations on what Congress can do in just a moment, but, first, I would like to touch briefly upon the benefits of demand response and smart grid technologies. There are a number of benefits that occur in a number of different areas. My written testimony covers all of those.

What I would like to highlight at the moment is one area of benefits that is only now being realized, and that is environmental benefits.

With a clear consensus in place that energy efficiency is one of the cornerstones of any climate change strategy, it is important to realize what advanced metering and a smart grid can do to enhance efficiency.

It is true that a meter, in and of itself, does not save any energy, but that does not mean that a smart meter is not a green meter. Smart meters enable customers to be provided with timely and accessible information that research shows will make them a better manager of their electricity usage overall.

Research shows that more informed customers reduce their consumption just based on getting informational feedback, even if they decide not to go on time-based pricing. Indeed, it is my opinion that advanced metering systems are the platform for the next great era of energy efficiency, one where efficiency becomes part of the customer's daily life and activity and one where efficiency is finally institutionalized and made sustainable.

A smart meter is green in a different way. As the Nation moves towards systems where carbon reductions are monetized, measurement and verification of those reductions will be increasingly important. Smart metering systems will meet that need.

It is also becoming recognized that demand response can help make renewable energy resources more viable by helping to balance renewable resources in certain regions where those resources do not provide power during the peak period of the day.

Also, in terms of emissions other than CO_2, it should be noted that the Ozone Transport Commission in the northeast U.S. is looking at how demand response can help address NOx and SOx attainment challenges on peak demand days. Indeed, it may be that demand response and its enabling technologies will increasingly be seen as dynamic emissions management tools.

Let me now make four recommendations for consideration by this subcommittee. One, accelerate the depreciation schedule for smart

metering systems to bring such systems in line with the tax treatment of other high-technology hardware and software-based systems, as was noted by Mr. Thorn earlier.

Two, institute an investment tax credit to stimulate the capital investment needed to modernize the electricity system and create a smart grid.

Three, create a reduction tax credit that would be based on electricity savings that have been specifically verified using smart metering and other smart grid technologies. The objective would be to support the growth of demand response in a manner similar to the way that the Federal production tax credit has helped the renewable energy industry grow and mature over the past decade.

Fourth, institute a Federal system benefits charge on electricity that raises funds that could be used to support smart grid investments. The model would be the many State system benefits charges that are in place which raise funds for expenditures on energy efficiency and renewable energy.

In closing, let me emphasize one important thing. Much of the discussion about the smart grid is conducted in the future tense, and much of the talk is on developing better technologies in the future. All those who want the smart grid to develop must recognize that it is not necessary to wait for the future.

Yes, better technologies will come along. Meters and other demand response technologies are now high-tech items that will continue to evolve and improve. But these technologies are available now, and they provide all of the benefits now that my testimony describes.

If consumers and businesses waited to buy their first computer or cell phone until the best technology came along, they would likely have gone for years without those things and in the meantime have foregone the obvious benefits of using the existing technology.

The barrier to demand response in the smart grid is not more R&D. What is needed is a national commitment to make policy changes that accelerate the deployment of these technologies. The smart grid is definitely within reach, and it is more achievable than most think if the right amount of support and commitment is devoted to it.

Thank you very much.

Senator BINGAMAN. Thank you very much.

[The prepared statement of Mr. Delurey appears in the appendix.]

Senator BINGAMAN. Mr. Edwards, go right ahead.

STATEMENT OF CHRIS EDWARDS, DIRECTOR, TAX POLICY STUDIES, CATO INSTITUTE, WASHINGTON, DC

Mr. EDWARDS. Thank you, Mr. Chairman and Senator Cantwell, for having the hearing today on energy efficiency and the tax code.

Additional tax incentives such as tax credits probably could reduce U.S. energy consumption modestly, as we have heard today. However, narrow incentives complicate the tax code, create distortions that reduce overall growth, and open the door, I think, to more widespread social engineering through the tax system. So, I am a bit of a skunk at the picnic today, and I do not favor new tax incentives for energy policy.

However, Congress should reform tax provisions that create barriers to new investment in energy production and conservation by reforming current depreciation rules, as some of the previous panelists suggested. Current depreciation rules are unfavorable compared to those in other countries for energy technology.

I am the tax wonk here at the table, and my main concern is rising tax complexity. The number of tax expenditures or loopholes has increased from 121 to 161 since 1996; the number of tax loopholes just for energy has jumped from 11 to 23 just in the last 10 years.

There are a lot of problems with this increasing amount of tax loopholes in the Federal tax code. Tax loopholes amount to Congress trying to micromanage the economy. Leading up to the bipartisan Tax Reform Act of 1986, Majority Leader Dick Gephardt said, "The Ways and Means Committee and the Senate Finance Committee are being put in the business of trying to plan the American economy. I confess, I am not qualified to act as a central planner, and I do not know anyone on either committee who is."

Loopholes create high compliance and paperwork costs, and they cause frequent tax administration errors by taxpayers and the IRS. I think new tax incentives for energy would exacerbate these problems with the tax code.

Proponents of energy tax incentives often argue that energy deserves special attention because energy policies could fix so-called externalities in energy markets. But I think that idea of externalities opens up a Pandora's Box.

There are an endless number of theoretical externalities out there in the economy and in society that, in principle, government could try to fix. I mean, there are lots of very big problems in society today, such as obesity, which is a serious and growing problem, and it creates negative externalities in health care markets. Congress could, in theory, create a tax credit to do something about that problem.

Gun ownership. Folks who support gun ownership argue that, if more households owned guns, that would reduce overall crime rates, which is a positive externality, so in theory Congress could create a tax credit for gun ownership.

I do not advocate any of these ideas. I think there is a real slippery slope here if Congress gets into the idea of trying to fix every externality in the economy through the tax code.

So what should Congress do? Well, I think the first thing Congress can do is certainly to recognize, as I am sure most Senators do, that competitive markets are a friend of energy efficiency. Businesses have powerful incentives to make more efficient products and to reduce energy consumption.

The lure of profits forces a relentless effort by businesses to cut costs: labor costs, fuel costs, heating costs, lighting costs. Lower energy costs mean higher profits, and that is why business is interested in it.

The amount of energy consumed for each unit of GDP, the so-called energy intensity, has fallen just about in half since 1970, and much—perhaps most—of that improvement is just due to natural competitive forces in the economy.

For example, there were large improvements in household appliance efficiency prior to Federal standards going into effect in 1990. The big increases in appliance efficiency that occurred from the early 1970s to around 1990 or so were a market response to rising electricity prices.

That said, Congress can make changes to the tax code to improve energy efficiency, principally by reducing the tax code's bias against capital investment. The income tax discourages long-term investment.

To fix that bias, I think Congress should consider more favorable depreciation rules, as some of the previous panelists have said, optimally moving towards capital expensing. That would remove barriers to all types of investment in energy production, in alternative fuels, and in conservation. Now, the 2005 Energy Act took some steps in that direction, but I think more can be done.

There was a very interesting report released a couple of weeks ago by Ernst & Young that compared U.S. depreciation rules for energy production and conservation technologies to 11 other major countries.

The study found that the U.S. has less favorable depreciation rules than most other countries for investments in oil refining, electricity production, pollution control equipment, and even electricity smart meters, as we just heard about.

Nine of the 11 other countries examined by Ernst & Young had more favorable rules for electricity generation; 7 of the 11 had better rules for oil refining assets; 9 of 11 other countries had better depreciation rules for pollution control; and 10 of 11 other countries had better rules for electricity smart meters.

So I think Congress should consider improving depreciation rules for energy investments, or more broadly considering at least partial capital expensing across the board as we had in place back in 2003 and 2004.

That would promote not just better, more efficient investment in energy assets, but replacement of all types of older assets with new, more energy efficient assets across the board. That would be very good for conservation and energy efficiency.

Thanks a lot for holding the hearings. I look forward to any questions you may have.

Senator BINGAMAN. Thank you very much for your testimony.

[The prepared statement of Mr. Edwards appears in the appendix.]

Senator BINGAMAN. Doug Smith, we are glad to have you here. Go right ahead.

STATEMENT OF DOUG SMITH, Ph.D., PRESIDENT, NANOPORE, ALBUQUERQUE, NM

Dr. SMITH. Thank you, Mr. Chairman.

NanoPore has been in the business of trying to develop advanced thermal insulation for the last 13 years, and probably one of the least sexy things in this room, I will have to say, is thermal insulation. People never see it, hear it, or want to talk about it. But it is also one of the quickest ways that we can improve our actual energy efficiency, and I will go through a few examples of that.

But as background, we sell insulation which is roughly 10 times better than the current thermal insulation for a number of applications, from shipping drugs around to keep them cold, to hiking boots for when you are out hunting. But rarely do our customers ever buy insulation for energy savings.

The question is, why is that? If we make insulation that is 7 times better than foam and 12 times better than fiberglass, why do people not want to save energy? I think we found over the years, when I got all my gray hair, that there are really four reasons.

One is, advanced thermal insulation is just sort of like solar energy and wind generation is. It is a new industry, with new suppliers who need some market certainty to help boost production levels to reduce our costs.

Another thing, which I am actually agreeing on with the Cato Institute here, is that people investing in thermal insulation, it is a capital investment that they have to depreciate over years, yet what they are saving is energy, which they can write off directly that year. So, our own tax code actually argues against retrofitting, let us say, a refrigerated transport truck with advanced insulation.

Just as we have heard before, there is a public relations issue with energy efficiency, where people really do not think about energy conservation with better insulation. And probably what is worse is, most customers who are paying for the insulation are not the ones who end up saving in the energy savings. I will go through a couple of examples of that.

A lot of people say market forces should drive the adoption of new technology and energy efficiency, like insulation. My favorite example to the question that I always ask everyone in this room is, everyone has a hot water heater in their home. You can go out and buy one of these fiberglass blankets to put on that hot water heater from Lowe's or Home Depot for $20, and you actually even get a tax credit on it, but very few people do, even though, if you have an electric hot water heater, that investment will pay off in roughly 4 or 5 months, depending upon your cost of electricity, which is certainly better than my investment in the stock market, I will say.

So it is a question of scale of investment. When you talk about 20 million hot water heaters, does it make sense to have a tax credit to incentivize people to do that, or should we really focus on where you can get large blocks of energy savings with relatively small industries? That is where we have been really working, and I will give a few examples.

One is refrigerated trucking. Everyone sees large refrigerated trucks hauling frozen food and vegetables around this country. There are roughly 200,000 of those trailers on the roads in our country and they use approximately 2,000 gallons of diesel, each, per year.

Just a quarter inch of this kind of insulation tacked on the inside reduces that by over 1,000 gallons of diesel. So if you have 200,000 times 1,000 gallons of diesel per year, that is a tremendous energy savings, with the resulting reduction in pollution.

The trouble is, why does an operator not want to invest that $5,000 to $10,000 he would have to do for that trailer? It is really

two. One, he cannot depreciate it. As a matter of fact, the depreciation schedule for insulation is longer than the lifetime of his trailer.

The second issue is, really, he does not reap any benefit from reducing the environmental impact of that 1,000 gallons of diesel he is burning. So, that is a big barrier to them investing.

Another one is cold storage. Now, cold storage is something no one ever thinks about, probably, but everything from a McDonald's, with its walk-in freezers, all the way up to large, large cold storage units for storing lettuce and so forth, use a tremendous amount of energy.

Actually, we had not realized how big it was. It is roughly 6 billion cubic feet, which is one of those numbers which is meaningless, so I converted it into football fields, something everybody understands. It is roughly 30,000 football fields of cold storage. Think of a giant refrigerator. It uses a tremendous amount of energy.

And remember, most of these were built back in the days when electricity was cheap. They are typically not rebuilt again. Just retrofitting those with a quarter inch of insulation would save almost 2,000 megawatts of generation capacity, that is seven coal-fired power plants, for example. A tremendous amount.

It is much more focused, too. It is not going after every household in the country and trying to get them to put their hot water heater blanket on, it is going after the 20 largest operators and getting them to do it.

Beverage machines are another perfect example. Vending machines. Everybody sees all the Coke machines. I saw them out here. I was disappointed that most of them were not Energy Star rated, I will have to say. But most vending machines are not actually owned by the people using them, they are owned by the beverage companies. They are typically loaned to you.

So, they have no incentive to put good insulation or any other energy savings mechanism in there because you are going to end up paying the electric bill. That is a perfect example where, often the person paying for the insulation and the person reaping the energy benefit, are not connected.

I could go on, and on, and on, but I will stop there. Thank you for your time.

Senator BINGAMAN. Thank you for your time and for your excellent testimony.

[The prepared statement of Dr. Smith appears in the appendix.]

Senator BINGAMAN. Thank you all for being here and for your excellent testimony.

Let me ask a few questions, then call on Senator Cantwell for her questions.

Let me take an idea that you talked about a little bit, Mr. Delurey, in your testimony and relate it to what Doug Smith is talking about. You talked about a reduction tax credit, where you said the credit would only be granted when reductions are measured and verified using demand response technologies, of course.

In each of these cases, if we were to allow quicker depreciation, do we just do that across the board for any retrofitting that involves insulation or do we require that there be some kind of demonstration that the retrofitting is actually resulting in an energy savings?

I guess I do not know how specific we ought to be getting. Obviously, Mr. Edwards makes a good point about how complicated we made the tax code and how we are being urged to make it even more complicated.

Mr. Delurey, did you have a thought on that?

Mr. DELUREY. Well, I think changing the depreciation schedule is probably the first thing that should be done. But in the case of our proposal for a reduction tax credit, it is recognizing the fact that there are now technologies that allow a more precise measurement and verification that a reduction actually took place.

Historically, a lot of the incentives provided in the area of energy efficiency and so on have been based on a pro forma estimate that those savings would occur. In the case of the new technologies, you can actually verify exactly when and how much occurred, and it is almost the inverse of a power plant, if you will, as in the production tax credit.

Senator BINGAMAN. But are you building in an administrative complexity here? You have to verify the energy savings in order to be eligible for the tax credit. I mean, there are a lot of problems in filling out a tax return already besides having to be able to demonstrate to the IRS an energy savings.

Mr. DELUREY. The data would be available and you could tie it in. This is not something that would likely happen outside of utilities being involved and the regional system operators being involved which are running these types of demand response programs to modify peak usage.

Senator BINGAMAN. All right.

Mr. DELUREY. So the data would be there. You could look and see how many kilowatt hours were reduced on peak, so you could then monetize that as an incentive.

Senator BINGAMAN. Mr. Casten, did you have a thought on this?

Mr. CASTEN. I do not have a response on that.

Senator BINGAMAN. All right. Let me ask you, Mr. Edwards. If we were to just dramatically reduce the time for depreciating these kinds of investments in insulation that Doug Smith is talking about, does that comply with your view of an appropriate change in the tax code, and would that be an effective way to encourage energy efficiency?

Mr. EDWARDS. Yes. I was surprised to learn that apparently the asset life of insulation is longer than the trucks, which does seem kind of remarkable. The recent study that I mentioned about how U.S. depreciation rates are out of line with foreign countries is one of a number of studies that I have seen over recent years that argue that U.S. depreciation rates are out of line with what is in place in other countries. I like expensing even more than accelerated depreciation because it is simple, it does not complexify the tax code.

There was a new study out a couple of weeks ago from the National Bureau of Economic Research looking at the 2003 and 2004 so-called bonus depreciation tax reductions that showed a substantial increase in investment in exactly the type of assets that got the bonus depreciation. It is the assets now that have longer lives, 10 to 20 years, that would get the most benefit, and that's where you would see the largest increase in investment.

Senator BINGAMAN. All right.

I guess I am just trying to get it straight in my mind. I understand shortening the depreciation time for insulation. That is pretty straightforward. I guess, Mr. Delurey, you are recommending the same thing for smart metering technology.

Mr. DELUREY. That is correct. Currently, those are depreciated anywhere from 20 to 30 years.

Senator BINGAMAN. Yes. And what are the other items that we ought to be doing? Combined heat and power?

Mr. DELUREY. Distribution, cable, and equipment.

Senator BINGAMAN. All right. So we would put a list of things together, all of which add up to increased efficiency, and all of which currently have long depreciation lifetimes or schedules.

Mr. THORN. Outdoor lighting, also.

Senator BINGAMAN. Outdoor lighting. All right.

Let me call on Senator Cantwell for her questions.

Senator CANTWELL. Thank you, Mr. Chairman.

I would like to follow up, Mr. Delurey, about your question in regards to the reduction tax credit, because isn't part of the challenge here in modernizing the grid, which in an era of distributed generation has great efficiencies for us, and then being able to move the power around efficiently? Isn't the reduction tax credit not partly the fact that we need to get the benefits of infrastructure investment and get the utilities to make that infrastructure investment?

Mr. DELUREY. Exactly. It would drive the investment. The accelerated depreciation would go a long way towards getting new technologies like smart meters in place. But then you have to put those smart meters to work in trying to do demand response and shift the usage, and that is where a reduction tax credit, being a dynamic type of incentive, would do a lot towards improving the business case to put those kind of programs in place.

Senator CANTWELL. And do we not have this challenge here? Because I am sure we are going to, in this committee as we move through with larger energy packages and packages specifically focused on the finance of incentives of an energy package, have this discussion, as Mr. Edwards is saying, where you cannot do everything, nor should you try, but at the same time we want to have the generation of power and the reduction of demand to be on equal footing so that we are not constantly looking at new generation as the only source.

Mr. DELUREY. That is correct. Right.

Senator CANTWELL. But if we want to get to the point of reduction as the same as being a fuel source, we have to figure out how we are going to get the infrastructure investment accomplished.

Mr. DELUREY. Right. The idea of the smart grid is that it would be a dynamic organism, if you will, that would have the demand side of the equation and the supply side of the equation both being deployed so that you optimize the entire system.

Right now, as with other things like efficiency and renewables that have been provided support to be able to ramp up quickly and develop faster than they otherwise would, that is what we ought to be talking about in terms of smart grid investments.

Senator CANTWELL. And how do you see this playing out for the consumer?

Mr. DELUREY. The consumer wins in a lot of different ways. There are a lot of different benefits in a lot of different places, and that is all in my written testimony. But consumers who participate directly in demand response, they save directly by shifting their usage around and having direct savings.

But the real power of this is that everybody saves. When only a small percentage of customers modify their peak usage, it depresses the demand and leads to lower wholesale prices, which everyone pays, so everyone wins.

Senator CANTWELL. We have had different studies and analyses. Are you putting a number on what you think these savings might be? I have heard as high as double-digit savings out of the current supply.

Mr. DELUREY. On a per-customer basis?

Senator CANTWELL. No, no, no. Just in general, that you could out of the current supply with smart grid technology. I am talking in the broadest sense. I think part of the challenge is, everybody thinks we are talking just about smart metering. We are talking about an infrastructure overhaul.

Mr. DELUREY. Yes. That is right. We are talking about other things as well. There are ranges of estimates in terms of what the benefits might be, on the order of $5 to $10 billion a year if enough customers were provided with the technologies and became part of the system via demand response.

In EPAct 2005, the Department of Energy was actually asked to estimate the nationwide potential on this. They came back with a report to Congress that cited other estimates. They said they did not have the time, in the 6-month window, to do the proper analysis, but the savings are potentially huge and they go to all customers. It is not just to those who participate.

Senator CANTWELL. I think I may be remembering a pilot project that is going on in our State with the Pacific Northwest Labs, and I think they are seeing 10 percent or maybe better.

Mr. DELUREY. Yes. There is research that shows that customers just getting the information of what a smart meter can provide, for example, even if they do not do the prices, will reduce their consumption by, on the order of 11 percent just because they are more in tune with their electricity usage. They are able to monitor what they do, and that is important to them.

Senator CANTWELL. So do you think that this is on a level playing field with the production tax credits? Or how should we think about this?

Mr. DELUREY. It is, unfortunately, not on a level playing field with anything. There are no incentives, really, in the tax code for demand response and smart grid. It has not received the lift, if you will, that other preferred areas have over the years. So, it certainly would be a good candidate for that right now.

Senator CANTWELL. Right. And obviously I am a fan of that. But I am saying, from a return for investment, if they were both in place, are there other factors that might even give the reduction side a boost, given the fact that you are using current energy sources more efficiently.

Mr. DELUREY. Right.

