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Google.org
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Mr. Chairman and members of the Committee, my name is Dan W. Reicher and I am pleased to testify today on federal policy measures that can enhance investment in clean energy, particularly energy efficiency. I recently joined Google where I serve as Director of Climate Change and Energy Initiatives for the company's new philanthropic venture called Google.org. Google.org has been capitalized with more than $1 billion of Google stock to make investments and advance policy in the areas of climate change and energy, global poverty and global health.

Prior to my position with Google, I was President and Co-Founder of New Energy Capital, a private equity firm funded by the California State Teachers Retirement System and Vantage Point Venture Partners to invest in clean energy projects. New Energy Capital has made equity investments and secured debt financing for ethanol and biodiesel projects, cogeneration facilities, and a biomass power plant. Prior to this position, I was Executive Vice President of Northern Power Systems, the nation's oldest renewable energy company. Northern Power has built almost one thousand energy projects around the world and also developed path-breaking energy technology.

From 1993 to 2001, I served in the Clinton Administration as Assistant Secretary of Energy for Energy Efficiency and Renewable Energy, Department of Energy Chief of Staff and Deputy Chief of Staff, and the Acting Assistant Secretary of Energy for Policy.

Mr. Chairman, we have a broad array of options for addressing the nation's energy challenges, as other witnesses demonstrate in their testimony today. The federal government, through Congressional and Presidential leadership, has a powerful role to play in moving these energy solutions to market. I am honored to share with you my views as an investor, former policymaker and most importantly, as a professional dedicated to ensuring our success in meeting today's energy-related challenges: climate change, national security, economic competitiveness and poverty alleviation.

There are several steps the federal government must take to drive massive private sector investment – measured in the trillions of dollars – that will be required to move the nation toward a more sustainable energy future:

- First, the federal government must put a price on greenhouse gas emissions in order to internalize the costs of climate change and move energy investments toward lower carbon and more efficient technologies.
- Second, we must remove barriers to cleaner and more efficient technologies and establish incentives and standards to move these technologies to market.
- Third, we must significantly increase public funding of research, development and deployment of advanced energy technologies.
- And fourth, the federal government must support fluid, transparent markets to monetize the environmental benefits that these technologies provide. The market needs clear definitions of and ownership rules for renewable energy certificates, carbon offsets, white tags, and other environmental assets created by regulation at the federal and state level.

Energy Efficiency – Our Cheapest, Cleanest and Fastest Energy Option

Today I have been asked to focus my attention on how to spur investment in what many see as our fastest, cheapest and cleanest opportunity to address our energy challenges – energy efficiency. Duke Energy CEO James Rogers has termed energy efficiency our "fifth fuel" and energy efficiency guru Amory Lovins measures it in "Negawatts". The federal government has the power to leverage vastly more private sector investment in energy efficiency thereby dramatically increasing U.S. competitiveness, improving our quality of life, and addressing climate change.

Energy efficiency is the real low-hanging fruit in the US and global economy. From cars and homes to factories and offices, we know how to cost effectively deliver vast quantities of energy savings TODAY. And the exciting fact is that this low hanging fruit grows back. The incandescent light bulb we replace today with a compact fluorescent, we will be able to replace again with an even more efficient bulb in the future. Similarly, we can trade our gas-guzzling SUV today for a more efficient full-featured hybrid gas-electric model. And down the road we will replace the hybrid with an advanced model that runs on ethanol or biodiesel and plugs into the electric grid.

We have made an important transition in this country away from a focus on "energy conservation" and toward the more recent concept of "energy efficiency" (or "energy productivity"). In the era of energy conservation in the 1970's and 1980's we were asked to "do less with less" – to lower the thermostat, turn off the lights, don a sweater and leave the car in the garage. Energy efficiency takes a different approach, offering the opportunity to "do more with less". As McKinsey and Company states in a 2006 report, "By looking merely in terms of shrinking demand, we are in danger of denying opportunities to consumers – particularly those in developing economies who are an increasingly dominant force in global energy-demand growth. Rather than seeking to reduce end-user demand – and thus the level of comfort, convenience and economic welfare demanded by consumers – we should focus on using the benefits of energy most productively."