Senator CANTWELL. That has to be easier.

Mr. DELUREY. That is right.

Senator CANTWELL. And more cost-effective. It certainly has to be more cost-effective than production overall.

Mr. DELUREY. That is right. And it also gets to those other benefits: you are reducing emissions, you are avoiding power plants, you are mitigating market power, you are increasing reliability. It has a whole host of benefits, some of them easy to quantify, some of them difficult.

Senator CANTWELL. If I could, Mr. Chairman—I know my time has expired—ask Mr. Casten a question about the Combined Heat and Power Credit. I know that I am interested in this credit for thermal energy and how we drive that in the concept of helping with already-established facilities in driving down costs by having their—I do not know, what do you want to call it?—waste power better efficiently used by some of these tools.

Mr. CASTEN. May I assume that this is in reference to the bill that you have drafted up with the existing thermal energy credits?

Senator CANTWELL. Yes.

Mr. CASTEN. If I could comment a bit on that specific bill, then take it wherever you would like to take it. First of all, I think that the draft language you have proposed does a couple of things really, really well.

Number one, the intent is clearly to level the playing field and provide the right incentives. I would actually extend Mr. Delurey's comments a bit to go one step further upstream, that our intent should not simply be to reduce electricity usage, but to reduce the usage of fuel to generate that electricity.

That is simply a boundary definition. It is entirely consistent. But increasing generation efficiency is as valuable in reducing fuel use as increasing the efficiency of appliances.

I like the fact that your bill includes thermal electric credits. I am, frankly, rather intrigued by your zero carbon rules, although I would love to chat with you offline about exactly how those definitions are developed.

Having said that, I have some concerns that are primarily driven with trying to think about how I would fit the technologies that I know how to deploy into that bill. If you will allow me to pontificate for a moment, it seems that in the ideal world, apropos of some of the earlier comments, competitive markets would work.

They really do not work in the energy sector, in large degree because it is the biggest industry in the country at about $400 billion, and it is subject to cost plus pricing, which is a good incentive to drive up your costs. The ideal regulatory environment would provide greater rewards to those who reduce carbon emissions more quickly.

Senator CANTWELL. And you have a specific example of how you could do that?

Mr. CASTEN. Well, clearly that would work within a cap-and-trade context. My concern with some of the provisions in your bill is that there are pieces for thermal, there are pieces for zero carbon. I can think of a lot of very cost-effective ways to reduce carbon

emissions and drive up efficiency that would fall through the cracks.

What I personally like about the Inslee bill is that it simply sets a high efficiency test and then says, we have defined success as high efficiency, you get there however you want. I think that that is more efficient from a policy perspective, and I do not think it is at all inconsistent with what you have proposed.

Senator CANTWELL. All right.

Anybody else on that point? [No response.] If not, Mr. Chairman, thank you.

Senator BINGAMAN. Yes. Thank you very much.

Let me just also ask Mr. Casten, you talked about how combined heat and power should be included in biofuel facilities, new ethanol plants, as I understand it. Could you elaborate a little bit on what you think could be done there and how we ought to proceed?

Mr. CASTEN. Sure. This really reflects from conversations we have in commercial development with some ethanol plants in California right now. An ethanol plant, in the jargon of our industry, is "thermal long." Most of its energy is thermal energy. Proportionately, it uses relatively little electric power.

What we would do if we were king is to design a thermally balanced power plant at every ethanol facility in the country. If you assume for sake of argument that the typical ethanol plant going up nowadays is about a 50 million gallon plant, the thermal demand at that facility is perfectly suited to install a 45- to 50-megawatt combined heat and power plant that is perfectly balanced to the thermal load, about 80 percent fuel-efficient, and that would provide the 5 megawatts, approximately, of load in an ethanol plant and export the remaining 45 to the grid.

The sheer scale of ethanol plant construction makes this—if you just think about adding up all the ethanol plants—a massive reduction in energy use. I can quantify that offline for you if you would like. Here's what is interesting about doing that. One is that, in my approximate example, the amount of fossil fuel you displaced from the grid is about equal to 135 megawatts of fossil fuel. I am using megawatts as the unit, not because it is electric power, but it makes the math more simple. That is roughly equivalent to the total fossil energy currently going into the ethanol plant in the plant and on the farm.

So you basically net those plants to zero if you do that. Now the question arises as to why we are not doing that. If I am going to install that plant in the coal belt where the wholesale cost of power is perhaps $40 or $50 a megawatt hour, I simply cannot make that work, in spite of the high efficiency of the plant, if I am buying $8 gas.

More significantly, the overall project economics are contingent on having to get a fair price from the utility for the exported 45 megawatts, and there have been some historic issues there that I will not go into now but I suspect you are familiar with. What we have proposed is a modest production tax credit that would basically bring that up to a point of 1.5 cents a kilowatt hour, $15 a megawatt hour, that would basically tip that balance to make it possible to start deploying these plants.

Senator BINGAMAN. And this is a production tax credit on the production of the electricity that is going into the grid?

Mr. CASTEN. Yes. And only applicable for plants that pass a fairly stringent efficiency test.

Senator BINGAMAN. And it would be just limited to ethanol plants the way you are thinking of it, or is there——

Mr. CASTEN. You know, candidly, I think from a policy perspective it would be nice to apply it everywhere. There is a nice logic to ethanol plants because of the politics of biofuels, and because those are the thermal-intensive plants that people are building nowadays. But there is no reason it would have to be limited in that regard.

Senator BINGAMAN. All right. Have you written all this up?

Mr. CASTEN. We have, and we can provide you with that.

Senator BINGAMAN. Yes. We would be interested in seeing it. I think it is an interesting set of suggestions.

Mr. CASTEN. All right.

Senator BINGAMAN. All right. Let me think if there are more things that I can get into here.

On these "regulatory head winds" that you are running into, are there any of those that the Federal Government can realistically resolve or is this all State regulatory head winds that the Federal Government basically has to sit back and watch?

Mr. CASTEN. How much time do you have? [Laughter.]

Senator BINGAMAN. Give me the really short version.

Mr. CASTEN. The honest-to-goodness truth is that there is 100-plus years of regulation, some of which is State, some of which is Federal, some of which is municipal, and it is a rather difficult onion to unpeel. It is a particularly difficult onion to unpeel without going into issues of competitive markets and deregulation debates, which shift with political winds.

There is a bill that Representative Boucher has recently introduced in the House—subtitled DNE; I do not have my memory right now, but I can get you a copy of the bill—that tackles some really neat pieces of that, specifically a provision that would allow anybody to build a private wire to connect two facilities. Think about the ethanol example. I have 45 megawatts of excess capacity and I only have one path to market, through a single company's wires.

If I had the ability to sell power to my neighbor, who would also like cheap power—which is a felony offense in 50 States right now—if I had that ability, you would unleash a sea of innovation and investment and lower the costs for everybody simply by virtue of the powers of competition.

There are some other provisions in that bill with respect to making sure that there is a fair price paid for power that is a location-specific price. I raise those as two examples. Not as the whole story, but as two partial answers to your question.

Senator BINGAMAN. All right.

Mr. Delurey?

Mr. DELUREY. On your question about the States, the fact is, the States have the ball—much of the ball, anyway—with respect to the smart grid and demand response. What they do not have is really enough capacity to do much with that ball. This was proven,

I think, with the provisions in EPAct 2005 that required that each State conduct an investigation on time-based pricing and advanced metering, and it created the new purpose standard for them to consider.

This is a new area. Your average state utility commission needs a lot of assistance to be able to handle a new area like this, and I am not sure that that has been provided over the time since EPAct was enacted. That is the type of thing that the Congress could do in probably a couple of different ways, to try to provide more technical assistance and other types of support to the States to be able to allow them to do their job.

Senator BINGAMAN. Let me just finish with this. The policy options we have talked about here—tax incentives, shortened depreciation, direct regulation. Let me ask you, Doug. Which of these, if any, will solve the problem of the vending machines?

Dr. SMITH. Actually, with the vending machines, it will not. That is the basic problem there, where you have someone who is making the capital investment who gets the credit, whether it is accelerated depreciation or investment tax credit, and he does not really get the benefit then of what Mr. Edwards is going to save in his electric bill.

So, unfortunately, in some of these applications, just tax credits may not do it, or accelerated depreciation. Now, it will bring down the cost of insulation to him, so PepsiCo or Coke America would have more incentive to, let us say, build better insulation into a vending machine. But that is still one of the issues, I think, a lot of these——

Senator BINGAMAN. Do any of you have a genius idea as to how you use a public policy tool to incentivize someone who is going to provide a vending machine, for which they do not pay the electric bill, to make the vending machine more fuel efficient? Kateri?

Ms. CALLAHAN. Well, at least with the Federal Government you could require that any vending machines that are placed in government facilities are Energy Star labeled.

Senator BINGAMAN. Right.

Ms. CALLAHAN. So you make that. You have the power of a huge Federal purse. That could be very helpful. I think other State governments and municipalities could do the same thing.

Senator BINGAMAN. Right.

Yes, Mr. Edwards?

Mr. EDWARDS. I actually do not see why, if Congress was a business purchasing, they have a couple of different vendors offering Coke machines, it seems to me the company offering the most efficient machine, the business could offer a better price and they split the difference on the energy advantage. So, I actually do not see any market failure there with that particular example.

Senator BINGAMAN. All right. For the ones that the government is purchasing, is that what you are saying?

Mr. EDWARDS. If Congress was a private business.

Senator BINGAMAN. Right.

Mr. EDWARDS. I mean, the private business would want to reduce costs. They would go to a vendor where they could get a more efficient machine and they would be willing to pay a little more to that vendor.

Senator BINGAMAN. But as I understand it, these vending machines are not sold, they are just located in the facility.

Mr. EDWARDS. I mean, they would pay a little more to rent the machine, it seems to me.

Senator BINGAMAN. I see. I see. I do not know that they charge any rent. I think they just make up the money on the Cokes they sell, so they are sitting around here soaking up power and nobody is paying attention. All right.

Dr. SMITH. Mr. Chairman, could I just add one thing?

Senator BINGAMAN. Certainly.

Dr. SMITH. On the Energy Star, that is one of the issues which comes back to bureaucracy of policy. If you look at the Energy Star vending machines, their regulations are on energy per 24 hours, so how they have actually improved their energy efficiency is they actually let the vending machine heat up at night when no one is using it, and then cool down during the day, so it is the exact opposite of what you want from an efficiency viewpoint.

Senator BINGAMAN. Right.

Mr. DELUREY. But again, an example. I did not talk about the smart appliances, but that really is the future, where appliances and other devices can respond to a price signal. So it is not just about being——

Senator BINGAMAN. So you think if we had properly priced electricity, there would be an incentive for—the problem again is, though, the people who are making the vending machines do not pay the electric bill. But whoever is paying the electric bill would have an incentive to see that the vending machine cools off during the day when people want cold Cokes, and warms up at night when nobody cares.

Mr. EDWARDS. Could I offer a bit of a skeptical comment? I am curious to hear what Mr. Delurey would say. With electricity generation, the peak power, as he discusses, is far more expensive than the base load. It does surprise me that it would not be in a utility's own interest to use smart meters because of the big incentive to get that peak load down to save the high marginal cost.

Mr. DELUREY. Part of the answer is that it is a major capital investment to turn over your metering fleet. As FERC noted in a report done pursuant to EPAct, there is only 6 percent penetration right now of smart meters out there, so you are talking about, again, a major capital investment and, in some cases, a business case that requires a lot of benefits to be pulled together to be able to justify it.

Ms. CALLAHAN. Can I add to that? The notion, and you have heard this in hearings before, of decoupling the revenues from the sales is just critical.

Senator BINGAMAN. Right.

Ms. CALLAHAN. So when you look at the regulatory head winds that folks are facing and what the Federal Government can do, your bill, the energy efficiency bill, directs States to consider looking at rate structures that reward investment in energy efficiency or that do not reward investment in new electricity.

But I think you can do more than that, and I think that if the Congress could consider that and look at ways to help the States or direct the States to value efficiency the way that they do other

resources, it will go a long way to helping investment in all these areas.

Senator BINGAMAN. Mr. Casten, did you want to make a point?

Mr. CASTEN. I would second the comments about decoupling. I would add that there is a group in Vermont, the Regulatory Assistance Project, that has a wonderful model of how to do that right, essentially recognizing that decoupling removes a negative incentive, but it does not create a positive incentive, so you need to get those two aligned. I would urge you to look at their work.

I wanted to just quickly comment on Mr. Edwards's point, and it goes to what you have heard me say many times here. A regulated investor-owned utility has no incentive to save those costs because the costs are pass-throughs.

Senator BINGAMAN. Right. They get a rate of return on whatever their capital is.

Mr. CASTEN. That is the elephant in the room that needs to be addressed.

Senator BINGAMAN. Right.

Well, this has been very useful. We appreciate your being here and appreciate the good testimony. We will try to take it to heart as we proceed with legislation. Thank you.

[Whereupon, at 3:21 p.m., the hearing was concluded.]

APPENDIX

ADDITIONAL MATERIAL SUBMITTED FOR THE RECORD

Testimony of Kateri Callahan
President
Alliance to Save Energy

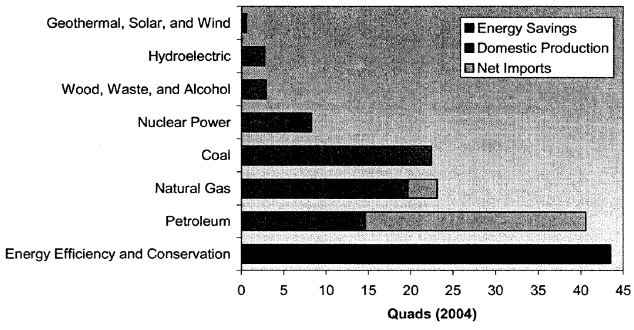
Introduction

The Alliance to Save Energy is a bipartisan, nonprofit coalition of more than 120 business, government, environmental and consumer leaders. The Alliance's mission is to promote energy efficiency worldwide to achieve a healthier economy, a cleaner environment, and greater energy security. The Alliance, founded in 1977 by Senators Charles Percy and Hubert Humphrey, currently enjoys the leadership of Senator Mark Pryor as Chairman; Duke Energy CEO James E. Rogers as Co-Chairman; and Senators Jeff Bingaman, Susan Collins, Larry Craig, and Byron Dorgan along with Representatives Ralph Hall, Edward J. Markey, and Zach Wamp as its Vice-Chairs. Attached to this testimony are lists of the Alliance's Board of Directors and its Associate members.

Energy Efficiency is America's Greatest Energy Resource

Energy efficiency is the nation's greatest energy resource—efficiency now contributes more than any other single energy resource to meeting our nation's energy needs, including oil, natural gas, coal, or nuclear power. The Alliance to Save Energy estimates that without the energy efficiency gains since 1973 we would now be using at least 43 quadrillion Btu more energy each year, or 43% of our actual energy use. Much of these savings resulted from federal energy policies and programs like appliance and motor vehicle standards, research and development, and the Energy Star program.

Energy Efficiency: America's Greatest Energy Resource



Source: Alliance to Save Energy

Energy efficiency is the quickest, cheapest, and cleanest way not only to tackle our current energy cost issues, but also to meet the anticipated future growth in energy demand in the Untied States. The enormous contribution of energy efficiency to meeting our energy needs is achieved with little or no negative impact on our wilderness areas, our air quality, or the global climate. Energy efficiency enhances our national and energy security by lessening requirements for foreign energy sources. Further, energy efficiency is invulnerable to supply disruptions; is rarely subject to siting disputes; is available in all areas in large or small quantities; and generally costs much less than it would to buy additional energy.

Energy-efficiency and conservation measures have a proven track record of balancing demand and supply much faster than drilling, constructing power plants, or building new import facilities. When a series of rolling blackouts and electricity price spikes hit California in 2000-2001, the state undertook a massive electricity efficiency outreach campaign that reduced peak summer power demand by 10 percent and reduced overall electricity use by 7 percent in less than a year, thus helping avoid further shortages. The cost was just 3 cents per kWh. The American Council for an Energy-Efficient Economy estimates that a small decrease in natural gas demand (2-4 percent) could result in a decrease in wholesale natural gas prices of as much as 25 percent over the next few years, with vast savings for consumers and energy-intensive industries.

Tax Incentives are an Essential Piece of an Energy Efficiency Policy

Tax incentives are a critical element of a comprehensive energy efficiency policy. Federal action for energy efficiency has been most effective when it combines four elements to create a cycle of improvement: 1) Support for research and development on new energy efficiency technologies, 2) Incentives and early adoption to create initial markets for the most advanced products and technologies, 3) Public education to spur widespread commercialization of efficient options, and 4) Standards and codes to set an efficiency floor. Tax incentives are the best mechanism to spur initial markets and can be an important hook for public education efforts to help efficient products achieve widespread use.

For tax incentives to have the desired impact on "market transformation" they must be carefully designed. They must not only encourage the most efficient technologies and products and last long enough to have a meaningful impact on the market, but also must keep pace with rapidly changing market conditions.

Extending and Improving the EPAct 2005 Energy Efficiency Tax Incentives

The Energy Policy Act of 2005 (EPAct 2005) included important tax incentives for highly energy-efficient new homes, improvements to existing homes, commercial buildings, heating and cooling equipment, appliances, fuel cells, and hybrid and advanced diesel vehicles. These incentives for consumers and businesses have the potential to help transform markets to embrace energy-efficient technologies and thus to help the best buildings, vehicles, and equipment become mainstream.

Unfortunately, most of the EPAct 2005 incentives were not put in place for a long enough period of time to insure market transformation. Most of the incentives were limited to two years—expiring on December 31, 2007. And, while two of the incentives—for commercial buildings and new homes—were extended for one year and so now are set to expire at the end of 2008, this

is still not adequate to insure a meaningful impact on the market. In order for these tax incentives to be effective in creating a market transformation toward greater energy efficiency and reductions in energy use they need to be given more time to work. An extension for multiple years is imperative to allow enough time for the planning and construction of new buildings.

Buildings Incentives – EXTEND Act

Building energy use is a major factor in the linked problems of energy prices, energy security and global warming in the U.S. More than one-third of all energy used in the U.S., and more than two-thirds of electricity, goes to heat, cool and power buildings. Just over half of that is for homes and the rest for a wide variety of commercial buildings. There is a significant and important opportunity to reduce energy use in this sector. A 2000 study by several national labs estimated that energy-efficiency policies and programs could cost-effectively reduce U.S. energy use in residential and commercial buildings by about 20% over a 20-year span, essentially reversing the growth in demand that is projected for this sector. Tax incentives are one of the effective policy tools that can be employed to help realize this potential.

On March 8, 2007 Senators Snowe, Feinstein, Kerry, Bunning, Bingaman, Salazar, Coleman, Smith, Allard and Cornyn introduced the *EXTEND the Energy Efficiency Incentives Act of 2007* (S. 822). Companion legislation (H.R. 1385) was introduced in the House by Representatives McDermott, Markey and Weller on March 7. The EXTEND Act seeks both to restore the duration and levels of the EPAct incentives to those that were in the original energy bill passed by the Senate, but reduced during conference, and to improve those provisions. The Alliance to Save Energy believes that the provisions in the Snowe-Feinstein bill will ensure that the incentives achieve their full potential benefits.

GDS Associates has estimated the potential savings that would come from extending and expanding the current EPAct tax incentives as envisioned in the EXTEND Act. Over the 2006-2020 time period, GDS estimates that the incentives would help to reduce U.S. natural gas use by about 4.65 trillion cubic feet (almost enough to serve California and New York for a year), decrease consumer energy bills by about $93 billion, and avoid 657 million metric tons of carbon dioxide (equivalent to 142 million passenger cars not being driven for one year.) GDS also estimates that EXTEND would reduce peak electric demand by about 15,500 megawatts by 2020 (equivalent to 52 power plants of 300 MW each).

Details about the specific incentives in EPAct, and ways that the EXTEND Act would improve upon them, are outlined below:

Existing Home Improvements Credit

The greatest immediate potential for energy savings is from efficiency improvements to existing homes. For example, just adding insulation to existing homes could save 800 trillion Btu, reduce NOx emissions by 100,000 tons and SO2 emissions by 190,000 tons, and avoid 6,500 asthma attacks and 240 deaths each year. EPAct provides a tax credit of up to $500 for homeowners to help defray the cost of installing a variety of energy-efficient products. In particular, the measure provides homeowners a credit for 10 percent of the cost of new windows, insulation and doors. It also provides credits of $300 for efficient central air conditioners, water heaters and heat pumps, $150 for furnaces and boilers, $50 for fans in furnaces and caps the portion of the

credit that may be used toward purchase of windows at $200. This provision is currently set to expire at the end of this year (December 31, 2007).

The EXTEND Act would establish a new, performance-based tax credit for whole home retrofits that save energy. The credit starts at $800 for homes that are certified as saving 20% and increases, based upon the percentage of energy savings realized, up to $4,000 for a home that reduces its energy use to zero. Homes occupied by either owners or renters can qualify for the credit, which lasts until 2011. This new approach should encourage much greater energy savings by helping homeowners find the best measures for their homes and subsequently insuring that the savings are realized from the improvements made. The new credit will require an inspection and certification of the energy savings in order to establish the level of credit to be received.

There are two additional new incentives proposed to help ensure that trained certifiers are available. A credit of up to $500 is available to help cover the cost of training and certification of personnel. A second credit of up to $1000 is available to help defray the cost of equipment used for home energy inspections. These new credits will result in the training of many more people to perform energy ratings, audits, and inspections, creating an important infrastructure that will far outlive the limited availability of the tax credit and continue to deliver energy savings for decades to come.

In addition to the new credits, the bill extends the EPAct tax credit for retrofits to existing homes until 2009 to maximize the effectiveness of this credit and to allow time for ramp-up of use of the new, performance-based credit.

Finally, the bill also includes equivalent business deductions (at three times the credit amounts) for energy-efficient retrofits to low-rise residential buildings to insure that the millions of consumers living in these types of dwellings can reap the benefits of investments in energy efficiency that the building owners are encouraged to make through the tax incentives.

New Homes

EPAct 2005 provides builders a credit up to $2,000 for a home that saves at least 50 percent compared to the model residential code, and $1,000 for an Energy Star manufactured home. This provision is currently set to expire December 31, 2008. The EXTEND Act would extend this tax credit to 2011.

In 2006, the Residential Energy Services Network Inc. (RESNET) tracked that 8,076 new homes were certified for the $2,000 credit. (Please note that this figure represents approximately 6 months of construction). According to the U.S. Census Bureau, there were approximately 1.65 million single-family homes built in 2006. Over 172,000 of those were Energy Star Homes—which must meet guidelines set by the U.S. Environmental Protection Agency (EPA), generally at least 15 percent more efficient than homes built to the model residential code. In addition, about 3,000 Energy Star manufactured homes, out of about 150,000 sold, qualified for the credit.

But the duration of the credit has not been long enough to allow new developments of qualifying homes. Extending the new homes tax credit to 2011 would give builders time to learn new technologies and techniques, change their designs, obtain permits, and build and sell qualifying

homes. This would allow many more families to enjoy the financial and environmental benefits of living in an efficient home and increase the market for energy-efficient building products.

Commercial Buildings

Commercial buildings use about as much energy as residential buildings, and energy use in these buildings is growing faster than in the residential sector. There is a growing interest in "green" commercial buildings and the availability of federal tax incentives, we believe, can translate this interest into action and therefore significant energy savings for the country. EPAct provides a tax deduction up to $1.80/square foot to owners or tenants (or designers, in the case of government-owned buildings) of new or existing commercial buildings designed to use 50 percent less energy than required by the model commercial building energy code. One-third of that amount is available for each of three systems (heating and cooling, building "envelope," and lighting) that achieves one-third of the savings. The provision currently is scheduled to expire December 31, 2008.

Given the limited timeframe for the availability of the commercial tax deduction, and the fact that a typical large commercial building takes at least three years to build, it is almost impossible for a commercial builder to design and build a large, new commercial building before the end of 2008. This has largely limited use of the incentive to buildings that were already planned and to relatively simple retrofits such as improved lighting. An extension of multiple years is imperative to allow enough time for planning and construction of energy-efficiency buildings.

The EXTEND Act would extend the energy-efficient commercial building tax deduction through 2012, and would allow an additional two years beyond that to complete and place in service qualifying buildings. The bill also increases the amount of the deduction from $1.80 per square foot to $2.25 per square foot, and makes a number of technical changes to clarify what efficiency measures qualify and sets more appropriate criteria for the individual building systems.

Appliance Incentives – Super-Efficient Appliance Incentives Act

EPAct 2005 also provides manufacturers $50-$200 credits for increased production of super-efficient refrigerators, clothes washers, and dishwashers. These credits expire December 31, 2007. In order to improve the extraordinary gains in efficiency of home appliances that have been achieved over the past few decades, the Alliance to Save Energy encourages the Committee to include the tax incentives for manufacturers of efficient home appliances that are in the *Super-Efficient Appliance Incentives and Market Transformation Act of 2007* (H.R. 2137), which was introduced May 3, 2007 by Representatives Sander Levin, Earl Blumenauer and Alyson Schwartz.

These tax incentives, along with strengthened appliance energy and water efficiency standards and recommended improvements in Energy Star levels, are an essential part of a consensus package that was negotiated between energy and water efficiency advocates, including the Alliance, and home appliance manufacturers. These policies work best as a package, as tax incentives for increased production of the most efficient appliances help bring those advanced technologies into the marketplace and decrease their cost, Energy Star helps efficient appliances gain market acceptance, and federal standards ensure that no appliances needlessly waste energy, water, or consumer dollars.

According to analysis conducted for the Department of Energy, the tax incentives *and* standards included in this package will save about 3.3 quadrillion Btus of energy, 10.8 million acre feet of water and nearly $15 billion on consumer energy bills over about 30 years. Depending on minimum standard levels selected by DOE in refrigerator and clothes washer rulemakings to be completed in 2011 and 2012, the savings could grow to 15 quadrillion Btus of energy, 68 million acre feet of water, and $68 billion in consumer energy bill savings.

The manufacturer tax incentives in the bill are designed to spur increased market share for the most energy-efficient and, where appropriate, water-efficient refrigerators, residential and commercial clothes washers, residential dishwashers, and dehumidifiers. Multiple tiers allow larger incentives for the most efficient appliances. The limited duration, and applying the incentives only to increased production of eligible products, ensures cost-effective use of taxpayer funds in this dynamic marketplace.

Industrial and Commercial Equipment

EPAct 2005 included no incentives for industrial equipment or for combined heat and power, which provides efficient, on-site electricity generation. The Alliance to Save Energy supports a modified version of a provision that was in the Senate version of EPAct 2005 to provide a 10 percent investment tax credit for combined heat and power systems under 50 Megawatts in size. The Alliance also supports a new proposal for a credit for purchasers of efficient electric motors that meet the highest efficiency tier set by the National Electrical Manufacturers Association. Like the appliance tax credits, this credit is part of a negotiated package that includes improved efficiency standards for electric motors.

Vehicle Incentives

In addition to providing tax incentives to increase energy efficiency in the built environment, the Alliance to Save Energy believes that it is imperative to address vehicle fuel use given that the transportation sector accounts for two-thirds of U.S. oil use (passenger cars and light trucks consume 40 percent of that oil), the majority of CO and NOx emissions, and one-third of U.S. greenhouse gas emissions. These realities, coupled with the fact that U.S. vehicle miles traveled are growing at a faster rate than vehicles and at more than twice the rate of the population, underscore the criticality of improving the efficiency of today's passenger cars and trucks immediately.

Hybrid and diesel vehicles

EPAct 2005 provides purchasers of hybrid and lean burn diesel vehicles a credit of $250-$3,400 based on fuel economy and gas savings, capped for each manufacturer starting at 60,000 vehicles. It also provides a larger credit for heavy-duty hybrid vehicles ($7,500-$30,000) that expires in 2009. The credits for one manufacturer are already being phased out. The Alliance believes that these credits can help steer buyers toward vehicles with advanced technologies and higher fuel economy, but that in order to increase their effectiveness, they should be extended and the manufacturer vehicle volume cap should either be removed or increased.

Feebates

The Alliance encourages this Committee to consider a more comprehensive approach to encouraging more fuel-efficient vehicles. A new, innovative approach to encouraging efficiency of light-duty cars and trucks is a national "feebate" system. A national feebate would apply a fee or rebate to new vehicles based on the expected lifetime fuel use of the vehicle. We would recommend that the fee and rebate apply to manufacturers of all light-duty passenger vehicles—including SUVs and minivans—but they could be determined relative to vehicles in the same class or to vehicles of the same size. The fee or rebate would then be determined relative to a dividing line or reference mpg (eg for a 27.5 mpg car, $1/gallon * 160,000 miles / 27.5 mpg = $5818; if the dividing line were at 24 mpg, or $6667, the 27.5 mpg car would receive a $848 rebate.)

We would recommend setting this dividing line between fees and rebates each year such that the total fees would pay for all the rebates thereby allowing the program to operate at no cost to the government. Under such an arrangement, about half the vehicles would receive a rebate, and about half the vehicles would be assessed a fee.

This would create an incentive for manufacturers to use fuel-efficient technologies in the vehicles they produce, and hence should increase the availability of efficient vehicles, as well as creating an incentive for consumers to purchase more efficient vehicles. As fuel economies increased, the reference mpgs would be ratcheted up, creating an incentive for continual improvement, but never out of line with the existing market.

This policy has the potential to improve fuel economies throughout the passenger vehicle fleet, not just give new technologies a foothold in the marketplace. Thus, depending on how it is set up, it could be complementary to tax incentives for hybrid and other advanced technology vehicles, or could provide a technology-neutral incentive for high efficiency vehicles of all kinds.

Conclusion

By wisely using the tax code, the federal government can spur the development and use of energy-efficient buildings, technologies and vehicles throughout the United States. While EPAct 2005 made important strides in this area, the energy-efficiency tax incentives can and must be expanded and enhanced in order to ensure that the American people are given immediate, cost-effective and sustainable assistance in addressing spiraling energy costs, an ever-less secure energy future and the dire environmental impacts associated with the production and use of energy.

the new green

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Testimony of Sean Casten
President, Recycled Energy Development
Chairman, U.S. Clean Heat and Power Association

Before the
Energy, Natural Resources, and Infrastructure Subcommittee
Of the
Senate Finance Committee
May 24, 2007

Mr. Chairman, Ranking Member Thomas, and other members of the Subcommittee, thank you very much for the chance to testify about the opportunities associated with combined heat and power (CHP) and recycled energy. My key point is that the nation has an opportunity to lower energy costs and reduce pollution by taking decisive policy action to embrace and reward energy efficiency.

To achieve this goal, I offer two policy recommendations. The first is to have Congress approve an investment tax credit for combined heat and power and waste-energy recovery projects. The more targeted proposal is to provide performance credits that induce energy efficiency of biofuel production facilities. Before discussing those proposals, allow me to briefly review the status quo's inefficiency and the barriers facing clean energy technologies.

The efficiency of today's typical electric power plant is only 33 percent, meaning that large "central station" generators burn three units of fuel to deliver just one unit of electricity, and this has been stagnant since 1960. Much of the wasted energy results from today's centralized utility model in which large generators vent their exhaust heat into the air or water, while other burners are needed at commercial and industrial facilities to produce the heat required for industrial processes and the heating and cooling of buildings. CHP, in contrast, uses one flame to provide both electricity and heat. Put another way, CHP (sometimes known as cogeneration) simultaneously produces useful thermal energy and electricity, achieving efficiencies of 60-90 percent. Indeed, this was the approach taken by Thomas Edison, whose first power plant in Manhattan was 50-percent efficient, almost entirely due to his focus on waste heat recovery. The fact that today's industry is less efficient than the first power plant every built points out the flaws

of our regulatory paradigm, but it also highlights the massive opportunity to lower energy costs and reduce greenhouse gas emissions.

However, the benefits of CHP go beyond simply saving fuel. Because CHP facilities are located close to where power is needed, they help avoid and/or defer investments in new transmission lines, cut line losses, and decrease vulnerability to production outages due to extreme weather, deliverability problems, and terrorism. Analysis done at Carnegie Mellon University has shown that a grid making better use of local power generation would need dramatically less reserve margin, thereby allowing us to serve current power demands with less capital investments.

The U.S. is an international laggard in CHP deployment. Germany, Japan, and China have CHP rates more than twice those in the United States, while Denmark, Netherlands, and Russia are significantly more efficient. Denmark's transition to distributed CHP over the past two decades required no new technologies, but the country simply used smaller applications of the technologies used in central generation and then captured and utilized the wasted energy.

A few U.S. manufacturers have a long history with CHP. The pulp and paper industry, for instance, burns its byproduct wood wastes to produce both electricity and useful steam. Dow Chemical has upgraded its CHP systems to save, compared to a 1994 baseline, 250 trillion BTUs of energy, equal to the annual household energy consumption of New York City or Tokyo. As part of its effort to cut fuel usage and carbon-dioxide emissions, Dow declares that CHP is "significantly more efficient than purchasing power from an outside utility power plant and then separately generating steam."

The potential for capturing wasted energy goes well beyond CHP. The Lawrence Berkeley National Laboratory, in a 2005 report for the U.S. Environmental Protection Agency, examined 19 clean-energy technologies that could produce power from presently wasted energy, ranging from small distributed power systems on farms to large integrated gasifiers at petroleum refineries. In aggregate, these technologies presently generate 10,000 megawatts (MWs) – the approximate output of ten large nuclear plants – but the researchers identified sufficient waste energy for another 96,000 megawatts, enough to provide almost 20 percent of U.S. electricity. This recycling of industrial waste energy would cut carbon dioxide emissions by nearly 400 million metric tons. Fully deploying this total would reduce greenhouse gas emissions from power generation by more than 17 percent **and** reduce total national energy expenditures by a comparable amount, with no reduction in our overall standard of living. Indeed by lowering energy costs, this would put more disposable income in American consumers' pockets. Encourging the greater use of CHP is therefore a GDP-enhancing greenhouse gas reduction strategy.

To understand the substantial potential associated with recycled energy, consider the Mittal Steel facility on the southern tip of Lake Michigan. Occupying several thousand acres of treeless grime, blazing furnaces, and mounds of black coal, the smelter is not where you'd expect signs of an environmental revolution, yet this industrial behemoth is converting its waste heat into

power and demonstrating how energy recycling can tackle the nation's power and greenhouse-gas problems. A long row of 368 ovens that annually produce 1.2 million tons of coke for the blast furnace used to vent the 1,800°F wasted heat into the air. Sixteen heat recovery steam generation boilers now recycle that coke-oven exhaust to produce steam, which powers a 93-megawatt steam turbine generator. The plant also sends roughly 1 million pounds of steam per hour to Mittal's steel plant, eliminating the need to burn natural gas as boiler fuel. This plant annually generates about 770,000 megawatt-hours of clean energy. Combined with the capturing of flare gases at adjacent smelters, such energy recycling in northwest Indiana is producing almost the equivalent of a coal-fired power plant, all without burning any additional fuel or emitting any additional pollution or greenhouse gases. There are two rather remarkable points to make here. The first is that this plant produces fuel-free electricity, as clean as a solar panel but at $1/10^{th}$ the cost. The second is that there are so many other steel plants in the country that could also deploy this technology, but don't.

These points, of course, raise the billion-dollar question: If CHP and energy recycling make such sense, why isn't more being done? The short answer is that local (sometimes called "distributed") generation faces an array of policy barriers created over the past century to advance and protect the centralized model. Our electric regulatory system was crafted in the early part of the 1900s and was quite well designed to electrify the country, but it has become ever more antiquated as technologies have marched forward while the regulatory paradigm has stalled. These outdated regulations now subsidize the most expensive options to serve new power load at the expense of CHP and other energy efficiency measures, and thus they encourage a massive misallocation of private capital.

So what are some of these barriers? Many state public service commissions have approved both fixed and variable backup-power rates that insulate regulated utilities from competition and block the deployment of the most economic ways to serve new load. In 15 states, it is illegal for any company other than the electric utility to sell a kilowatt-hour, effectively preventing the development of an energy outsourcing industry. In every state, it is a felony offense to run a private distribution wire across a public thoroughfare, which causes many clean energy plants to be undersized relative to the total opportunity (since they have no leverage to negotiate a fair price for exported power if the only route to market is through a single company's wire).

A second set of barriers are not explicit per se, but they create an environment that fails to provide full credit to CHP and recycled energy for the system benefits they create. Distributed generation, for instance, reduces the need for transmission and distribution wires, yet it receives no compensation. Doubly efficient CHP that recovers and recycles wasted heat energy also cuts criteria pollutant and greenhouse-gas emissions in half compared to conventional central generation, but it receives no benefit credit under current emissions regulations. (Indeed, efficiency can in some cases be a liability under the input-based emissions standards that are prevalent in most jurisdictions.). Moreover, distributed generation, due to the large number of relatively small units, requires less redundant generation and redundant transmission capacity. The aforementioned Carnegie-Mellon research shows that a system of many local generators with 3-percent to 5-percent redundancy would provide the same system reliability as the current 18-percent

redundancy for large central generators, but local generation again receives no credit for this benefit. This regulatory environment creates a problem familiar to any introductory economics student. The private sector will mobilize rapidly in response to accurate price signals – but if you don't pay for it, they won't come.

Today's playing field, moreover, provides differential advantages to existing or new central generation. Utility rate structures, for instance, guarantee the financial return on all investments in central generation and in the associated wires and transformers, yet distributed generation is not included in rate base and receives no comparable guarantees. The host or third-party power provider bears the total risk of the (much more energy and economically efficient) investment, which makes obtaining capital more expensive or even impossible to obtain. The costs associated with interconnecting central generation plants to the distribution or transmission system also are typically included in rate base and passed on to ratepayers, yet distributed generators pay for the costs to interconnect to the grid.

All of these barriers to efficiency suggest a rather easy prescription for reform. **We need a level playing field.** Unfortunately, 100 years of regulatory precedent is a hard onion to unpeel. That said, there are a few small steps that can be taken to dramatically increase the private sector's deployment of clean, local power technologies. I urge you to approve a 10-percent investment credit for qualified CHP and recycled energy systems up to 50 megawatts. Such a credit would make a crucial difference in the financial feasibility of CHP investments, which would create sizable energy savings, greenhouse gas reductions, job creation, and technology innovation.

Both houses of Congress passed a CHP investment tax credit during the 2005 EPACT process, but the provision was cut in the final conference report, largely because of an inaccurate cost assessment by Treasury. A recent scoring by the Joint Committee on Taxation corrects the prior assessment and highlights the reasonableness of a CHP credit in light of its efficiency, economic, and environmental benefits. I hope the Senate will endorse a bipartisan House provision, H.R. 2001, introduced by Reps. Inslee (D-WA) and Terry (R-NE).

A more targeted incentive – one that induces energy efficiency at biofuel production facilities – also would provide substantial benefits. The Senate Energy and Natural Resources Committee, as you know Mr. Chairman, recently passed a provision to encourage biofuel production. Adding to that provision a performance tax credit for CHP would allow the nation to make even more progress toward energy independence as well as ensure vast improvements in the efficiency of ethanol and biofuel production. If done correctly, biofuel facilities could become the sites of clean base-load electricity generation. Such increased energy efficiency would reduce costs for biofuel producers, cut pollution, increase ethanol's net energy savings, and provide revenue and jobs in rural areas.

If the biofuel industry optimizes its energy islands – its steam and electricity production facilities – it would increase the net fossil savings per gallon of biofuel by 25 percent to

310 percent compared to the lowest-first-cost approach. These gains would destroy for ever any criticism of ethanol's net energy savings. Lawmakers can induce the building of such high-efficiency biofuel plants by offering a production credit of at least 1.5 cents per kilowatt-hour (kWh) for the electricity these efficient facilities generate. I'd be pleased to offer more detailed legislative language associated with this proposal.

In closing, I urge this committee to use the tax tool to help reduce wasted energy and enhance efficiency. Combined heat and power and recycled energy, if given the chance to compete on a level playing field, will provide substantial rewards.