The main finding of the 2006 McKinsey report is that while energy demand will continue to grow, "there are sufficiently economically viable opportunities for energy-productivity improvements that could keep global energy-demand growth at less than 1 percent per annum – or less than half of the 2.2% average growth to 2020 anticipated in our base-case scenario." According to McKinsey, "Energy-productivity improvements can come either from reducing the energy inputs required to produce the same level of energy services, or from increasing the quality or quantity of economic outputs." The report concludes that globally the largest untapped potential for cost-effective energy productivity gains (>10% Internal Rate of Return) lies in the residential sector (e.g. better building shells and more efficient water heating and lighting), power generation sector (e.g. more efficient power plants and electricity distribution) and industrial sector (e.g. less energy-intensive oil refineries and steel plants).

However, McKinsey concludes that capturing this vast potential will require a significant policy push. McKinsey says, "market-distorting subsidies, information gaps, agency issues, and other market inefficiencies all work against energy productivity. Furthermore, the small share of energy costs for most businesses and consumers reduces end-use response to energy-price signals. Therefore shifting global energy demand from its current rapid growth trajectory will require the removal of existing policy distortions; improving the transparency in the usage of energy; and the selective deployment of energy policies, such as standards."

As we consider this policy dimension we also need to consider how to harness an important and heartening new trend – the unprecedented flow of private capital toward clean energy. Who would have thought even a few years ago that Goldman Sachs, Citigroup, John Hancock Insurance, General Electric, Morgan Stanley, the Carlyle Group, Kleiner Perkins and other titans of Wall Street and Silicon Valley would be major investors in clean energy technologies and projects? In fact, in just the last year we have seen literally billions of dollars invested in companies commercializing advanced energy technologies and tens of billions of dollars invested in building clean energy projects. "CleanTech" has recently become the hottest new area of venture capital investing, while clean energy projects have become an important new element of the project finance world.

At the same time, most of this increasing investment in technologies and projects has been on the supply side involving key technologies like solar, wind, and biofuels. However, little investment has found its way to commercializing or deploying energy efficiency technologies despite their cost-effectiveness and reliability. Explanations for this range from the simple to the arcane: for example, the less "sexy" nature of efficiency technologies, the often more disaggregated nature of their deployment, the greater challenge of financing "savings" measured in Negawatts than production measured in Megawatts, and weaker policy support.

Regarding the last point, aggressive federal policy can make a major difference in the development and deployment of energy technology. In the case of ethanol, for example, Congress has enacted both a significant federal tax credit and major federal mandate

which have helped stimulate massive new investment in production plants as well as new technologies. Energy efficiency has simply not enjoyed this kind of policy support and the investment that it generates. Below I address how federal policy can enhance private sector investment in energy efficiency, as it now supports critical investment in renewable energy.

I should emphasize that by moderating demand growth through energy efficiency, and at the same time increasing clean generation using renewable sources, we can slow and begin to decrease carbon emissions while we work to adopt and implement a comprehensive approach to addressing climate change. Congress should pay careful attention to this complementary strategy involving both energy efficiency and renewable energy as an important down payment on reducing carbon emissions, while it deliberates the more complex issues entailed in enacting and implementing an economy-wide climate policy.

Federal Policies to Increase Investment in Energy Efficiency

There are an array of federal policy instruments that can enhance investment in energy efficiency including standards, tax credits, and RD&D funding.

- *Automobile Fuel Efficiency*

The single most effective energy efficiency policy ever adopted by the federal government is the Corporate Average Fuel Economy requirement (CAFE). Since its adoption in 1975, CAFE has cut U.S. oil consumption by over 1 billion barrels each year. Even with this progress, passenger vehicles today consume approximately 40% of the petroleum in the United States – with the transportation sector projected to generate 89 percent of the growth in petroleum demand through 2020. And the federal government has not significantly strengthened the CAFÉ standards in years, further diminishing their effectiveness. Raising fuel economy performance to 40 mpg over the next 10 years – through revision of the CAFE standards –could alone cut passenger vehicle oil demand by about one-third or 4 million barrels per day by 2020 -- about twice current daily imports from Saudi Arabia and Kuwait.