Testimony of Dan Delurey
Executive Director
Demand Response and Advanced Metering Coalition (DRAM)

Before the Senate Finance Committee
Energy, Natural Resources and Infrastructure Subcommittee

May 24, 2007

My name is Dan Delurey and I am Executive Director of the Demand Response and Advanced Metering Coalition (DRAM). DRAM is the trade association for companies that provide technologies, products and services in the electricity industry segments known as demand response and smart grid. Its members[1] include the leading providers of smart metering systems, communications and control technologies, meter data management systems, smart thermostats and other "smart" equipment. Its members also include companies that use these technologies to provide services, including the provision of "negawatt" blocks of demand response. DRAM welcomes the opportunity to provide testimony to the Energy, Natural Resources and Infrastructure Subcommittee of the Senate Finance Committee on why demand response needs to be included in electricity policy, planning and operations, and to offer comments on how demand response and its enabling technologies, such as smart meters, not only relate to but are in fact necessary for the development of the smart grid.

Our testimony seeks to do several things:

1. Provide a brief explanation as to what demand response is, why it is important to national energy policy, and why it is an important element of a "smart grid".
2. Provide a brief overview and explanation of demand response technologies such as smart meters.
3. Discuss the many and varied benefits that demand response and its enabling technologies deliver to various parties.
4. Discuss specific ways that demand response, smart meters and other smart grid technologies and applications can support energy efficiency and renewable energy and address climate change.
5. Put forth tax policy options that the Congress can consider and act upon to accelerate the deployment of demand response technologies, increase the amount of demand response resources in the national electricity mix, and put the foundation in place for the smart grid.

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[1] DRAM members include Cellnet, Comverge, Echelon, Elster Electricity, eMeter, EnerNOC, EnergySolve, Esco Technologies, Itron, Landis + Gyr, Sensus, Silver Spring Networks, SmartSynch, and Trilliant

What is Demand Response?

Demand response refers to the policy and business area whereby electricity customers reduce or shift their peak demand usage in response to price signals or other types of incentives. At present, the vast majority of electricity customers, and virtually all residential customers, are on rates or prices that have them paying the same unit price for electricity at any time of day and any time of year, no matter how much the cost to produce or deliver electricity fluctuates as demands on the system rise and fall. These existing "flat" rates do nothing to stem peak electricity usage, which continues to grow unconstrained across the U.S. The lack of any disincentive to on-peak consumption does nothing to address the reliability of the electricity system, which continues to be threatened by the rapid growth in peak demand. When demand response is introduced, and when even a small percentage of customers modify their peak usage, outages can be prevented, overall prices to all customers can be reduced, and customers, utilities and many other stakeholders can reap significant benefits.

For example, in 1999 in California, if only 20% of the state's retail demand had been subject to time-based pricing, and if there had only been a moderate amount of price responsiveness, the state's electricity costs would have been 4%, or $220 million, lower. The following year, in 2000, electricity prices were more than four times as high and the same amount of demand response would have saved California electricity consumers about $2.5 billion – or 12% of the statewide power bill.

In 2001, McKinsey and Company estimated that on a national basis, electricity consumers could potentially realize benefits of $10 to $15 billion per year if demand response programs were employed, with the result being the avoidance of 250 peaking power plants (at 125 MW each) for a total of 31,250 MW and $16 billion in plant costs. These and other estimates of benefit potential were presented to Congress in a Senate-requested Report by the General Accounting Office in 2004.[2] More recently, PJM Interconnection estimated that during the heat wave of August 2006, demand response reduced real-time prices by more than $300 per megawatt-hour during the highest usage hours, estimated to be equivalent to more than $650 million in payments for energy.

More discussion of benefits will be provided in a later section of this testimony.

As with any new field, definitions of demand response are still in development within the policy and business community. One definition that many policy makers have accepted was developed by the non-profit U.S. Demand Response Coordinating Committee (DRCC), a diverse group exclusively dedicated to the development of new content and information on demand response. Its definition is as follows:

> *Providing electricity customers in both retail and wholesale electricity markets with a choice whereby they can respond to dynamic or time-based*

[2] The GAO Report on Electricity Markets: Consumers Could Benefit From Demand Programs, but Challenges Remain, August 2004, is available at http://www.gao.gov/new.items/d04844.pdf.

prices or other types of incentives by reducing and/or shifting usage, particularly during peak periods, such that these demand modifications can address issues such as pricing, reliability, emergency response, and infrastructure planning, operation, and deferral.

An examination of this definition reveals that there are a number of different facets to demand response. While this can make an appreciation of demand response more challenging, it also means that the amount and type of benefits can collectively be very high. Each of these facets will be discussed in the benefits section below, but it is worthwhile to note that key to this definition, and to any definition of demand response, is that it is focused on customers and providing them with new options to manage their energy use and reduce their energy bills.

One more background item is worth noting. Just as energy efficiency was at one point referred to as "energy conservation," early forms of demand response were known as load management. Under that name, a number of utilities have operated successful programs over the years where in return for some incentive, customers allowed utilities to put controls on certain of their appliances and turn those appliances off when peak demands on hot summer days or cold winter days threatened the reliability and integrity of the system. These programs have functioned well in years past and many continue today. The difference between demand response and load management is that new technologies in the area of metering, communications and controls means that many new types of demand response options are available to customers. These options are "smarter" and allow customers to maintain and share control of appliances and equipment or to employ automated controls that can respond to price and other signals. These options also allow other demand response options to be provided such as time-based rates.

Demand Response Technologies

The most ubiquitous demand response and smart grid technology is the meter, and some background on metering can be helpful in understanding demand response, its benefits and how it plays a role in the development of the smart grid.

The vast majority of electricity customers in the U.S. do not have a smart meter on their home or business. (The Federal Energy Regulatory Commission, in its 2006 Report to Congress on Demand Response and Advanced Metering, which was required by EPACT 2005, estimates only 6% have smart meters[3]; the Department of Energy's Assessment of Demand Response Potential, submitted to Congress in February 2006 pursuant to an EPACT requirement also discusses the lack of penetration of smart metering[4]). Many customers still have the basic type of meter that has been in use for decades. This meter has one function—to "count" the units of electricity that the customer consumes and to

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[3] The FERC Report to Congress is available at the following link: http://www.ferc.gov/legal/staff-reports/demand-response.pdf.

[4] The DOE Report to Congress is available at the following link: http://www.oe.energy.gov/documentsandmedia/congress_1252d.pdf

maintain a cumulative total of that usage that at some point is multiplied by the price of that unit to produce a total electricity bill. In a modern society where customers can easily and quickly obtain information about the things they purchase, such meters and the information they provide are anomalies. Customers with basic meters get no informational feedback on how and when they are using electricity or information they can apply to their future electricity purchases. They also are unable to take advantage of any time-differentiated rates or prices that could help them reduce their electricity bill.

A smart metering system does two important things. First, it measures and stores electricity usage in intervals, on at least an hourly basis. This time-based measurement allows time-based pricing and rates to be offered and accepted. Second, the smart meter is part of a communications network that allows the data measured and stored to be collected and retrieved on a timely basis—at least daily—for use by the utility and other parties and for presentation to the customer. This communications network and connectivity with the customers' premise provides other non-demand response benefits to utilities and customers alike, as is described below.

Smart meters are not the only new technologies that enable demand response and that help create the smart grid. "Smart" advances have been made in remote controlled and price-sensitive thermostats and lighting systems that allow these technologies to be utilized in demand response applications. Energy management systems (EMS), formerly only used for energy efficiency purposes, are being made smarter and thus capable of empowering demand response applications. New in-home display devices are available that can transmit information from the meter to the customer in real time. New building automation and management technologies are available that allow optimization of energy use with respect to time of use. New thermal and battery storage systems are available that allow dynamic storage and release in concert with peak demand management. Even automobiles are developing into dynamic storage media in the case of the Plug-In Hybrid Electric Vehicle (PHEV), where the replacement of petroleum with electricity has been shown to have net environmental benefits as well as help optimize grid management.

It is important to note that it is not just the technology but also how it is employed and applied that creates demand response. For example, some demand response companies have a service, or resource-based business model, whereby they contract with utilities to provide a block of demand response (e.g. 10, 20, 30 or even 40 MWs) in the same manner as if they were offering a peaking power plant to the utility. The demand response provider takes on the responsibility for enrolling and aggregating customers and controlling the peak loads of those they enlist so as to create a "negawatt" resource for the utility that is a substitute for additional power generation.

Demand Response and the Smart Grid

It is perhaps intuitive to understand why demand response technologies such as smart metering are an integral part of the Smart Grid. In the context of the smart grid, demand response and its enabling technologies such as smart meters are the place where the smart grid touches the customer. The vision of a smart grid is that of an intelligent, dynamic

"organism" that allows the electricity system to be planned and operated in a way that optimizes all of its components to lower costs, increase reliability and utilize new informational and communications technologies. That vision includes an optimization of not only supply side options but also demand side options, and demand response is the way for demand side resources to effectively and dynamically be engaged.

Viewed another way, given that the smart grid will not arrive in one instant in time or in one fell swoop, smart meters and other related communications and control technologies are, collectively, the building blocks of the smart grid that will provide the foundation upon which the rest of the smart grid will be built. Timely, and in some cases, on-demand information from customers will help smart grid operators better monitor grid conditions and assess potential threats to the reliability and/or security of the electricity system. By providing information, including price signals, to customers, those operators will in turn be able to deploy customer reductions as a resource. Demand response technologies allow information and control over the demand side to be individually addressed yet aggregated into sizable blocks of capacity that will be key to the success of smart grid development. Not only will the deployment of demand response technologies help avoid electricity outages, but also will help utilities and regional operators restore electricity faster than otherwise when outages do occur. In the case of the last major Northeast Blackout, New York State, where a substantial number of demand response technologies are deployed with large customers, was able to use those technologies and customer connections to do a controlled restoration which resulted in power being restored a full day earlier than expected.

Benefits of Demand Response and its Enabling Technologies

Demand response and its enabling technologies offer many different benefits in many different areas. In terms of reliability, a reduction in peak electricity demand reduces the threat of outages. In terms of electricity markets, demand response and its technologies allow dynamic demand reductions to be deployed instead of resorting to additional power production, with the result being lower wholesale prices, which all customers pay one way or the other. Also related to markets, reductions in peak demand serve as a means of mitigating market power of suppliers, which can otherwise occur when demand increases unconstrained during peak periods due to consumers not paying prices anywhere near the cost of producing the electricity during that critical peak period.

In almost all cases, technology is required to enable demand response even if it is only for time-based measurement purposes. In the case of the smart metering system, however, non-demand response benefits are introduced when the technology is deployed for demand response. A good example is grid outage management and restoration. At present, many utilities rely on customers who lose service due to a storm to make a telephone call to let the utility know of the outage. In other cases, utility truck crews drive around to identify which homes and businesses are out. With the communications and connectivity abilities that come with smart metering systems, a utility customer service operator can instantly know when a customer is out and can optimize dispatch of crews to address the situation, increasing the speed and decreasing the cost of restoration.

Other types of benefits in the areas of customer service, outage management, system planning, system operations and security maintenance are possible when demand response technologies are deployed.

Environmental Benefits of Demand Response and the Smart Grid

It is only now beginning to be understood that demand response can make important contributions to addressing climate change and other environmental issues. One way that it does this is by enhancing and reinforcing customer energy efficiency, the accepted cornerstone of emission reduction policies. With demand response and smart grid technologies, customers will get information on their electricity usage that they have never had before and get it in a timely manner such that it acts as feedback to reinforce their energy management efforts. Furthermore, they will have price and rate options that will stimulate them to be more efficient energy consumers. Demand response technologies will be the answer to the question "how can you manage what you cannot measure?" Studies have shown that even where customers are not on time-differentiated rates, they may reduce their electricity usage by 11% just as a result of being more informed and understanding better how and when they are using electricity[5] Other new government-funded research from the United Kingdom, where smart metering is becoming an official part of the Government's climate change strategy, shows that businesses with smart metering achieved a 5% reduction in CO2 emissions and that there was more than double that in identified potential for future savings.[6] Indeed, demand response control and information technologies such as smart meters can be the platform upon which the U.S. moves to an entirely new, more expansive and effective era of energy efficiency.

Demand response technologies and practices will not only lead to greater energy efficiency but also to greater accountability of reductions, something that will be increasingly important under any policy where emissions are constrained and reduction-based offsets are monetized. Indeed, the smart electricity meter, while not an energy efficiency device in and of itself, may prove to be not only a smart meter, but also a green meter, as it helps to not only improve overall energy efficiency but also track and verify energy savings.

In the case of some pollutants such as NOx, time-based emissions (e.g. during hot summer afternoons) can lead to ozone non-attainment. In the case of NOx and ozone, demand response holds out the potential to be a dynamic emissions tool that can be used to reduce power plant emissions precisely when they contribute the most to non-attainment.

Finally, the potential contribution that demand response can make to renewable energy development should be noted. In the case of wind energy, a particular geographic wind

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[5] "The Green Effect – How Demand Response Programs Contribute to Energy Efficiency and Environmental Improvement", Nemtzow, Delurey and King, Public Utilities Fortnightly, March 2007

[6] Advanced Metering for SMEs – Carbon and Cost Savings, Carbon Trust, London, England, www.carbontrust.uk.co

resource may not be available during peak demand periods. By matching that wind resource with demand response during the period that wind is non-available, the wind resource may become more viable. The result is a greater chance that less environmentally friendly resources can be avoided through a combination of wind and demand response.

Tax Policy Considerations

There is presently no policy in the U.S. Tax Code designed to foster the development of demand response and the deployment of smart technologies. Federal tax policy has been used for almost two decades to accelerate and enhance the development and deployment of energy efficiency and renewable energy technologies and activities. Efficiency and Renewable Energy are closer to maturity as a result of this tax policy. These areas obviously still deserve consideration for preferential tax treatment as more of each is needed, but the opportunity now exists for the Congress to provide similar support for important new areas such demand response and the smart grid, i.e. to provide the important lift that tax policy can provide such that the amount of demand response resources is increased, and the deployment of the smart grid happens faster than it otherwise would. By doing so, not only will Congress be expanding and enhancing efficiency and renewable energy as outlined in the previous section of this testimony, but also it will also be delivering the many other benefits that occur in many other areas, as also outlined above. In passing EPACT 2005, the Congress adopted the following policy statement in the Smart Metering provisions of Section 1252 (f):

> *(f) Federal Encouragement of Demand Response Devices- It is the policy of the United States that time-based pricing and other forms of demand response, whereby electricity customers are provided with electricity price signals and the ability to benefit by responding to them, shall be encouraged, the deployment of such technology and devices that enable electricity customers to participate in such pricing and demand response systems shall be facilitated, and unnecessary barriers to demand response participation in energy, capacity and ancillary service markets shall be eliminated. It is further the policy of the United States that the benefits of such demand response that accrue to those not deploying such technology and devices, but who are part of the same regional electricity entity, shall be recognized.*

If this policy goal is to be realized, the Congress must turn its attention to use tax policy to support demand response and smart grid technologies. DRAM offers four recommendations:

> **1. Modify Depreciation**
> Congress should recognize that smart meters represent new, high-technology hardware and software and should be treated as such for tax and regulatory purposes. Currently, electricity meters are depreciated over periods of as much as 20 to 30 years. Depreciation policy should be permanently changed to five

years to bring these new technologies in line with other modern technologies. This policy recommendation was officially endorsed by the National Association of Regulatory Utility Commissioners (NARUC) at its recent meeting; that Resolution can be found as Attachment A to this testimony.

2. Investment Tax Credits

While the smart grid is not all about technology – e.g., it is also about changing the relationship between consumers and their electricity usage and purchasing habits – new smart technologies are key to demand response and the modern grid. Most of these technologies are not ones that will be purchased by or invested in by individual consumers. For example, there is an experienced-based consensus that smart meter deployment is most effectively, economically and rapidly achieved via mass deployment through utility distribution companies (the cost of deployment on an ad hoc consumer-by-consumer basis has been shown to be up to 10 times as high).

Most of the technology investments made to enable demand response and "construct" the smart grid, whether they are by utilities or by other parties, will be capital intensive. Providing appropriate tax incentives such as investment tax credits would support the acceleration of such investments.

3. Reduction Tax Credits

The functionality and capabilities of demand response and smart grid technologies opens up entirely new possibilities for performance-based tax incentives. Unlike traditional energy efficiency, these technologies allow more precision in the measurement and verification of energy reductions. Because of this, Congress should consider putting in place a reduction tax credit (RTC), similar to the production tax credit (PTC) that has allowed the renewable energy industry to gain traction and grow over the past decade. Such a credit would only be granted when reductions are measured and verified using demand response technologies and applications, in recognition of the capabilities of such.

4. National Smart Grid Fund

In total, a considerable capitol investment needs to be made to develop demand response resources and the smart grid. Congress should consider following the example of the many states that have implemented "wires" charges to collectively raise funds for expenditures on energy efficiency and renewable energy. Unfortunately many of these "System Benefit Charge Funds", as they are known, do not allow funds to be spent on demand response and smart grid technologies or activities. That fact, and the fact that much of the development of the smart grid requires a nationally or at least multi-state coordinated effort, means that Congress should consider instituting a National Smart Grid Fund that is enabled via the introduction of an assessment on the transmission system. Even an extremely small "wires charge" of $.0005 per kilowatt-hour, a size that is used with the State Funds, could generate billions of dollars in revenue earmarked for

smart grid investments, yet not be an additional cost burden to any individual consumer.[7]

Conclusion

As with any major endeavor such as the transformation of the nation's electric system into a smart grid, it is important to consider the timing and nature of the transition. In the case of the smart grid, it is easy to always see it as something that is out in the future somewhere, just out of reach. It is easy to see it as something that requires substantial research and development and that can only be accomplished if new technologies, not necessarily yet invented, are developed and made available. Some aspects of the smart grid may indeed meet this future-oriented test. But in the case of demand response, smart meters and other smart technologies and applications, the future is now. These technologies, as with any modern technology, especially in the computer or telecommunications area, will be on a continual path of evolution and will continue to improve over time. Yet those businesses and consumers do not wait for the next great product to be developed before deploying a computer or cell phone so as to capture the many benefits that present technology provides, even while recognizing that new technology will certainly replace what they have at some point. It is important to take this perspective with the smart grid and not in all cases wait for future technology. The threshold to greater demand response and the smart grid is not increased R&D. Demand response and smart technologies are available today which can deliver immediate benefits to utilities, customers, other stakeholders and the nation as a whole. With a greater commitment by state and federal policy makers to deploying these technologies now, expressed through changes to federal tax policy that will accelerate their deployment, the construction of the smart grid can begin now instead of in the future.

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[7] For example, in the case of one New England state with such a charge, the $0.0005 amount per kwh translates into 20 cents per month on the typical bill, representing only 1/3 of 1% of the total monthly bill amount.

Attachment A
Resolution on Smart Metering Adopted by the National Association of Regulatory Utility Commissioners (NARUC) at its February, 2007 Meeting in Washington, DC

WHEREAS, the Energy Policy Act of 2005 amended the state ratemaking provisions of the Public Utilities Regulatory Policies Act of 1978 (PURPA) to require every state regulatory commission to consider and determine whether to adopt a new standard with regard to advanced metering infrastructure (AMI); and

WHEREAS, advanced metering, as defined by FERC, refers to a metering system that records customer consumption hourly or more frequently and that provides daily or more frequent transmittal of measurements over a communication network to a central collection point; and

WHEREAS, the implementation of dynamic pricing, which is facilitated by AMI, can afford consumers the opportunity to better manage their energy consumption and electricity costs through the practice of demand response strategies; and

WHEREAS, effective price-responsive demand requires not only deployment of AMI to a substantial portion of a utility's load, but also implementation of dynamic price structures that reveal to consumers the value of controlling their consumption at specific times; and

WHEREAS, AMI deployment offers numerous potential benefits to consumers, both participants and non-participants, including:

- greater customer control over consumption and electric bills;
- improved metering accuracy and customer service;
- potential for reduced prices during peak periods for all consumers;
- reduced price volatility;
- reduced outage duration; and
- expedited service initiation and restoration.