Existing technologies – hybrid electric automobiles, drive train improvements, lighter weight materials – can today get us to roughly double the mileage of our current passenger fleet. Perhaps the most exciting technological development has been the recent emergence of plug-in hybrids – a technology that will enable us to exceed any fuel economy proposals under consideration at this time. Plug-in hybrids have a more powerful battery than traditional hybrids and are designed to be connected to the electric grid for recharging. This allows the vehicle to cut gasoline use and, if charged at night, use lower cost and cleaner off-peak electricity. These cars can also benefit electric utilities when plugged in during the day by sending power back to the grid to meet peak power needs, thereby supplanting some of the most costly and often most polluting power generation. According to analysts, this benefit to utilities could be worth thousands of

dollars per year per car, a value that could rapidly exceed the incremental cost of the vehicle's more powerful battery if shared with consumers.

By increasing vehicle use of electricity over liquid fuels, we should have an easier time improving the environmental profile of our automotive fleet. This is because lowering emissions from hundreds of power plants will likely be a more rapid and straight forward task than influencing the fuel purchases and driving behavior of millions of individuals. Even charged with electricity from coal dominated parts of our electric grid, a plug-in hybrid is generally cleaner than a gasoline powered car. In addition, plug-in hybrid vehicles enabled to run on biofuels can reduce greenhouse gasoline emissions up to 80%, and oil consumption by as much as two thirds.

The multiple benefits provided by plug-in hybrids call for significant federal actions to move this technology to market as quickly as possible. In addition to controls on greenhouse gas emissions and increased CAFE standards, the federal government can partner with the private sector to address outstanding technological barriers such as battery cost and performance. Even more importantly, the federal government should support deployment of plug-in hybrid vehicles through tax incentives and federal fleet procurement.

- *Energy Efficiency Resource Standard (EERS)*

Just as the Senate has voted in favor of a Renewable Portfolio Standard, it should strongly consider a similar - and highly complementary - mechanism called the Energy Efficiency Resource Standard (EERS). The EERS sets efficiency resource targets for electricity and gas suppliers over the period of 2008-2020. It builds on policies now in place in eight states – California, Texas, Vermont, Connecticut, Nevada, Hawaii, Pennsylvania, and Colorado – designed to cut the growth in electricity demand through energy efficiency. The Texas and Vermont policies have been implemented for several years and have been very successful. Texas utilities, for example, are required to meet 10% of their load growth needs through efficiency programs. Utilities are easily exceeding this target, resulting in current consideration of raising the standard to as high as 50% of load growth. Vermont created an energy efficiency utility that has helped the state in recent years meet more than two thirds of load growth (typically 1.5 to 2% per year) through energy efficiency and the state is on a path to avoid all load growth in the near future.

Under the proposed federal EERS, suppliers are required to obtain energy savings from customer facilities and distributed generation installations in amounts equal to at least 0.75% of base year energy sales for electricity, and 0.50% for natural gas. This requirement is phased in over three years and cumulates during the compliance period. The requirement applies to retail suppliers, be they local distribution utilities or competitive energy suppliers, who sell annually at least 800,000 megawatt hours of electricity or 1 billion cubic feet of natural gas.

Eligible energy savings measures include efficiency improvements to new or existing customer facilities, distributed energy technologies including fuel cells and combined heat and power systems, and recycled energy from a variety of defined commercial and industrial energy applications. Savings are determined using evaluation protocols that can be defined by the Department of Energy (DOE), with state protocols available that the Department can build upon.

Suppliers may obtain and trade credits for energy savings under procedures to be defined by DOE. This will enable suppliers with energy savings beyond the requirements of the standard to sell them to suppliers unable to obtain sufficient savings from their customers within a given compliance period.

The EERS is a compelling complement to a Renewable Portfolio Standard (RPS), which the Senate has passed before and will consider again this year. EERS moderates demand growth so that RPS targets can actually reduce fossil fuel consumption. The RPS provision the Senate supported in 2005 calls for 10% of US electricity generation to be generated from non-hydro renewable energy sources in 2020. However, the Energy Information Administration forecasts electricity demand to grow more than 22% by 2020. Unless we bring down demand growth, the RPS will not likely reduce fossil energy consumption or carbon emissions. The EERS proposal, as analyzed by the American Council for an Energy Efficient Economy would reduce 2020 peak electricity demand by about 10% or about 133,000 MW -- equivalent to almost 450 power plants at 300 MW each. This would bring demand growth down to a level where a 10% RPS could meet all new electricity generation needs. ACEEE also estimates that by 2020, this provision will reduce natural gas needs by about 2 billion cubic feet, reduce CO2 emissions by more than 340 million metric tonnes, and result in cumulative net savings to electricity and natural gas consumers of about $29 billion. Moving to a 15% or 20% RPS level, as proposed in recent bills, would further accelerate the move to a less carbon-intensive electricity system.

These two policies, EERS and RPS, figure prominently in a forthcoming report, prepared by the American Council for an Energy Efficient Economy and the American Council on Renewable Energy and supported by the Rockefeller Brothers Fund, that explores the synergies between energy efficiency and renewable energy. These two energy sources offer a highly complementary approach to managing the challenges of the U.S. power sector in the coming decades.

By moderating demand growth through an EERS and increasing clean generation through an RPS, we can slow and begin to decrease carbon emissions in the utility sector, while we work to adopt and implement a comprehensive cap-and-trade system. Congress should give strong consideration to this EERS-RPS approach as a straightforward down payment on reducing carbon emissions, while it deliberates the more complex issues entailed in enacting and implementing an economy-wide climate policy.

- *Utility Revenue Decoupling*

The recent National Action Plan for Energy Efficiency (http://www.epa.gov/cleanrgy/actionplan/eeactionplan.htm) provides joint recommendations from federal agencies, states, the utility industry and environmental groups regarding energy efficiency. One area of focus in the report is the concept of "revenue decoupling". This approach, first instituted in California, decouples sales from profits, so that electric and gas utilities do not have a disincentive to promote energy efficiency. The current "throughput" incentive (the more electricity or gas a utility sells, the more it earns) is a significant impediment to energy efficiency. As state utility commissions work to advance decoupling, Congress and the Administration (especially FERC and DOE) should consider further incentives to promote energy efficiency. One important federal role would be to promote "best practices" and provide technical assistance to interested parties to facilitate energy efficiency.

- *Tax Credits for Efficient Buildings*

Thanks in part to the efforts of this Committee, the Energy Policy Act of 2005 provided important tax incentives for efficient buildings and equipment, in addition to significant support for renewable energy and other advanced energy technologies. Legislation introduced last year by Senators Snowe and Feinstein, called the EXTEND Act, extends and expands these building-related incentives to enhance investment in energy efficiency. The principal purpose of the bill is to extend the temporary 2005 EPACT tax incentives for a sufficient length of time so that the business community can invest in complying with the significant requirements for the incentives.

Commercial buildings and large residential subdivisions have lead times for planning and construction of 2-4 years, so many businesses will refrain from making investments to qualify for tax incentives if the duration of the incentive is only 2 years. The EXTEND Act provides four years of assured incentives for most situations, and some additional time for projects with particularly long lead times, such as commercial buildings.

The EXTEND Act also makes an important modification to the 2005 EPACT incentives so as to phase out incentives based on the cost incurred in saving or producing energy and replace them with incentives based on the actual performance (measured by on-site ratings for whole buildings and factory ratings for products like air conditioners, furnaces, and water heaters.) The legislation provides a new home retrofit tax incentive for ambitious levels of energy savings that are verified by a third-party rater.

A goal of this bill is to provide a transition from the EPACT 2005 retrofit incentives, which are based partially on cost and partially on performance, to a new system that provides greater financial incentives based on performance. These larger incentives should not cost the Treasury more because the ambitious requirement of a minimum 20

percent savings will effectively eliminate free ridership, which is the problem that caused the current EPACT incentives to be scored as high as they were.