WHEREAS, the use of AMI may afford significant utility operational cost savings and other benefits, including:

- automation of meter reading;
- outage detection;
- remote connection/disconnection;
- reduced energy theft;
- improved outage restoration;
- improved load research;
- more optimal transformer sizing;
- reduced demand during times of system stress;
- decreased T&D system congestion; and
- reduced reliance on inefficient peaking generators; and

WHEREAS, sound AMI planning and deployment requires the identification of tangible and intangible costs and benefits to a utility system and its customers; and

WHEREAS, AMI will be a critical component of the intelligent grid of the future that will provide many benefits to utilities and consumers; and

Whereas, it is important that AMI allow the free and unimpeded flow and exchange of data and communications to empower the greatest range of technology and customer options to be deployed,

WHEREAS, the deployment of AMI technology may require the removal and disposition of existing meters that are not fully depreciated and may require replacement of, or significant modification to, existing meter reading, communications, and customer billing and information infrastructure; and

WHEREAS, regulated utilities may be discouraged from pursuing demand response opportunities by the prospect of diminished sales and revenues; now, therefore, be it

RESOLVED, that the National Association of Regulatory Utility Commissioners, convened at its February 2007 Winter Meetings in Washington, DC, recommends that commissions seeking to facilitate deployment of AMI technologies consider the following regulatory options:

- pursue an AMI business case analysis, in conjunction with each regulated utility, in order to identify an optimal, cost-effective strategy for deployment of AMI that takes into account both tangible and intangible benefits;
- adopt ratemaking policies that provide utilities with appropriate incentives for reliance upon demand-side resources;
- provide for timely cost recovery of prudently incurred AMI expenditures, including accelerated recovery of investment in existing metering infrastructure, in order to provide cash flow to help finance new AMI deployment; and
- provide depreciation lives for AMI that take into account the speed and nature of change in metering technology; and be it further

RESOLVED, that the Federal tax code with regard to depreciable lives for AMI investments should be amended to reflect the speed and nature of change in metering technology; and be it further

RESOLVED, that NARUC supports movement towards an appropriate level of open architecture and interoperability of AMI to enable cost-effective investments, avoid obsolescence, and increase innovations in technology products.

Energy Efficiency: Can Tax Incentives Reduce Consumption?

Statement of Chris Edwards, Director of Tax Policy Studies, Cato Institute

before the
Senate Committee on Finance,
Subcommittee on Energy, Natural Resources, and Infrastructure

May 24, 2007

Mr. Chairman and members of the committee, thank you for inviting me to testify today regarding energy efficiency and the federal tax code.

Additional tax incentives, such as tax credits, probably could reduce U.S. energy consumption modestly.[1] However, narrow incentives complicate the tax code, create distortions that reduce growth, and move down the slippery slope of widespread social engineering through the tax system.

On the other hand, Congress should reform tax provisions that hinder new investments in energy production and conservation. Current business depreciation rules for energy and conservation investments are unfavorable compared to the rules in other countries. Congress should reform those rules, and it should pursue broader tax reforms to spur more rapid replacement of older structures and equipment with newer, more energy efficient infrastructure throughout the economy.

Investment, Consumption, and the Income Tax

Policymakers have long considered major reforms to the federal tax system. Some favor a broad-based consumption tax, while others favor a broad-based (or Haig-Simons) income tax. The difference between the two is the treatment of savings and investment. Consumption taxes apply one layer of tax to savings and investment, while income taxes apply two layers. The current federal "income tax" is a hybrid between the two systems.

Reforms to move the current tax code toward a consumption-based system dovetail with the goals of those concerned about America's energy future. A consumption tax would limit current consumption, including energy consumption, while removing tax barriers to investment—including investment in energy production, energy technologies, and energy conservation. As discussed below, more favorable depreciation rules would be an important step in a consumption tax direction.

Rising Tax Complexity

The federal tax system has become enormously complicated in recent years. The anti-investment bias and high tax rates under the current system have encouraged the

proliferation of narrow loopholes and special preferences. There seems to be more interest on Capitol Hill these days in creating new tax credits than in simplifying the tax code to provide fair and equal treatment of all taxpayers.

By contrast, during the 1980s there was bipartisan agreement that the tax code should be reformed to have a broad and neutral base with low rates. One congressional leader on tax reform at the time, Richard Gephardt (D-MO), noted in 1985:

> The main argument for tax reform, I believe, is to achieve greater efficiency in the way the tax code works. When Congress gets into the business of figuring out $370 billion of tax breaks a year, the House Ways and Means Committee and the Senate Finance Committee really are put in the business of trying, at least partially, to plan the American economy. . . . I confess that I am not qualified to act as a central planner and I do not know anybody on either committee who is.[2]

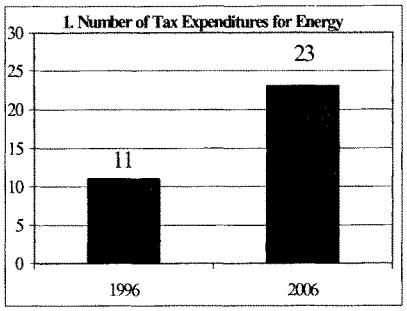
The Reagan administration held similar views about tax reform. The Congressional Research Service noted that the administration

> opposed using the tax law to promote oil and gas development, energy conservation, or the supply of alternative fuels. The idea was to have a more neutral and less distortionary energy tax policy, which economic theory predicts would make energy markets work more efficiently and generate benefits to the general economy.[3]

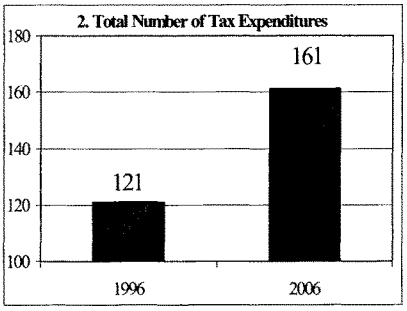
The two parties came together and agreed on the landmark Tax Reform Act of 1986, which ended many narrow tax breaks and reduced rates.[4] Unfortunately, "central planning" through the tax code has come back into vogue since then. The number of pages in the federal tax code, regulations, and related rules has increased from 40,500 in 1995 to 67,204 in 2007, an increase of two-thirds.[5]

The number of narrow provisions, or loopholes, in the tax code is rising. Figures 1 and 2 show the number of "tax expenditures" in the income tax, based on data from the Office of Management and Budget.[6] The number of tax expenditures for energy jumped from 11 to 23 between 1996 and 2006. The total number of tax expenditures increased from 121 in 1996 to 161 in 2006.

There are problems with these measures of tax expenditures. Some items, such as accelerated depreciation, are counted as loopholes under the income tax. But such pro-investment provisions would not be considered loopholes under a consumption tax. Nonetheless, the OMB's tally of tax expenditures shows that Congress is moving away from the ideal of a neutral tax base toward micromanagement of the economy.



Source: Office of Management and Budget.



Source: Office of Management and Budget.

The rising number of narrow provisions in the tax code reduces economic efficiency. Such provisions distort market price and profit signals, which redirects capital and labor into less productive uses. That's why a tax code with a neutral base and low rates is preferable to one with narrow carve-outs and high rates. The economic cost of today's Swiss cheese tax base is large. U.S. output would be substantially higher if the tax base were reformed and effective tax rates across industries were equalized and reduced.[7]

Rising tax code complexity also

- Creates high compliance costs for record keeping, tax filing, and learning tax rules.
- Causes frequent tax filing errors by taxpayers and the Internal Revenue Service.
- Impedes economic decisionmaking by confusing taxpayers. Many taxpayers do not understand the tax rules for education incentives, retirement savings, and other items.[8]
- Promotes an invasion of privacy by the government. With special breaks, such as those for education and energy, the IRS needs to hunt for volumes of added documentation to carry out its enforcement activities.

Going forward, creating new tax incentives for energy and conservation would exacerbate these complexity problems. New tax incentives would add to the paperwork burden, create more errors in tax administration, further confuse economic decisionmaking, and provide further reason for the IRS to dig into personal affairs.

Pandora's Box

Current federal tax incentives for energy and conservation are not large. Total income tax expenditures for these items are valued at just $7 billion in 2007.[9] That represents just 0.3 percent of total federal revenues. Thus, the discussion about tax incentives for energy and conservation is not a discussion about how high federal taxes ought to be.

Instead, the important issue for policymakers is to consider the sort of tax code that America ought to have. Should we have a tax code that treats families and businesses as equally as possible? Or should we have a tax code full of special provisions that treat

people differently as Congress micromanages family and business decisions? I favor the former. After all, equality under the law is a bedrock American principle.

Proponents of tax incentives no doubt think that their favored activities deserve special attention. Many energy and environmental analysts argue that federal tax policies should be used to fix "externalities" in energy markets.[10] But such an approach risks opening a Pandora's box of widespread social engineering through the code.

Many interest groups, such as those promoting education, housing, and scientific research, argue that their favored activities are subject to externalities that need special tax code treatment. But, in theory, there are an endless number of externalities that governments could meddle in. At the risk of promoting bad ideas, tax lobbyists could champion tax credits for

- *Obesity*. This is a serious and growing problem that imposes negative externalities on nonobese Americans through the health system and elsewhere. How about a tax credit for membership costs at Gold's Gym?
- *Neighborhood Beautification*. Neat lawns and abundant greenery create positive externalities for neighborhoods. How about a tax credit for tree planting?
- *Guns*. Some analysts say that if more households owned guns it would reduce crime through deterrence. How about a tax credit for gun ownership because of this safety externality?

I'm not advocating these tax credits, but they illustrate the slippery slope of social engineering if Congress wanted to fix every externality through the tax code. Just this year, the CRS finds that more than 150 bills on energy efficiency and renewable energy have been introduced, with many proposing narrow tax breaks. I hope Congress resists the temptation to create more tax loopholes.

Conservation and Competitive Markets

The Congressional Research Service noted that the "Reagan administration believed that the responsibility for commercializing conservation and alternative energy technologies rested with the private sector and that high oil prices ... would be ample encouragement for the development of alternative energy resources."[11] I think Reagan got it right.

Competitive markets have made a huge contribution toward America's energy security and conservation. Businesses, for example, have powerful market incentives to reduce energy consumption. They are relentless in cutting costs—labor costs, tax costs, production costs, fuel costs, heating costs, cooling costs, and lighting costs. Lower costs mean higher profits. That's why businesses strive continually to improve efficiency, including energy efficiency, particularly in today's competitive global economy.

Market forces are behind huge improvements in U.S. energy efficiency in recent decades. The amount of energy consumed for each unit of gross domestic product has fallen dramatically since the 1970s. Economist Gilbert Metcalf found that if U.S. energy

intensity were still at the level of 1970, the nation would be consuming 187 quadrillion BTUs annually.[12] Instead, the United States consumes just 98 quadrillion BTUs annually, and thus we have cut our energy intensity almost in half since 1970.

Some of this improvement stemmed from the changing structure of the U.S. economy. But Metcalf calculates that at least two-thirds of the improvements since 1970 came from rising energy efficiency. And much, perhaps most, of that I think is due to the natural competitive processes in the economy, not government policy.

Consider the rising energy efficiency of household appliances. Federal efficiency standards for appliances went into effect in 1990, and appliance efficiency has improved since then. But appliance efficiency also improved markedly between the early 1970s and 1990, apparently as a market response to rising electricity prices.[13] The average energy consumption of U.S. refrigerators fell from 1,800 kWh per year in 1974 to just 800 kWh by 1990.

If Congress does not change efficiency standards or enact new tax credits for energy conservation, it seems likely that U.S. energy intensity will continue to fall in coming years due to natural market forces.

What Should Congress Do?

Congress can make tax policy reforms to improve energy efficiency. A first step would be to end any tax provisions that encourage excess energy consumption. A good example are the tax preferences for owner-occupied homes, which some economists think favor the acquisition of particularly large homes.[14] Larger homes need more heating, cooling, and lighting. Thus, one reform would be to combine repeal of the mortgage interest deduction with marginal tax rate cuts.

Another avenue for reform would be to reduce the tax code's bias against capital investment. The income tax encourages current consumption and discourages long-term investment. To fix this bias, Congress should consider more favorable depreciation rules, optimally moving toward immediate expensing of capital purchases. That would remove barriers to all types of investments including those in energy production, alternative fuels, and conservation technologies. The Energy Policy Act of 2005 took some modest steps in this direction, but more could be done.[15]

Policymakers often say that America needs more job-creating investments in computers, automotive plants, transportation, and other activities. Those concerned with energy policy seek greater investment in electricity generation and transmission, oil refining, alternative fuels, pollution control, and conservation technologies. Thus, more favorable tax treatment of capital investment should be a common cause on Capitol Hill.

A new study by Ernst & Young and the American Council for Capital Formation shows that the current tax code stands in the way of energy and energy efficiency investments.[16] The study compared U.S. cost recovery, or depreciation, rules to the rules in 11 other

countries for 11 types of energy investment. Faster write-offs of assets over shorter periods of time reduce effective tax rates on new investment.

The study found that the United States has less favorable tax rules than most other countries for investments in petroleum refining, electricity, pollution control equipment, electricity smart meters, and other items. Here are the results for capital cost recovery after the first five years of an investment:

- Nine of the 11 other countries had more favorable cost recovery for gas and nuclear electricity generation assets than the United States.
- Seven of the 11 other countries had more favorable cost recovery for oil refinery assets.
- Nine of the 11 other countries had more favorable cost recovery for pollution control equipment.
- Ten of the 11 other countries had more favorable cost recovery for electricity smart meters.

Consider electricity smart meters. If a U.S. utility installed these assets, it would take depreciation deductions worth 30 percent of the cost over the first five years. The comparable cost recovery values in other countries are Canada (63 percent), Germany (63 percent), Korea (58 percent), and Malaysia (90 percent).

America's less favorable depreciation rules combined with the industrial world's second-highest corporate tax rate creates a barrier to investment in new and traditional energy technologies. Because Congress is concerned with energy security, conservation, global warming, and high gasoline prices (partly caused by restricted refining capacity), it should focus on removing tax barriers to investment in energy production and energy efficiency.

Congress should consider reinstating the 50 percent capital expensing provisions that were in place in 2003 and 2004.[17] That would spur economic growth while promoting the replacement of all types of older business assets with new, more efficient assets. New machines don't just replace similar old ones, they embody new technologies that increase economic and energy efficiency.

Thank you for holding these important hearings. I look forward to working with the committee on energy tax policy issues.

[1] Kevin Hassett, "The Role of Tax Incentives in Energy Policy," American Enterprise Institute, July 10, 2001. For a history of federal tax incentives, see Chris Edwards, Ada Rousso, Peter Merrill, and Elizabeth Wagner, "Cool Code: Federal Tax Incentives to Mitigate Global Warming," *National Tax Journal* 51, no. 3 (September 1998).
[2] Richard Gephardt, "The Economics and Politics of Tax Reform," *Cato Journal* 5, no. 2 (Fall 1985): 458.
[3] Salvatore Lazzari, "Energy Tax Policy: History and Current Issues," Congressional Research Service, July 28, 2006, p. 5.
[4] However, the 1986 Act had numerous anti-savings and anti-investment provisions.
[5] This page count is based on CCH data. See Chris Edwards, "Income Tax Rife with Complexity and Inefficiency," Cato Institute Tax & Budget Bulletin no. 33, April 2006.
[6] *Budget of the U.S. Government: FY2008, Analytical Perspectives*, p. 291.
[7] The literature is summarized in Chris Edwards, "Options for Tax Reform," Cato Institute Policy Analysis no. 536, February 24, 2005.
[8] CCH, "*CompleteTax* Survey Suggests Taxpayers Confused by Tax Code Complexity," March 16, 2005.
[9] *Budget of the U.S. Government: FY2008, Analytical Perspectives*, p. 291.
[10] For background on the history and purposes of federal energy policy, see Gilbert Metcalf, "Federal Tax Policy Towards Energy," National Bureau of Economic Research, Working Paper no. 12568, October 2006.
[11] Salvatore Lazzari, "Energy Tax Policy: History and Current Issues," Congressional Research Service, July 28, 2006, p. 5.
[12] Gilbert Metcalf, "Energy Conservation in the United States: Understanding Its Role in Climate Policy," National Bureau of Economic Research, Working Paper no. 12272, May 2006, p. 2. See also International Energy Agency, "The Experience with Energy Efficiency Policies and Programs in IEA Countries," August 2005.
[13] Ronald Sutherland, "The High Costs of Federal Energy Efficiency Standards for Residential Appliances," Cato Institute Policy Analysis no. 504, December 23, 2003, p. 5.
[14] The homeowner tax preference results from the combination of the mortgage interest deduction and the exemption from taxable income of imputed rent on homes.
[15] For a discussion of the 2005 law and background on the depreciation of energy assets, see Gilbert Metcalf, "Federal Tax Policy Towards Energy," National Bureau of Economic Research, Working Paper no. 12568, October 2006.
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Testimony of
Douglas Smith
President
NanoPore Incorporated

Before the Subcommittee on Energy,
Natural Resources and Infrastructure
Committee on Finance
U.S. Senate

May 24, 2007

Mr. Chairman and Members of the Committee thank you for inviting me to testify before you today on the subject of improved energy efficiency in refrigeration and cold storage. Although NanoPore is developing a range of energy savings technology for concepts such as air conditioning using waste heat for automotive and housing, the topic that we are very passionate about is energy production via the application of advanced thermal superinsulation.

We strongly believe that the lowest cost form of new generation capacity comes from increasing the efficiency of existing products. In particular, retrofitting insulation to applications originally designed in the era of low cost energy and ignoring the environmental impact of energy use. Although not as sexy as new ways to produce energy, retrofitting older, energy intensive applications has the potential for demonstrating similar energy savings in a much shorter time period and at greater economic and environmental savings to society.

The history of thermal insulation has followed a 30-40 year technology cycle. In the 60's, we saw the widespread adoption of polymer foams such as polyurethane and expanded polystyrene. These materials, produced from petroleum, offered a 30 to 50% improvement in thermal performance as compared to fiberglass. However, they were historically produced with blowing agents with ozone-depletion potential that leached out over time leading to lower thermal performance and the release of the blowing agent to the atmosphere. With the Montreal Protocol, blowing agents were replaced resulting in lower thermal performance and performance still degrades with time as volatile organic compounds are released to the atmosphere. Before foams, fiberglass was (and for many applications, still is), the thermal insulation of choice. Before fiberglass, there was asbestos, cork, dried seaweed, and wadded newspaper. Of course, the problems with asbestos are now well-known but its legacy has been a thermal insulation industry in this country which has seen very limited innovation in the last two decades.

The main advances in thermal insulation occurred in the late 80's as General Electric and Whirlpool demonstrated the commercial use of silica vacuum insulation panels in

domestic refrigerators. These panels offered thermal performance approximately four times better than foams and were used in many refrigerators as part of a DOE-sponsored rebate program. Since the early 90's, NanoPore has doubled the thermal performance of this type of superinsulation and with improvements in vacuum packaging technology, we are now selling our superinsulation to a wide range of customers from packaging for shipping drugs to hiking boots. However, rarely is our customer using superinsulation for energy savings but rather for some other benefit, ranging from reduced shipping cost to personal comfort.

So if we produce thermal superinsulation that is at least seven times better than foams and twelve times better than fiberglass, why are customers not using it to save energy? The main reasons include:

1) Just as with solar and wind energy, the production of advanced insulation is in its infancy and the cost of our insulation has only begun to decrease significantly;
2) Advanced thermal insulation adds to the capital cost of an item that must be depreciated over time whereas higher energy costs can be immediately deducted (i.e., our own tax code argues against the use of insulation);
3) Society is not aware of energy efficiency to nearly the same level as they are of renewable energy, and;
4) Most customers paying for the insulation are not reaping the economic benefits of energy savings.

Residential construction provides a good example of the current forces that work to discourage maximum efficiency. If it was not for building codes, most houses would have minimal thermal insulation. The builder and consumer want to keep the house price low, the energy consumption of the house is low on a consumer's list when purchasing because we are not used to thinking about energy, and we don't have a good comparison of energy expenses while shopping for houses. How many houses have a yellow tag showing the annual utility bill like a refrigerator now does?

I suppose that some would say that market forces should govern the use of better thermal insulation and, if the return on investment is adequate, the market will drive the implementation of new technology. My favorite response to this statement is to direct our attention to the hot water heaters we have in our homes. How many of us have gone to Home Depot or Lowe's to buy a insulation blanket for your hot water heater? If our heater is electric, the investment pays for itself in months, not years.

There are a number of large applications where the use of superinsulation can yield dramatic energy savings, namely refrigerated trucking, cold storage, vending machines, and home refrigeration.

- Refrigerated trucking is a perfect example of an area in which a small investment in technology can yield great savings. There are over 200,000 reefer trailers on US highways that use, on average, over 2,000 gallons of diesel per year just for the cooling unit. The addition of thin superinsulation to either retrofit the 200,000 existing trailers or in the 40,000 new trailers built every year would save

approximately 1,000 gallons of diesel per year per trailer. The trailer operator would have to invest $7,000 to $10,000 in capital which must be depreciated over a number of years to save the 1,000 gallons of diesel per year.

The only risk to the operator is that diesel prices decrease, yet this is ***the*** barrier to the large capital investment of better insulation today -- not the higher operating cost of using more diesel fuel. Of course, the operator also sees no economic benefit to the reduced emissions from the potential reduction of burning over a hundred million gallons of diesel per year.

- Cold storage is another area ripe for investment. In the United States, there is approximately six billion cubic feet of cold storage space which ranges from small walk-in cooler and freezers in local restaurants to very large facilities that support the import and export of fresh and frozen food. Energy costs are typically the number two operating cost at these facilities and many were built decades ago during the years of low energy cost. Retrofitting the cold storage industry with only a ¼" thick layer of superinsulation could save almost 2,000 MW of generation capacity (several very large generation plants).

- Beverage vending machines are a perfect example of how there is often disconnect between the person who pays for the insulation and the person who pays the energy bill. Most vending machines are owned by large beverage/ice cream companies and loaned to the location where the machine is placed. The store/office/university must pay the energy cost. There are approximately 2 million vending machines in this country and the retrofit application of a ¼" thick superinsulation would save over 500 MW of energy. This energy savings does not account for the knock-on effect that when energy is being expended inside a building, there is an additional energy load on the HVAC system. Although reducing the energy consumption of new vending machines is an important step, retrofitting older machines with lower efficiency will bring even greater benefit in reduced energy consumption and its associated environmental impact. However, for the vending machine operator, the payback time for better insulation may be longer than the remaining service life of an older vending machine.

- Household refrigeration can also be made much more energy efficient at relatively low cost. In the United States, there are over eight million domestic refrigerators produced every year. Although the efficiency of domestic refrigerators has improved dramatically as a result of energy policy over the last 20 years, the selective use of superinsulation in fridges could lead to another 20-30% improvement in energy performance. As a result of the large number of fridges, the energy savings are dramatic. As with vending machines, the energy efficiency of a refrigerator goes beyond the fridge itself because it affects the house HVAC energy consumption.

The insulation technology we have developed at NanoPore offers benefits beyond the first tier energy savings. It also represents an improvement in manufacturing technology.

The production of conventional thermal insulation is energy intensive, often produced from petroleum, and causes recycling/disposal problems. In comparison, superinsulation is produced primarily from silica and is completely recyclable. In addition, and perhaps just as importantly, both the superinsulation and silica raw material are produced in the United States.

As with any new and growing industry, the expansion of production and supplier capacity depends upon market certainty. Energy costs are not predictable and although most of us think that energy prices will continue to rise, many of us are not willing to bet large amounts of capital that energy prices will stay at current levels for the foreseeable future. In the same way that government policies around the world have served to jumpstart the solar and wind energy generation industries, the growth of the superinsulation industry and its suppliers will be enhanced by some means of government encouragement. Unlike many energy savings programs where strict metrics may be used for incentives, superinsulation can be used in a wide range of applications so we believe that the best way to encourage its use is via an investment tax credit to the customer.

I would like to thank you for the invitation to speak today and I hope that the information provided will be useful.

Statement of the National Electrical Manufacturers Association

Before the

Senate Finance Subcommittee on Energy, Natural Resources, & Infrastructure

"Energy Efficiency: Can Tax Incentives Reduce Consumption?"

May 24, 2007

Chairman Bingaman, Ranking Member Thomas, and Members of the Subcommittee:

On behalf of the National Electrical Manufacturers Association (NEMA), I am Stuart Thorn, President & CEO of Southwire Company and a member of the NEMA Board of Governors. NEMA is the leading trade association in the U.S. advancing the interests of 430 electrical manufacturers of a wide array of electroindustry products used in utility, industrial, commercial, institutional, medical imaging, and residential applications.

NEMA companies are actively engaged in the research, development, manufacturing and promotion of a wide range of energy efficient technologies and products, including lighting, electric motors, wire and cable, and utility distribution equipment. While a vast array of energy efficient technologies exists, their use in the marketplace is limited. What we strive for is wider recognition, deployment, and use of today's state-of-the-art products and technologies, and support for emerging technologies.

We appreciate this opportunity to testify on energy efficiency tax incentives that would complement S.1321, the Energy Savings Act of 2007, favorably reported out of the Senate Committee on Energy and Natural Resources recently. Since the early stages of development of

federal energy efficiency provisions that became part of the original Energy Policy and Conservation Act (EPCA) in the 1970's, and amendments promulgated as technologies advanced, NEMA has participated with congressional, agency, and nongovernmental organizations in the development of effective and workable energy efficiency standards for our members' products.

Under present law, there are certain tax credits to promote energy efficiency, including credits for individuals who make their existing homes more energy efficient by buying an energy efficient central air conditioner or heat pump, furnace or boiler, windows, or insulation and sealing materials. Other current energy efficiency incentives include a tax deduction for either retrofitting existing commercial buildings with highly efficient systems or constructing efficient commercial buildings from the ground up.

In the commercial sector, NEMA worked with Congress during the development of the Energy Policy Act of 2005 (EPAct 2005) to promote a number of energy efficiency provisions. The Commercial Building Tax Deduction (EPAct 2005 Section 1331) is the first tax code provision that provides incentives for energy efficient commercial buildings. For the reasons discussed in detail below, we are urging that Congress enact extensions to the commercial building tax deduction to provide a reasonable time horizon for potential builders and investors to avail themselves of the incentives. The process for planning, construction, and delivery of more energy efficient commercial buildings is a multiyear undertaking. NEMA believes that period available for this incentive must be extended to provide a meaningful window for developers to undertake more energy efficient construction in significant numbers of projects, so as to provide a meaningful contribution to improved commercial building energy efficiency on a national scale. We are also

proposing a complementary new tax incentive for more efficient outdoor lighting through the use of accelerated depreciation

In the industrial sector, NEMA worked with the American Council for an Energy Efficient Economy (ACEEE) over recent months to develop a new tax incentive proposal to accelerate adoption of premium efficient electric motors.

In the electrical utility sector, we are proposing to accelerate depreciation schedules for certain more efficient electric transmission, distribution, and metering equipment that would be placed in service by electric utilities so as to promote transformation of the Nation's electric grid into a more energy efficient one.

Extending the Commercial Building Tax Deduction

Each year, about two billion square feet of new commercial building construction, and two billion square feet of commercial building lighting retrofitting occur in the United States. Section 1331 of EPAct 2005 provided for a $1.80 per square foot whole building, or $0.60 per square foot system (heating, ventilating, or air-conditioning; building envelope; or interior lighting) tax deduction to promote energy efficiency.

NEMA has developed two websites, www.efficienctbuildings.org and www.lightingtaxdeduction.org, to help manufacturers, distributors, lighting designers, contractors, and building owners understand the provision. We have also made over 20 presentations to over 1500 participants on the provision, with a major emphasis on lighting. We have been asked for help by numerous stakeholders and continue to respond to requests daily. During this effort we have

received abundant feedback from people wanting to use the provision. Our experience leads us to make the following judgments.

This current incentive has been instrumental in increasing the energy efficiency of lighting retrofits in existing buildings. However, the provision, as currently interpreted by IRS, is unlikely to be used for retrofits other than lighting, for government-owned buildings, or to encourage on-site renewable electric generation, which were all intended by Congress in EPAct 2005. In order to be effective, the deduction amount should be restored to the originally proposed $2.25 per square foot, and the provision should be extended to 2014. Field experience has shown that $2.25 per foot is needed to fully incent energy efficiency investment. Moreover, the current expiration date makes the effective period of such short duration that it effectively precludes the use of the incentive for new buildings, due to multi-year planning, design, and construction timelines for new construction. A one-year extension of the provision through December 31, 2008 passed Congress in late 2006. While helpful in the interim, the duration of the provision should be extended to 2014 so investments, especially in new buildings, will occur. Additionally, the IRS has yet to issue guidance on government-owned buildings, or on on-site renewable electrical generation. Treasury's schedule for promulgating implementing regulations in these areas remains uncertain.

Consequently, provisions in addition to extending the expiration date and increasing the amount back to $2.25 are needed. These additional proposed changes are based on lessons that we and others in the energy efficiency business have learned. For example, by adding well-recognized national certifier qualifications, quality certification can be enhanced and designs for a nationwide market (for example, retail chains) can be facilitated. Congressional action can both reduce the chances of IRS misinterpretation, and speed up the implementation of the tax provisions already a

part of EPAct 2005. For whole buildings to meet the 50% energy reduction target, on-site generation will likely be needed in many cases.

One beneficial effect of the tax deduction is to increase awareness of the energy savings value of lighting retrofits (indeed, the major financial benefits are the energy cost savings, not the tax savings). Anecdotal feedback indicates that taxpayers are attempting to qualify millions of square feet of lighting retrofits for the commercial buildings tax deduction. Although this is impressive, this amount must be compared to the nominal two billion square feet a year of annual retrofits. In order to qualify for the deduction, the retrofit efficiency must be significantly higher than that of typical retrofits. The requirements are energy use below the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE) 90.1-2001 standard and most retrofits are probably saving far more energy than the reduction from 90.1-2001 because the prior designs in the lion share of the cases have been to an earlier energy efficiency code, or no efficiency standard at all. Once a designer has determined how to achieve the tax deduction requirements this becomes a tool in the toolbox for future designs. Besides energy savings we have improved lighting, as well, as the incentive requires that the design meet lighting handbook requirements. These are true market transformation impacts, and fulfill the congressional intent of imbedding higher efficiency levels into normal practice.

Premium Energy Efficient Electric Motors

Electric motors consume 65-70% of the electrical energy used in commercial and industrial motor-driven systems, such as pumps, fans, and compressors. As a consequence, increases in motor efficiency translate to significant energy savings for industrial and manufacturing facilities.

NEMA has worked with ACEEE to develop a tax proposal to address this issue. We estimate the savings attributable to the NEMA-ACEEE joint recommendations to be 8 billion kilowatt hours by 2030, with a net energy savings to consumers of almost $500 million.

NEMA developed the first standard and levels for an "energy efficient" electric motor in 1987, which were included in the Energy Policy Act of 1992. In 2003, NEMA established new "premium efficiency" motor levels and has undertaken a significant marketing and promotion effort for NEMA Premium®. The Energy Savings Act of 2007 now includes an important expansion of electric motors that will be subject to federal efficiency requirements, including adoption of premium efficiency for the bulk of the 1-200 horsepower general-purpose motors.

The NEMA-ACEEE proposal provides for a tax credit for the purchase of qualified energy efficient motors that meet or exceed certain energy efficiency standards, subject to limitations. Purchasers of qualified energy efficient motors would be allowed a credit in an amount equal to $15 per horsepower of qualified energy efficient motors placed in service by the taxpayer during the taxable year. The tax credit would be part of the general business credit and is time-limited to 3 years after date of legislative enactment to coincide with the effective date of proposed new federal energy efficiency standards for these motors.

In addition, the aggregate amount of credit that a taxpayer may claim for any taxable year shall not exceed $1,250,000. For this purpose, taxpayers treated as a common employer under section 52(a) and (b) or section 414 (m) or (o) generally would be treated as one taxpayer.

The Secretary of the Treasury would be instructed to provide rules that would simplify the administration of the credit. These rules would require manufacturers comply with existing 10 CFR Part 431 motor test, labeling, and lab accreditation rules to certify that motors meet or exceed the

efficiency standards required for the credit and provide information necessary to determine the credit. Such information should include the manufacturer's name, address and compliance number, as well as the motor's serial number, horsepower, and date of purchase.

If enacted, an incentive electric motor replacement program is estimated to achieve substantial savings as early as 2010, as well as greatly expand the scope of motors covered by enhanced energy efficiency standards. The proposal would measurably decrease the demand for electricity, having the direct, measurable environmental benefit of reducing 80,000 metric tons of carbon over the life of each new NEMA premium efficiency motor. The tax incentive would make the purchase of the most highly efficient motors more cost-effective to industrial and commercial users and therefore more attractive than extending the useful life of a much less energy efficient motor with a "business-as-usual" repair of such older motor.

Accelerated Depreciation for Certain Utility Transmission, Distribution, and Metering Equipment

The EPAct 2005 tax incentives included a tax life reduction for transmission assets used at 69 kV or more from 20 to 15 years. We support broadening the same tax life reduction for lower voltage transmission, as well as distribution assets to increase system reliability, reduce congestion charges, and increase energy efficiency in the grid. Advanced metering is a technology that enables energy savings and peak load reduction. A consumer must be able to measure energy use along with the time of such energy use to tie energy production costs to energy prices. If customers pay on the basis of time-based costs to the energy supplier, they will use less energy when the grid is stretched and production costs are high. Since advanced metering is largely an 'information technology'

product, the tax life should be reduced from 20 to 5 years, which is more in line with the advanced metering technology life.

EPAct 2005 dealt with a number of issues intended to increase investment in high voltage transmission in order to deal with well-recognized reliability concerns and transmission congestion charges. For example, Congress reduced the depreciation period for electrical transmission equipment such as large power transformers. Over the six quarters since the depreciation period was cut from 20 to 15 years, investment in large power transformers has more than doubled, with much of the growth occurring in the last year. By comparison, over the one-year period prior to the change in the depreciation rate, investment in large power transformers increased by barely two percent.

However, lower voltage (less than 69 kV) transmission and distribution property were not addressed in EPAct 2005. From the perspective of the utility customer, most outages are related to distribution problems. Therefore, distribution needs to be addressed. As the states are responsible for regulating distribution, many of the remedies at the Federal Energy Regulatory Commission (FERC) provided by EPAct 2005 are unavailable for distribution. Tax incentives have proven to be an effective response. [An issue not widely known is that the cost of materials that go into electrical products, for example, aluminum, copper, and electrical steel has doubled or tripled in the past three or four years as international demand has grown. Therefore, the seemingly significant (50 percent) increase in transmission investment in dollars in the last year may still be well below the need in systems capacity expansion required, and distribution investments would be similarly impacted.]

Faster tax depreciation can help us move toward the 'smart grid'. For example, automation of distribution substations is an important element in reducing costs and improving reliability.

Distributed generation is most often connected to the distribution system (or, in the case of large industrial facilities medium voltage transmission), so the new 15 year distribution (and less than 69 kV transmission) asset tax life would also help incent more distributed generation.

Many electric transmission and distribution system assets in the U.S. are at or near the end of their design lives. The 15-year tax life would help reduce the cost of component replacement with new more efficient products. For example, low voltage dry-type distribution transformers have national efficiency standards effective January 1, 2007 and medium voltage units are scheduled to have standards promulgated in September 2007; the shorter tax life would encourage replacement of old units with new efficient units rather than refurbishment to the original less efficient specifications.

Reducing the depreciation period provides additional capital resources for investment in modernizing and increasing the systems capacity. This also reduces electricity rates for customers.

A comparison of capital cost recovery for electrical distribution lines in the U.S. versus other trading partner nations shows that in five years the other nations have recovered far most of the initial cost (American Council for Capital Formation *International Comparison of Depreciation Rules and Tax Rates for Selected Energy Investments*, May 2007). Consequently, improved capital cost recovery can also have trade implications.

Tax Incentive for Efficient Outdoor Lighting

Many experts believe that it would be sound energy-efficiency policy to adopt a tax incentive for efficient outdoor lighting similar to the incentive that exists for indoor lighting pursuant to the commercial buildings tax deduction of Section 1331 of the EPAct 2005. The

ASHRAE 2001 standard referenced in the EPAct 2005 commercial buildings tax deduction does not include most outdoor lighting applications. However, ASHRAE's more recent 2004 standard adds these applications making an outdoor lighting tax provision practical and appropriate. Since retrofits for outdoor lighting would be very expensive, the measure would likely only be applied to new construction. As with the EPAct 2005 commercial buildings provision, this provision would reach significantly beyond the most recent codes and standards, maximizing energy savings and minimizing those who might be eligible for a tax deduction without installing higher efficiency equipment.

The approach NEMA favors is to decrease the depreciable life of the efficient outdoor equipment to three years. The affected equipment would be required to achieve efficiency 30 percent below ASHRAE 90.1-2004 lighting power densities, or achieve 90.1-2004 lighting power densities with additional controls, to save the same amount of energy. In addition, as in the EPAct 2005 indoor lighting provision, minimum requirements for calculated outdoor lighting levels as set forth in the Illuminating Engineering Society of North America Lighting Handbook, Performance and Application, Ninth Edition (2000) must be satisfied, assuring quality lighting performance.

Conclusions

NEMA believes that, if adopted, these tax incentives in the commercial, industrial, and utility sectors will materially enhance the Nation's productivity in the years to come. Specifically:

- Extend the effective date of the Energy-Efficient Commercial Building Tax Deduction and adopt clarifying provisions based on lessons learned since the enactment of EPAct 2005.
- Support new purchaser credits for premium efficient electric motors which complement proposed efficiency standards
- Support accelerated depreciation for electric utility distribution equipment and advanced metering
- Support a performance-based tax incentive for energy efficient outdoor lighting.

NEMA commends the Subcommittee for considering tax incentives and their critical role in accelerating the deployment and installation of energy efficient technologies.

COMMUNICATIONS

Statement of William Prindle,
Acting Executive Director
American Council for an Energy-Efficient Economy (ACEEE)

Submitted to the Senate Finance Committee

Hearing Entitled:
Energy Efficiency: Can Tax Incentives Reduce Consumption?

May 24, 2007

Summary

Energy efficiency is the "first fuel" in America's race for a clean and secure energy future. While energy efficiency can be highly cost effective, it faces significant market barriers in realizing its full potential of meeting our nation's future energy needs. Appropriate tax incentives—combined with appropriate regulatory and policy signals—can help to overcome these hurdles. ACEEE feels that it is appropriate for the Federal Government to consider providing these incentives to level the playing field.

In particular, ACEEE supports the enactment of the following provisions:

- The tax provisions in the *Extend Act* (S. 822)
- The CHP investment tax credit as introduced in *Industrial Cogeneration Act of 2007* (H.R. 2001)
- A tax credit for the purchase of *NEMA Premium*™ electric motors as proposed by ACEEE and the National Electrical Manufacturers' Association (NEMA)
- A tax credit for producers of extra-high efficiency appliances as proposed in S. 1101
- Extension and refinement of the tax credit for the purchase of hybrid heavy-duty vehicles
- Expansion of the number of vehicles eligible for the tax credit for the purchase of hybrid light-duty vehicles
- A feebate on the purchase of light-duty vehicles to encourage the purchase of energy-efficient models

These provisions, combined with the regulatory and policy energy efficiency provisions in the *Renewable Fuels, Consumer Protection, and Energy Efficiency Act of 2007* (S. 1419) currently under consideration in the Senate, send an important and meaningful signal to the country that it is time to get serious about energy efficiency.

Introduction

The tax code can provide effective incentives for energy efficiency investments. Many of the measures we recommend the committee consider for inclusion complement current or pending federal legislation. In addition, these provisions can be leveraged by existing programs on the state and local government level as well as by various voluntary programs, making these incentives even more effective.

EXTEND the Energy Efficiency Incentives Act of 2007

ACEEE supports the extension of energy efficiency tax incentives as proposed in *EXTEND the Energy Efficiency Incentives Act of 2007* (S. 822) introduced by Sen. Snowe. These incentives are already proving effective in the marketplace, and their extension and refinement will allow them to have even greater effect as awareness of these incentives increases in the marketplace.