The Snowe-Feinstein bill also extends the applicability of the EPACT incentives so that the entire commercial and residential building sectors are covered. The current EPACT incentives for new homes are limited to owner-occupied properties or high rise buildings. The Snowe-Feinstein bill extends these provisions to rental property and offers incentives whether the owner is an individual taxpayer or a corporation. This extension does not increase costs significantly, but it does provide greater fairness and clearer market signals to builders and equipment manufacturers.

- *Public- Private Partnership on Low Income Weatherization*

Across the nation, poor families often increasingly face the choice between heating and eating as prices for natural gas, heating oil, propane and electricity have skyrocketed and millions of poor Americans have found themselves spending more than one-quarter of their income to run their furnaces, air conditioners and keep the lights on. In a survey of low income families – before the energy price spike in 2005-2006 -- 32% went without medical or dental care, 24% failed to make a rent or mortgage payment, and 22% went without food for at least one day due to energy bills.

Congress continues to debate the traditional fix for this problem: additional funding for the Low Income Home Energy Assistance Program (LIHEAP). But we need to recognize the serious limitations of the roughly $2 billion we spend annually on federal fuel assistance, particularly as Congress considers the Fiscal Year 2008 budget. LIHEAP is essentially a one-shot buy-down of energy bills that covers only a modest percentage of eligible families – an absolutely critical but in no way sufficient answer to the energy woes of the poor. Together, federal and state fuel assistance funds provided less than 10% of the total energy costs for low income households in 2006.

The longer-term answer for the poor is home weatherization. By upgrading a home's furnace, sealing leaky ducts, fixing windows, and adding insulation we can cut energy bills by 20-40% -- for years – and the substantial savings accrue with summer air conditioning as well as winter heating. And by adding energy efficient appliances and lighting the savings are even greater. Replacing a 1970's vintage refrigerator with a new energy efficient model will cut an average home electricity bill by 10-15%. Weatherizing low-income homes also improves comfort, reduces illness, and creates jobs.

Unfortunately, we have taken a penny-wise pound-foolish approach to low-income weatherization with less than $245 million in the 2006 Department of Energy weatherization budget, enough for only about 100,000 U.S. homes. And while the nation has weatherized about 5.5 million low-income homes since 1976, more than 28 million remain eligible. While the Bush Administration has supported increases in the weatherization program in the past, the 2008 budget proposes only $144 million, a cut of about $100 million that will have serious consequences for the nation's poor.

Instead of cutting weatherization funding, the President and Congress should make a national commitment to weatherize at least one million low-income homes each year for the next decade. This program would go a long way toward helping the most vulnerable among us—something the nation pledged it would do after Hurricane Katrina emphasized the extent of American poverty. The price tag for retrofitting 10 million low-income homes is relatively modest – about $2 billion annually when fully implemented.

With such a commitment there would be other benefits that directly address our current energy and environmental challenges. Stresses we are seeing today on the U.S. energy system – from blackouts to natural gas shortages --will be dampened with every additional home weatherized. For example, weatherizing all the low-income homes that heat with natural gas would cut residential U.S. use of this clean-burning fuel by about 5%, dampen its price volatility and reduce the call on federal fuel assistance funds.

The advanced technologies pioneered in the federal low income weatherization program can also be readily applied to the U.S. housing stock at large, with even greater energy savings. One technology developed in the Department of Energy weatherization program uses a pressurization device and a simple infrared sensor to pinpoint leaks down to the size of a nail hole for about $100 per home. With this information insulation can be installed in the right places with the least amount of waste.

As we cut energy demand we also cut air pollution. An Ohio study showed that weatherizing 12,000 homes not only cut the average consumer bill by several hundred dollars each year but overall avoided annual emissions of 100,000 pounds of sulfur dioxide as well as 24,000 tons of carbon dioxide – the primary global warming gas. As Congress and the Administration consider changes to the Clean Air Act and how to address climate change we ought to create an effective way to encourage power plant owners to invest in weatherization and other "downstream" pollution reduction opportunities. This could leverage substantial additional private sector capital for low-income weatherization and avoid the need for new power plants.