CHP Investment Tax Credit

Combined heat and power (CHP), also know as cogeneration, has been an important contributor to industrial energy efficiency over the past 25 years thanks to a renewed interest sparked by the *Public Utility Regulatory Policies Act of 1978* (PURPA). Interest in CHP was renewed in the late 1990s as the U.S. DOE and EPA both undertook efforts to promote expanded implementation as part of the *CHP Challenge*, which set a target of doubling the installed base of CHP by 2010. Our country appears to be on track to achieve this goal, in no small part due to the programs that DOE and EPA have administered over the past decade. While the achievements have been significant, analysis by ACEEE suggests that we are only part of the way toward achieving the energy and carbon savings available from this energy efficiency resource, and we need an expanded effort to realize the full potential of this low cost resource. One of the challenges has been that market barriers have created costs for potential CHP developers and owners that have discouraged them from making an investment in CHP, especially for those with systems that are smaller than 50 megawatts. These smaller systems tend to have somewhat higher equipment and operating costs than do larger systems, making their economics less attractive. In addition, the cost of interconnecting with electric utilities and interacting with air quality regulators represents a higher fraction of the total project cost for these facilities.

ACEEE has long advocated for an investment tax credit (ITC) to help offset the higher costs associated with smaller CHP systems. An ITC was initially proposed in 1998 as part of comprehensive energy legislation, and has been considered in every Congress since. Representative Jay Inslee has introduced a revised version in his *Industrial Cogeneration Act of 2007* (H.R. 2001). The bill would provide a 10 percent investment tax credit for new CHP facilities placed in service before January 1, 2011 with an electric capacity of up to 50 megawatts. We encourage the Finance Committee to include this CHP provision among its recommendations for energy efficiency incentives.

Premium Motor Purchase Incentive

Electric motors are responsible for more than half of the electricity consumed in the U.S., and more than two-thirds of industrial electricity consumption. The U.S. has been a global leader in enacting industrial motor minimum efficiency performance standards with the provision included in the *Energy Policy Act of 1992* (EPAct-92). The *Renewable Fuels, Consumer Protection, and Energy Efficiency Act of 2007* (S. 1419) proposes to raise the minimum efficiency levels for the motors covered by EPAct-92 to the *NEMA Premium*™ efficiency level, and to establish standards for many motors not covered by EPAct-92. This standards agreement was negotiated between ACEEE and the National Electrical Manufacturers' Association (NEMA). These standards will continue our nation's global leadership on motor efficiency.

Unfortunately, the ability of minimum efficiency standards for new motors to achieve rapid energy savings is limited, because only one-in-five industrial motor decisions result in the purchase of a new motor. In most cases, motors are repaired and returned to service. Since a motor can last well over 20 years, and is typically repaired several times, the penetration of premium efficiency motors

into the population is a slow process. With new minimum efficiency standards going into effect three years after enactment of the legislation, this issue is further complicated by motor purchasers who may buy non-compliant product in advance of the effective date of the standard or repair motors that they would otherwise have replaced.

To counter these two market trends and the accelerate the market shift to *NEMA Premium*™ motors, ACEEE and NEMA are proposing that Congress enact a tax credit for the purchase of qualified energy efficient motors of 1-500 horsepower. Purchasers of qualified energy-efficient motors would be allowed a credit in an amount equal to $15 per horsepower of qualified motors placed in service by the taxpayer during the taxable year. The tax credit would be part of the general business credit. In addition, the aggregate amount of credit that a taxpayer may claim for any taxable year would be limited to $1,250,000.

We believe that this purchaser tax credit would accelerate the adoption of this energy-saving product in the marketplace, and because of motors' long service life, result in substantial energy and carbon savings over the life of the motors. The tax credit would also complement existing voluntary motor efficiency programs run by states and electric utilities across the country, which can use their incentives to leverage the tax credits to transform the motor marketplace in their service territory and help shift motor decisions from repairing inefficient motors to purchasing new energy-efficient products.

Tax Credit for the Manufacture of Energy Efficient Appliances

Earlier this month, major home appliance manufacturers, their trade organization, and a nationwide coalition of energy and water efficiency supporters announced a historic agreement that will establish new mandatory federal energy and water efficiency standards, recommend new *Energy Star* levels, and support manufacturer tax credits for the production of super-efficient clothes washers, dishwashers, refrigerators, and dehumidifiers. This agreement continues a decade of progress in consensus agreements on home appliances. Just seven years ago, ACEEE and others negotiated a major increase in clothes washer standards that took affect this year. The new agreement shows that substantial further progress is possible.

Taken together, minimum national standards, *Energy Star*, and production tax credits can be powerful tools to achieve significant savings of electricity, natural gas, and potable water supplies throughout the country. Minimum standards set the floor of allowable performance, while *Energy Star* and tax credits aid premium efficiency products to enter the market at a faster rate. Subsequent revisions of minimum standards are likely to be influenced positively by the higher levels of more efficient products that result from *Energy Star* and tax incentives.

S. 1101 establishes a schedule of tax credits for production of high-efficiency appliances that links the dollar amount of the credit with the energy-saving performance of the appliance. Only production in excess of a two-year running average would be eligible for a credit, and credits will only be authorized for production during CY 2008-2010. Thus, these credits should be quite effective at leveraging significant production increases in extra-high efficiency appliances that are

currently available, but occupy only small niches of the market. The provisions of S. 1101 should greatly assist in "mainstreaming" these niche products, driving economies of scale with higher production, and introducing millions of Americans to the next generation of high efficiency appliances. We strongly support the enactment of these provisions.

Tax Credit for the Purchase of Hybrid Heavy-Duty Vehicles

Tax credits for heavy-duty hybrids are in particular need of an extension, because:

i) The credits expire at the end of 2009 (one year earlier than the light-duty credits), and
ii) Heavy-duty hybrids are just now making their way into the market, and manufacturers need to have confidence that prospective buyers will be able to pay the incremental costs.

These vehicles will prove highly cost-effective to users once they are established in the market. A heavy-duty vehicle can use well in excess of 10,000 gallons of fuel per year, so substantial increases in fuel economy bring large dollar savings. We recommend a four-year extension of the heavy-duty hybrid credit to the years 2010-2013.

In addition to the extension of the credit, a large increase in its maximum value is warranted. Unlike light-duty hybrids, heavy-duty hybrids have not yet reached the full production stage. This means that incremental costs are very high—much higher as a percentage of vehicle cost than the incremental cost (as a percent of total cost) of a light-duty hybrid today. We recommend the caps on incremental cost in the existing credits be increased by a factor of three, which would put them much more in line with real-world costs.

It is important to note that, while the light-duty credits aim to move hybrid production into the tens of thousands per manufacturer annually, the aim of the heavy-duty credits would be to incentivize production of vehicles in the *hundreds*. The increase in incremental per-vehicle cost caps suggested above consequently would have modest implications for the total cost to the Treasury.

Tax Credit for the Purchase of Hybrid Light-Duty Vehicles

Per-manufacturer limitations in EPAct-05 on the number of vehicles that can receive credits are keeping light-duty hybrid penetration from increasing as quickly as it could. To address this problem while maintaining a cap on cost, Congress should modify the current tax incentive to allow sales of 60,000 vehicles per manufacturer per vehicle class (rather than 60,000 vehicles of any type per manufacturer) before the phase-out of the credit is triggered. This would promote the development of hybrids across the full spectrum of vehicle classes.

A Feebate for the Purchase of Energy Efficient Light-Duty Vehicles

ACEEE supports enactment of a self-financing fee/rebate program for light-duty vehicles, under which vehicle-purchasers would either receive a rebate or pay a surcharge, depending on the fuel consumption rate of the vehicle purchased relative to the fuel consumption rate of the average

vehicle. Automakers say that buyer interest in fuel economy is limited, even though fuel economy is a key determinant of vehicle satisfaction after purchase. A feebate policy provides an incentive for consumers to consider fuel economy strongly at the time of purchase. Hence feebates would complement manufacturers' efforts to improve fuel economy. They also can substantially increase the fuel savings achieved by higher fuel economy standards.

A variety of design issues arise in the detailed formulation of a feebate policy. ACEEE would be pleased to provide a more detailed discussion of these considerations option should the Committee be interested in pursuing the development of this provision.

Conclusion

ACEEE supports inclusion of energy efficiency provisions in a Senate energy tax bill as a major additional step on the road to a sustainable energy future. We recommend that the committee consider including the provisions we have stated above, and we stand ready to assist the committee in its consideration of these provisions. Thank you for the opportunity to provide this input to the committee's deliberations.

Testimony for the Record by
CURRENT

Hearing on
"Energy Efficiency: Can Tax Incentives Reduce Consumption"
Subcommittee on Energy, Natural Resources and Infrastructure
Committee on Finance
United States Senate
May 24, 2007

Chairman Bingaman, Senator Thomas, and members of the Subcommittee:

CURRENT Group, LLC commends the Subcommittee for focusing on ways that energy tax incentives can reduce energy consumption, and appreciates this opportunity to comment on ways to achieve that important goal.

CURRENT believes that one of the most significant steps that the Congress could take to reduce energy consumption would be to improve efficiencies in energy transmission by providing tax incentives to accelerate the deployment of Smart Grid electric power management technologies.

The Problem
Achieving more efficient use of currently generated power can provide the nation with substantial environmental and economic benefits. Electric power generation produces approximately 40% of total U.S. energy related carbon dioxide emissions. During the next decade, U.S. electric demand will increase 19%, while supply will increase only 6%. Ten to twenty percent of energy now is lost before it reaches the end user. Power saved is better than new power generation because it costs much less and because there is no additional waste, pollutants, or CO2 emissions. The nation can avoid $125 billion in capital spending for additional power generation, save consumers the cost of dealing with power outages, and avoid CO2 emissions by more intelligent use of existing power generation capacity.

These facts, taken together, point to one conclusion: the best and quickest way of meeting future energy demands and managing energy consumption is to empower and incentivize our electric utilities to manage their grids as efficiently as possible in a manner that maximizes energy savings. That means incentivizing deployment

of Smart Grid solutions because true Smart Grids provide the networked intelligence and efficiencies needed to stem those losses and avoid new emissions.

CURRENT's Unique Smart Grid Solution

True Smart Grids require integrated systems of two-way communication allowing real time decisions by both utility and end users. Smart Grid systems are not simply data collection systems relying on new forms of automated meters. The true Smart Grid employs software to collect, analyze and interpret data collected from all along the distribution network, including substations, transformers and end users. The system's communications capability allows utility managers to identify power losses within the system and eliminate those losses as quickly as possible. These interactive features give utilities tools to reduce distribution inefficiencies through services such as automated capacitor bank control, load balancing and phase imbalance correction. Smart Grids also offer the capacity to end users to manage their use of power to shift activities to off peak hours; such management would be automated at the point of use rather than relying on consumers to constantly engage in managing power use. Finally, Smart Grids can easily improve the efficiency of incorporating renewable power sources in a generation portfolio.

Smart Grids are distinguishable from the metering systems already available in today's power markets. Meters which automate data on power use are a step forward but cannot provide the real time improvements to reliability, security, safety and power management available from Smart Grids.

CURRENT's Smart Grid technology enables any electric utility to deploy and manage its electric distribution system in a manner that creates maximum energy efficiency, reliability, safety, and security, thereby benefiting utilities, consumers and the environment. CURRENT provides sensing technology, two-way high-speed communications, 24/7 monitoring and analytic software and related services to provide location-specific, real-time actionable data in an integrated Smart Grid solution. A Smart Grid allows consumers to manage their own electricity usage and enables the electric utility to monitor and control the network, resulting in reduced costs, increased reliability and environmental improvements.

CURRENT already has already begun to deploy Smart Grids in the United States. For example, in Texas, CURRENT is deploying its Smart Grid solution with Oncor Electric Delivery, a subsidiary of TXU Corp., creating an advanced electric distribution infrastructure that will serve approximately two million homes and businesses throughout the Dallas-Fort Worth area and beyond. The CURRENT

solution also is being deployed commercially with Duke Energy, formerly known as Cinergy, in and around Cincinnati, Ohio. The network's robust performance and reliability have created high customer satisfaction. Successful smaller scale systems are deployed in Maryland with Pepco, Southern California Edison (SCE), San Diego Gas & Electric (SDG&E) and the Los Angeles Department of Water and Power (LADWP).

CURRENT was awarded the 2006 Platts' "Global Energy Commercial Technology of the Year" for its technology in relation to emissions reduction, practicality, reliability and overall commercial success, as well as *Red Herring*'s "Top 100 North America."

Accelerated Depreciation Will Incentivize Deployment of Smart Grid

CURRENT urges Congress to provide accelerated depreciation as an incentive to invest in Smart Grid power management communications systems, thereby facilitating more efficient use of today's power resources by utilities and their customers.

To promote swift deployment of Smart Grids, CURRENT recommends a temporary adjustment to MACRS depreciation. Allowing Smart Grid investment property placed in service during the next decade to be depreciated over a three-year period would enhance cash flow for utilities and ease the burden of financing these investments.

Ensuring that the incentives provide true interactive power management capability can be achieved by making the special depreciation available only if the taxpayer meets the following functional and component standards. Specifically, a Smart Grid includes sensors capable of collecting and monitoring data from the substation, transformers, meters and other electric distribution devices along the power lines, all connected through a high speed and low latency communications system and a distributed computing system capable of real time analysis and event prediction. Smart Grids are capable, in real time, of collecting and analyzing power supply and usage data from these devices and from end user devices as well as providing real-time load management. Components of a Smart Grid would include: electronics and related two-way broadband communications transmission facilities installed on the electric distribution network; computer software which provides data collection, analysis and power management capabilities; smart direct load control (DLC) devices; smart meters; smart grid-enabled distribution equipment (including capacitor banks and switches); and fiber and/or wireless backhaul facilities.

Conclusion

Again, we thank the Subcommittee for considering CURRENT's comments today. CURRENT looks forward to working with the Subcommittee to help it, and the Congress, achieve this important goal.

Statement for the Record of the Edison Electric Institute
Before the
Senate Finance Subcommittee on Energy, Natural Resources & Infrastructure
On the Topic of
"Energy Efficiency: Can Tax Incentives Reduce Consumption?"
May 24, 2007

The Edison Electric Institute (EEI) appreciates the opportunity to submit a statement for the record which recommends a number of tax incentives that could be extended or new initiatives that could be undertaken to promote energy efficiency and reduce energy consumption. EEI is the association of U.S. shareholder-owned electric companies. Our members serve 95% of the ultimate customers in the shareholder-owned segment of the industry, and represent approximately 70% of the U.S. electric power industry. We also have as affiliate members more than 65 international electric companies, and as associate members more than 170 industry suppliers and related organizations.

We believe the following tax incentives will help utilities and their customers become more energy efficient and reduce their demand for electricity:

Enhanced Accelerated Depreciation for Advanced Metering Infrastructure

A number of Federal tax incentives have been enacted to help American homes and businesses become more energy efficient. Another measure that will help promote energy efficiency is to increase the penetration of cost effective Advanced Metering Infrastructure (AMI).

AMI consists of the technologies, such as "smart meters" and communication equipment, that provide information to consumers about their usage and, more importantly, provide consumers with a signal that the grid is entering a critical, high-cost or emergency period. Smart meters provide two-way communication of price and consumption information at regular intervals. With this information and other "smart devices," consumers can control their usage and lower their electric bills.

With AMI and proper pricing signals, customers will be paying for energy based on the time of use and actual cost of energy. Reducing energy usage during the most expensive periods will not only provide substantial savings to those who can shift their usage, but also lower the price of energy for those who can't. Moreover, soon many new household appliances will be designed to turn-on or turn-off automatically in response to price signals communicated by a consumer's smart meter. This reduced electricity consumption has the added benefit of helping reduce the need for building new generation facilities.

Unfortunately, slow capital cost recovery is a major barrier for deployment of "smart" meters, which are expensive. Further, electric meters are no longer mechanical devices but are actually a form of "information technology," like computers and

telecommunication equipment. Consequently, the tax life should be reduced from 20 years to 5 years for these sophisticated two-way communication devices. This policy will increase investments in AMI and will lead to the advancement of "smart grid" applications for utilities and more consumer energy efficiency. EEI agrees with the National Electrical Manufacturers Association, the Demand Response and Advanced Metering Coalition and many other groups about the need for this enhanced tax incentive.

Extension of the Production Tax Credit (PTC) for Renewable Sources (IRC Sec. 45)

Since its inception in 1992, the PTC has led to significant development and investment across the United States in renewable energy resources. However, the unpredictable nature of the credit resulting from short-term extensions has prevented the needed investment in infrastructure that would facilitate economies of scale and efficiencies. EEI is in favor of at least a 5-year extension of the placed-in-service date of the PTC for renewable sources.

A short-term placed-in-service deadline has created particular problems for the wind industry. It precludes thoughtful business planning by all of those seeking to develop wind projects, as well as the electric utility industry, which is seeking to increase its use of renewable energy resources in its generation mix. Because many of the best wind resources in the nation are in parts of the country where the transmission system is strained, close coordination for the construction or expansion of transmission is crucial to the ability of the wind industry to meet the placed-in-service requirements of the PTC. Effective planning and construction of transmission facilities is a multi-year process, further highlighting the need for an expanded placed-in-service window.

The PTC assists in furthering the electric utility industry's goals of fuel diversity by making it easier for maturing and promising renewable energy resources to compete in generation markets. An extended PTC also is likely to stimulate the development of new technologies and more efficient devices to convert the raw fuel input into electricity.

Extension of the Solar Investment Tax Credit (IRC Sec. 48) and Removal of the Electric Utility Exclusion

EEI strongly encourages you to (1) extend the Internal Revenue Code section 48 commercial solar investment tax credit (ITC) for a minimum of eight years; and (2) remove the current exclusion in this section that prevents electric utilities from claiming the energy ITC for solar and geothermal projects.

The 30 percent commercial solar property ITC, which is scheduled to expire on December 31, 2008, provides an incentive for the development of commercial solar projects and has spurred new growth in U.S. solar power generation. In order to maintain this potential, it is critical that Congress provide a long-term extension of the 30 percent commercial solar ITC.

Many in the electric utility industry are increasingly hopeful and optimistic about the long-term potential of solar power as an important contributor to our nation's energy generation portfolio. In addition, geothermal energy is currently among the most cost-effective renewable resources. It is particularly abundant in the western states, which have significant potential for additional development. A recent MIT study has estimated the U.S. geothermal resource potential to be much greater and more widespread than previously assumed.[1]

In addition to ensuring the long-term availability of investment tax credits, an obvious way to support increased development of solar and geothermal power in this country is to allow the sector that may have the most to offer toward this goal – electric utilities – to claim the same tax incentive that other businesses claim. Granting electric utilities the ability to directly take advantage of the solar and geothermal investment tax credits by removing the section 48 electric utility exclusion will encourage broader and more efficient development of solar and geothermal power. This will result in more use of these renewable resources and lower costs to consumers.

A long-term extension of the existing commercial solar ITC (eight years or more) and removal of the section 48 electric utility exclusion for solar and geothermal property will provide the market stability necessary in the solar and geothermal sectors to encourage long-term, increased investments, including those by utilities. These changes would help underpin greater development of solar and geothermal power generation in this country.

Energy Efficiency Tax Credits and Deductions (EXTEND Act, S. 822)

Under the Energy Policy Act of 2005, consumers and businesses can make their facilities more energy efficient and receive federal tax credits or deductions.

For homeowners, this means that if they improve their building envelope by installing new insulation, windows, and doors, they can receive a federal tax credit. If they buy high-efficiency appliances or solar energy systems, they can also receive a tax credit.

For businesses, this means that if they improve their lighting, heating, air conditioning, ventilation, water heating, and building envelope, they may be able to qualify for a federal tax deduction of up to $1.80 per square foot. Businesses also qualify for federal tax credits for solar energy systems.

EEI supports the expansion and extension of these tax incentives, and urges that they be improved by extending the end dates, expanding the amount of equipment that qualifies for incentives, and simplifying the procedures so that more homeowners and businesses are able to take advantage of the incentives. Many of the provisions of the EXTEND Act (S. 822 / H.R. 1385) accomplish the goals of making homes and businesses more energy efficient. EEI supports many of the provisions of the EXTEND Act (S. 822 and H.R. 1385), especially the provisions that accomplish the following:

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[1] Massachusetts Institute of Technology, January 22, 2007. *"The Future of Geothermal Energy: The Impact of Enhanced Geothermal Systems (EGS) on the United States in the 21st Century".*

- Extending the period of availability of tax credits to consumers for the purchase of high efficiency appliances, insulation, and windows until 2011.
- Extending the period for commercial buildings to obtain tax deductions through 2012.
- Extending the tax credit for energy-efficient new homes to 2011.
- Permanently removing the current cap of $500 per taxpayer for the purchase of high efficiency appliances, insulation, and windows.
- Increasing the tax incentive for commercial buildings from $1.80 to $2.25 per square foot for total building improvements.
- Simplifying the process by which commercial building owners can obtain the tax deduction.

Reducing Depreciable Lives for Electric Distribution Assets

Electricity is the driving force behind our nation's economy, powering our homes, offices, and industries and enhancing our daily lives. Today, U.S. demand for electricity is at an all-time high. The population and economy are growing, and homes are larger and have more appliances, computers, and electronic equipment than ever before. As a result—despite continued energy-efficiency improvements—electricity consumption is expected to increase at least 40 percent by 2030, according to the Energy Information Administration (EIA).[2]

The need to expand our distribution infrastructure and install new, advanced distribution equipment to better meet current and future demand will require significant investment. Such investment will help reinforce system reliability and enhance energy efficiency. According to a recent study by the *Brattle Group*, if recent investment trends continue, distribution investment will average $14 billion per year over the next 10 years.[3]

Congress should encourage this investment by shortening the depreciable lives of distribution assets—from the current 20 years to 15 years. Reducing the depreciation period of distribution assets generates cash by deferring income tax payments, thereby providing additional capital resources for electric companies to invest in modernizing and increasing the capacity of their distribution systems. The deferral of income tax payments resulting from a reduced depreciation recovery period also reduces the cost of capital, which translates into lower electricity prices for customers.

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[2] U.S. Department of Energy Information Administration, *Annual Energy Outlook 2007*, February, 2007.
[3] *The Brattle Group.* "Why are Electricity Prices Increasing? An Industry-Wide Perspective." Prepared for the Edison Foundation, June 2006, page 64.

Investment in electric distribution facilities—in wires, transformers, substations, and all traditional utility distribution facilities—is needed, first and foremost, to keep pace with growing customer demands. Distribution investment also is needed to replace and modernize our nation's aging distribution grid.

Tax depreciation incentives for electric distribution systems would spur investment needed to make these systems smarter and to provide the platform for integrating advanced end-use devices that would utilize the grid more efficiently and at a lower price. Tax depreciation incentives also would accelerate the development and deployment of high-efficiency distribution transformers, which, in turn, would enhance energy efficiency and benefit the environment.

In fact, the U.S. Department of Energy estimates that once new high-efficiency transformers are phased-in, 26 billion kilowatt-hours of electricity will be saved annually. This is roughly equivalent to the amount of electricity used by 2.3 million U.S. households in 2005. Increased energy efficiency, in turn, will reduce annual emissions from electric power plants by 15 million metric tons, which is about equal to the average annual emissions of 2.7 million automobiles. The high-efficiency transformers are more expensive than the traditional baseline units, and a shortened depreciation period will allow more companies to purchase them.

A modernized and upgraded distribution system would bring a number of benefits to electricity customers nationwide. To realize these benefits, tremendous investment must be made to complete the work. Providing tax incentives in the form of shorter depreciation will reduce the cost of capital for building this grid, which translates into lower electricity prices for customers. Moreover, tax depreciation incentives for electric distribution systems will encourage the more modern grid to be built more rapidly. This will benefit customers who demand increased reliability to run an ever-growing array of electronic devices both at home and in the workplace.

Tax Incentives for Plug-In Hybrid Electric Vehicles

Plug-in hybrid electric vehicles (PHEVs) are the next generation of vehicles that will help our country enter a new era of clean transportation and greater energy independence. These vehicles are environmentally friendly, energy efficient, and use less gasoline than standard vehicles. Several car manufacturers have announced plans to incorporate PHEVs into their fleet.

The most significant hurdle in the commercialization of PHEVs is the development of a workable battery. A research tax credit would promote the development, design, and production of PHEV batteries and other applicable components. A motor vehicles manufacturing credit would assist in the retooling of existing automobile production facilities and would advance PHEV creation or conversion. Tax incentives for businesses that maintain a fleet of vehicles could be provided as a means of "jump-starting" the commercialization and sales of PHEVs. Once these vehicles are available to the public, tax credits for individual consumers would encourage the purchase of these vehicles, and

promote wide-scale acceptance of PHEVs. Further, any effort to promote clean transportation fuels should appropriately recognize the clean, efficient potential of electricity in the transportation fuel mix.

EEI appreciates your consideration of our suggestions of tax incentives that would promote energy efficiency, reduce consumption, and encourage greater investment in renewable energy resources, while at the same time enhancing the operation of the electric utility grid.

NATURAL RESOURCES DEFENSE COUNCIL

Statement of

David B. Goldstein, Ph.D.

Energy Program Director

Natural Resources Defense Council (NRDC)

Before the

United States Senate

Finance Committee

May 24, 2007

I. Introduction

My name is David B. Goldstein and I am Energy Program Director of the Natural Resources Defense Council, a national environmental advocacy organization with over 1.2 million members and activists nationwide. NRDC has been active in developing and advocating an energy strategy that is based on providing energy services at least cost. The strategy offers environmental benefits as well as promoting economic development and the growth of jobs.

The foundation of a least cost strategy is energy efficiency. Energy efficiency means the provision of the same (or better) energy services for lower energy use and cost, substituting more advanced technologies or designs for brute force use of energy resources. Although energy efficiency is defined as providing at least the same level of energy services, in many or all cases, the value of service improvements for efficiency technologies and designs exceeds the energy savings themselves.

Comprehensive studies of least cost energy futures, whether performed by state energy offices, national labs, environmental advocates, or national governments virtually always find that energy efficiency is the dominant new resource by virtue of its lowest cost and its near-universal availability.[i]

And more recent analysis shows that where policies have promoted efficiency aggressively, the remaining efficiency resource grows, because the policies lead to innovation and new technology development.[ii]

II. Energy Efficiency and Climate Stabilization

Energy efficiency is the most important piece of a strategy for minimizing greenhouse gas emissions, and even more important to a strategy that does so in a way that enhances economic prosperity. Not only is efficiency the largest single source of emissions reductions, it is also the only one with large non-environmental benefits.

The direct benefits of efficiency to the consumer outweigh the costs by two to one or better. And the cumulative savings from such measures is worth trillions of dollars to consumers and businesses[iii].

Energy efficiency policies also can reduce energy prices in national and global markets by suppressing demand while not changing supply. The benefits of price reductions for natural gas are nearly as large as the direct benefits of lower energy bills for consumers who invest in efficiency.

But efficiency is beset by an overwhelming array of failures of the market. These failures systematically discourage investments in new technologies throughout the economy, whenever these innovations are a part of something else, rather than the fundamental business of a company. These market failures reduce economic growth and cost the economy jobs.

Well-designed polices can overcome these failures of the market and promote competition and innovation. Such policies are critical to controlling climate change. Without new

technologies in the market, it will be hard to meet climate stabilization goals at a reasonable cost. But with them, we can achieve climate goals at a profit.

There are many policy options for promoting moderately high technologies that are cost effective: mandatory standards at the state or federal level, labeling programs such as Energy Star, managed incentive programs at the state or local level, and marketing programs.

But for advanced technologies—the ones that will make the biggest contribution to solving the climate problem, as well as to economic advancement—are hard to get into widespread commercial use and availability without multi-year, national-scale economic incentives.

So it is critical that the Committee include in its markup the tax incentives for efficiency in the Snowe/Feinstein bill S. 822. This bill, which has broad support from liberals and conservatives, Democrats and Republicans, and a variety of businesses and trade associations as well as environmentalists and other public interest organization, provides an extremely well vetted and experience-based way of introducing new cost-effective technologies for efficiency into widespread use.

The technologies in this bill are at the cutting edge of commercial acceptance. They are practical enough that they can succeed if incentives "prime the pump" for a few years, but are challenging enough that they may never be deployed without the nationally consistent, multi-year commitments to incentives that can only be provided through the tax code.

One simply can't be serious about addressing the problem of climate change—or in worrying about the potential for adverse economic impacts of doing so—without taking advantage of the opportunities for savings-at-a-profit in the provisions of S. 822.

III. Energy Efficiency is the Biggest, Cheapest, and Fastest New Energy Resource Available to the Nation

A. Energy Efficiency is the Biggest GHG Reduction Resource

Both prospective analyses of energy options and retrospective studies of where new energy has come from in jurisdictions that have promoted energy efficiency reach the same conclusions: that energy efficiency is by far the largest available resource. Usually the contribution of efficiency is larger than all other options combined.

An International Energy Agency study that concluded that global emissions could be held constant by 2050 (compared to a business as usual doubling) found that over 50% of the emission savings were due to energy efficiency, 12% to renewables, and 10% to nuclear power[iv]. Yet, despite accounting for the lion's share of the benefits, very little discussion is devoted to efficiency and to the policies needed to achieve it.

The energy efficiency advocacy community's 1992 study *America's Energy Choices* found that greenhouse gas emissions could be cut by 70% in 40 years, when the business as usual projection was for an increase of about 55%. Efficiency alone reduced emissions by 55% compared to business as usual, while renewables increased the reduction to 82%. So efficiency

was more than twice as important as an emissions reduction strategy than renewables and fuel substitution combined. This result occurred despite the fact that efficiency levels were limited to then-current technology, while we now see that where policy has been aggressive, new options are available in 2006 that were not foreseen in 1992.

The costs of the preferred scenario in this study were $2.7 trillion. But the benefits were $5 trillion, and efficiency was responsible for almost all of the net benefit.

Looking retrospectively, California has held its energy electricity consumption per capita constant since 1975, compared to 60% growth for the rest of the country. Considering that the rest of the country was also improving efficiency, this result means that California now derives *more than half of its electricity supply from energy efficiency*. Renewables make up 13% or 14% of what's left.

B. Energy Efficiency is the Cheapest GHG Reduction Resource

While some zero carbon approaches, such as renewable energy are cost-effective today, they offer little purely cost advantage compared to conventional resources. (They do offer other economic advantages such as diversity of energy supply, promotion of U.S. competitiveness, and reduction of import dependence.) Other zero carbon sources, such as nuclear, are substantially more expensive than conventional supply. But efficiency is typically one-third to one-half the cost of conventional energy supply.

Efficiency is based on investments in new technologies, and on better designs that out-perform existing ones. Frequently, these more efficient products have side benefits whose values dwarf even the value of the energy savings.

By promoting efficiency, we encourage innovation and the development of new technologies. Thus, even the potential contributions in studies like that of the IEA underestimate what efficiency can deliver if we really try, and overestimate the costs of expanding the markets for efficiency. For example, the technologies incentivized in S 822 go beyond the level of savings thought possible in the IEA study. For the products in which standards and incentives have been strongest and most consistent, the potential for further increases in efficiency is undiminished. In contrast, in products where little progress has been made, due to failure of energy policy to promote them, the demonstrable potential is smaller.

So efficiency technologies follow a learning curve, in which increased experience leads to improved performance and lower cost.

Renewable energy sources have also exhibited a learning curve effect, which is another reason for supporting them. But they are mostly at least twice the cost of efficiency.

C. Energy Efficiency is the Fastest GHG Reduction Resource

Energy efficiency can be obtained much faster than other resources. For example, the Energy Policy Act of 2005 established tax credits for super efficient air conditioners when it was passed in August 2005. By 2006, in markets where the tax credit was promoted by utilities, 15%

of all air conditioners sold to existing homes were at the efficient level. No other resource could have come on line from a standing start so strongly in one year.

Other incentives for efficient products have achieved their savings with lead times measured in months, not years. Even the slower policy mechanisms for energy efficiency deployment, such as codes and standards, have lead times of only 3-5 years.

IV. Incentives for Energy Efficiency

A. Efficiency Provides the Best Bang for the Buck

Efficiency resources are cheaper than conventional resources as discussed above. But from the point of view of the federal budget, the situation is even better than that. Tax incentives for energy efficiency are leveraged in two different ways.

The first form of leverage is straightforward. Tax incentives such as those in the Snowe/Feinstein Bill (S.822) are designed such that the tax incentive covers typically 30%-50% of the incremental costs of energy efficiency. Thus, each dollar spent by the Treasury is matched by $1-$2 of investment by the private sector.

More importantly, these tax incentives are designed to encourage only the most advanced technologies. Virtually no federal money will be spent on "free riders" because the number of taxpayers achieving these levels of efficiency without these incentives is utterly insignificant. For the commercial buildings tax deduction, for example, a detailed study by the New Buildings Institute could find only 100 buildings nationwide that met the Snowe/Feinstein energy efficiency target[v]. So virtually any taxpayer taking advantage of the incentives is producing new energy savings that would not have occurred otherwise.

More importantly, these incentives, along with the manufacturer tax credits for efficient appliances, are part of a program that has been called *market transformation*. Such a program is an effort to introduce new technologies into the marketplace by making it financially feasible for suppliers to offer them, or viewed alternately, by providing market signals such that consumers will be able to buy or specify them. These products and services are expected to be (and have always turned out to be) cost effective on their own merit. The incentives are merely priming the pump by providing reinforcing market signals that these heightened new levels of efficiency can be produced and sold by suppliers and that a market for them exists so that consumers can demand them.

The tax incentives will greatly ramp up the prevalence of these efficiency measures for the three or four or five years they are in effect, but after the incentives expire, other market interventions and perhaps simply the self-interest of all participants is overwhelmingly likely to provide greater and greater market share for these technologies in the future. Thus, by paying for the first few years of super efficiency, the government is buying higher market shares and infinitely many years into the future of new energy savings.

Perhaps the best example of this sort of market transformation is the "Golden Carrot"™ program of the Super Efficient Refrigerator Program, Inc. (SERP). The utilities participating in SERP offered a contract of up to $30 million to the manufacturer that could offer the greatest

energy savings in mass-produced refrigerators for the least incentive per unit. This contest produced a new generation of refrigerators that saved 30%-40% compared to the already stringent 1993 standards by the mid-1990s.

But the experience in meeting the SERP specifications, both by the winner of the program and by other companies that needed to compete with the winner, produced technologies that were so well-established in industry that they were accepted in a consensus efficiency standard adopted by the Department of Energy effective in 2001.

So, by paying for less than 200,000 refrigerators, the SERP market transformation effort produced a situation in which *over 7 million refrigerators sold every year from 2001 and onward* will meet the efficiency targets of the program. This is the kind of leverage that we can expect from the tax incentives for energy efficiency in buildings and appliances.

B. The Consequences of Better Cost Effectiveness in a Budget-Constrained World

Ideally, Congress should provide economic incentives for any improvements to the energy system that are cost effective or needed for the environment. But this would likely entail a budget far greater than will actually be available. How can we achieve the best environmental and economic result within a budget constraint?

The answer to that is very clear. Congress can get the greatest amount of greenhouse gas emission savings – and also the greatest amount of economic benefits--within a given budget constraint by rank-ordering all of the available options in terms of environmental and economic benefits per dollar of federal money spent, and then picking the cheapest resources first. This economic-based approach is much different from a politically-based approach of "sharing the wealth" among different aspirants to tax incentives. The "sharing the wealth" principle guarantees that every dollar spent on the less cost-effective resources will reduce environmental benefits and economic benefits compared to a scenario that goes with the cheapest buys first.

While NRDC has not done a comprehensive analysis of all the options before this Committee, we feel confident that when such an analysis is done, it will find that the energy efficiency measures for buildings are at the very top of the list.

Therefore, assuming that this result is validated, the efficiency tax incentives should be fully funded and the remaining budget either divided up among other aspirants or increased to cover all meritorious investments.

C. Additional Economic Benefits of Energy Efficiency in the Commercial Sector

While the following may or may not be counted by the Joint Committee on Taxation, the plain economic fact is that tax incentives for energy efficiency in commercial applications, such as the commercial buildings tax deduction in Snowe/Feinstein, *actually raise revenues for the government* rather than decreasing them.

The reason for this is that energy costs in a business are a deductible business expense. A company in the 35% tax bracket that saves $1.00 square foot on in its energy bill (about the amount that it would take to qualify for the commercial buildings tax deduction) finds itself with

that extra dollar no longer being deductible on its corporate income tax return, so the federal government gets $0.35. It is quick to see that a $2.25 tax deduction that produces a $1 annual increase in taxable income will pay back its initial cost to the government in enhanced tax collections within 3 years of the building being placed in service. This effect is so large that we have estimated that by the end of 10 years, the cumulative enhanced revenues from the commercial buildings tax deduction will pay for the entire cost of all the other incentives in the bill. And over 20 years, of course, the effect becomes much larger because of market transformation effects increasing the revenue generation and the fact that the tax deduction sunsets after 5 years.

V. Energy Efficiency Incentives Produce Jobs

Expanding energy efficiency increases jobs in 2 different ways. First, the employment intensity of energy efficiency is similar to that of the rest of the economy. Energy efficiency involves contractor labor in installing efficiency measures in buildings, manufacturing labor in producing the efficiency technologies, and service sector labor in designing more efficient buildings and products. These are similar in labor intensity to the rest of the economy. But energy supply itself has much lower job intensity. Thus, a project that costs a million dollars and saves a million dollar in energy costs over its lifetime will produce an increase in net jobs because the million dollar spent on efficiency is more labor intensive than the million dollar spent on energy.

This effect is enhanced by the fact that all of the energy efficiency measures of the type being discussed here are cost effective. Rather than $1 million of investment in energy efficiency saving a $1 million in energy supply, it saves $2 or $3 million in direct energy costs. The additional savings represents money available to businesses and consumers to either distribute to their shareholders or to spend on other pursuits. This re-spending also produces substantial increases in employment.

Energy efficiency also serves to enhance domestic employment as opposed to foreign jobs. And the new jobs produced are not merely within the United States as a whole, but within communities as they currently exist. So, for example, when new energy efficient homes are constructed, the builders and their contractors offer these services through jobs that are located at the site of the construction. These jobs cannot be outsourced to another region of the United States, much less to a foreign country. When home retrofit projects are initiated, they provide domestic jobs for energy raters who will advise the householder on what the most profitable upgrades are and then will inspect the finished work to assure both the IRS and the resident that the work has been done properly, for contractors and subcontractors who will do the work, and to component suppliers who will sell the insulation, equipment, etc. All of these jobs are domestic.

In contrast, most supply-side resources (with the exception of distributed energy resources such as solar) may or may not offer domestic jobs, but even when they do, the jobs often are located in remote areas where the new employment opportunities may come at the cost of disrupting family lives and establishing unstable (boom and bust) energy development communities.

More broadly, incentives for energy efficiency at the highest levels of technology encourage American businesses to be at the cutting edge of the world in terms of new technologies. These build on American strengths: innovation and the ability to start small businesses that can be competitive and facilitate the development of new companies that can become global leaders.

They increase U.S. competitiveness and promote export markets.

VI. Summary

We urge the Committee to consider the manifold economic as well as environmental benefits of energy efficiency when deciding what energy incentives to offer. We encourage the Committee to support all cost effective, performance-based green energy incentives.

If all worthy efficiency and renewable energy incentives cannot be funded, we urge the Committee to maximize environmental and economic benefits by fully funding the most cost effective proposals first.

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[1] A large number of books and articles documenting the large efficiency potential that can be realized at no cost has been published over the past thirty years. The following is a selection of some of the most convincing:

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Howard Geller, Stephen Bernow, and William Dougherty. Meeting America's Kyoto Protocol Target: Policies and Impacts. American Council for an Energy Efficient Economy, ACEEE Report # E993, 1999.

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Geller, H. *Energy Revolution: Policies for a Sustainable Future.* Island Press, 2003

[ii] Saving Energy, Growing Jobs: How Environmental Protection Promotes Economic Growth, Profitability, Innovation, and Competition. David B. Goldstein. (Point Richmond, California: Bay Tree Publishing, 2007.)

[iii] See the sources in footnote i, especially A. Meyer, H. Geller, D. Lashof, M. B. Zimmerman, P.M. Miller, D. B. Goldstein et al., *America's Energy Choices*, Union of Concerned Scientists, Cambridge, MA (1991).

[iv] "Energy Technology Perspectives—Scenarios and Strategies to 2050." International Energy Agency, 2006.

[v] See http://newbuildings.org/gtf/index.htm

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