More broadly, we believe there are a variety of potential mechanisms to spur private sector investment in weatherization and we are currently exploring these within the financial community. One approach would:

- aggregate thousands of homes eligible for weatherization in a locality
- establish a base-line of energy use as well as associated greenhouse gas and other emissions across the portfolio of homes
- install advanced metering to monitor post-investment savings as well as provide utility load control
- secure federal and state funding as well as carbon off-set, pollution credits, and utility capacity payments
- leverage private sector investment in the aggregated portfolio through a "shared savings" approach or other financial mechanism
- benchmark the investment to enhance replication

There may also be an opportunity to provide an extra incentive or credit in the Energy Efficiency Resource Standard for investment by an electricity or gas supplier in low income home weatherization.

- *State Building Codes*

California has demonstrated the significant efficiency gains that can be achieved through state building codes that are well designed and implemented. Title 24 of the California Code has been the national model, helping the state avoid thousands of Megawatts of new generation capacity. Despite this impressive track record in California, many states have inadequate state building codes or none at all. Section 128 of the 2005 Energy Policy Act authorizes $25 million per year for FY2006-FY2010 ($125 million total) for states that have adopted, and are implementing, both residential and commercial building energy-efficiency codes that meet or exceed specific standards. For states where there is no statewide code, the money will be allocated to local governments that have implemented codes that meet the above standards. Unfortunately, the funding authorized in the 2005 EPACT for state building codes was never appropriated by Congress and therefore this important incentive for adoption of state building codes has not been implemented. Congress should appropriate the funds authorized in the 2005 EPACT.

- *Appliance Efficiency Standards*

One of America's least-heralded energy success stories involves federal appliance efficiency standards. In the last 15 years, Congress and the Department of Energy have set new standards for dozens of products. Refrigerators sold since 2001 in the U.S. use just one-third the energy of comparable models sold in 1980. Home air conditioners are nearly twice as efficient as those sold at the start of the Reagan administration.
Standards in place today will save American families and businesses about $200 billion cumulatively by 2020, cutting electricity demand and carbon emissions substantially. The 16 products in the Energy Policy Act of 2005 will save another $50 billion, and will cut carbon emissions by another 16 million tons in 2020.

Unfortunately, DOE has issued only two new appliance efficiency standards during the tenure of the current Administration. In the settlement of recent litigation brought by states and environmental groups, DOE agreed to issue 22 overdue standards in the next four years. Congress should ensure that DOE has the funds to conduct the necessary analysis, that the Department stays on schedule, and that it adopts rigorous final standards.

Section 124 of EPACT 2005 authorizes a new program to encourage deployment of high efficiency appliances, based on a successful New York program. The program, however, has not been funded. Congress should appropriate the authorized funds.

- *Federal RD&D Funding*

Research and development is essential to supplying the "technology pipeline" we need to provide this century's clean energy solutions. Unfortunately, R&D on energy efficiency, as well as other energy technologies, has been falling. The Bush Administration's 2008 request for efficiency R&D is 18% below the FY 2006 levels, and more than a third lower than the 2002 budget. Total federal spending remains far below the peak of investment that occurred in the 1970s. And the private sector has not yet picked up the slack; efficiency funding in the electricity and gas industries has fallen even faster than federal investment. Some states, like California, Iowa, Wisconsin, and New York, are trying to pick up the slack, but their work is no substitute for federal support. Congress should ensure that adequate funds are appropriated in Fiscal Year 2008 and beyond to advance critical clean energy R&D.

Beyond R&D there are a number of deployment-oriented programs that Congress authorized in EPACT 2005 but has either not funded or has provided insufficient funds. These cut across many areas including buildings, appliances, energy codes, state energy programs, low income programs, public information and education, public buildings, and pilot projects. Also, the loan guarantee program authorized by Congress in EPACT 2005, which could be a significant help in energy efficiency projects, has yet to back any loans. All of these deployment programs help ensure that the technologies developed in the national laboratories or nurtured by federal R&D funding, actually get to the marketplace.

Conclusion

Mr. Chairman and members of the Committee I am confident that a concerted policy push by the federal government, as outlined above, can greatly increase private sector investment in energy efficiency, resulting in many benefits for the nation. I look forward to working with the Senate to develop, enact and implement legislation that will stimulate this much needed investment.