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BUSINESS OPPORTUNITIES IN A LOW-CARBON ENERGY ECONOMY

HEARING

BEFORE THE

SELECT COMMITTEE ON
ENERGY INDEPENDENCE
AND GLOBAL WARMING
HOUSE OF REPRESENTATIVES

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BUSINESS OPPORTUNITIES IN A LOW-CARBON ENERGY ECONOMY

WEDNESDAY, OCTOBER 10, 2007

HOUSE OF REPRESENTATIVES,
SELECT COMMITTEE ON ENERGY INDEPENDENCE
AND GLOBAL WARMING,
Washington, DC.

The committee met, pursuant to call, at 9:39 a.m. in Room 2172, Rayburn House Office Building, Hon. Edward J. Markey [chairman of the committee] presiding.

Present: Representatives Markey, Blumenauer, Inslee, Larson, Herseth Sandlin, Cleaver, McNerney, Sensenbrenner, Shadegg, Walden and Miller.

The CHAIRMAN. If the world is to increase energy security and avoid the worse impacts of global warming, a large-scale transition to a low-carbon energy economy will be necessary. To achieve success, governments, businesses and the public must work together to increase energy efficiency and the use of renewable energy and decrease global warming in ways that maintain economic vitality and create jobs. We must harness the power and creativity of the global economy to meet the global energy challenge.

Business leaders, better known for green eye shades than fondness for granola, are increasingly asking governments around the world to adopt smart long-term policies that ensure the true cost of energy and global warming is fully reflected in economic transactions and capital investment. They are seeking certainty for business decisions but also the opportunity to make a buck.

According to the Stern Review of the Economics of Climate Change, the value of the global environmental market could be $700 billion as soon as 2010 with the adoption of smart policies. Companies are already jockeying to gain the most advantageous position to capitalize on these new opportunities. Rather than a drain on the economy, energy and global warming policies can be a boon.

The European Union has adopted ambitious mandates for increasing energy efficiency and renewable energy use and decreasing global warming pollution. Instead of hindering the EU's economy, it is roaring.

As we have seen both in Europe and the United States, smart regulation drives innovation. In 1975, cars in the United States averaged just 13.5 miles per gallon. Fuel efficiency standards pushed the auto industry to innovate, and the fuel economy of cars rose to the height of 27.5 miles per gallon in 1987.

In the 10 years from 1977 to 1987, U.S. oil imports dropped from 46.5 percent to 27 percent. Rather than build on that progress, efficiency standards have remained untouched for 20 years. Our reliance on imported oil has risen to 60 percent today, and dioxide emissions from the transportation sector now make up a third of total global warming pollution in this country.

After years of stagnation, Congress has an opportunity to move our vehicle fleet into the 21st century by passing a strong 35 miles per gallon fuel economy standard this fall. By 2030, the fuel economy language in the Senate energy bill would reduce American oil consumption by 4 million barrels per day, almost double what we currently import from the Persian Gulf and reduce global warming pollution by more than 350 million tons per year. By passing the energy bill that couples this language with an increase in the renewable fuel standard and establishing a renewable electricity standard, Congress can initiate the transformation of a low-carbon energy economy and make a significant down payment on the reduction of global warming pollution necessary to save the planet.

The United States and the United Kingdom have been described as divided by a common language, but, as we will hear from our witnesses today, business leaders from both countries are united on the need for energy and global warming policies that drive innovation and investment towards the creation of a low-carbon energy economy.

I look forward to their testimony; and I will now recognize the ranking member of the Select Committee, the gentleman from Wisconsin, Mr. Sensenbrenner.

[The statement of Mr. Markey follows:]

Opening Statement for Edward J. Markey (D-MA)
"Business Opportunities in a Low-Carbon Energy Economy"
Select Committee on Energy Independence and Global Warming
October 10, 2007

If the world is to increase energy security and avoid the worst impacts of global warming, a large-scale transition to a low-carbon energy economy will be necessary. To achieve success, governments, businesses and the public must work together to increase energy efficiency and the use of renewable energy and decrease global warming pollution in ways that maintain economic vitality and create jobs. We must harness the power and creativity of the global economy to meet the global energy challenge.

Business leaders, better known for green eye shades than a fondness for granola, are increasingly asking governments around the world to adopt smart, long-term policies that ensure the true cost of energy and global warming is fully reflected in economic transactions and capital investment. They are seeking certainty for business decisions but also the opportunity to make a buck. According to the Stern Review of the Economics of Climate Change, the value of the global environmental market could be $700 billion as soon as 2010 with the adoption of smart policies. Companies are already jockeying to gain the most advantageous position to capitalize on these new opportunities.

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The United States and the United Kingdom have been described as "divided by a common language," but as we will hear from our witnesses today, business leaders from both countries are united on the need for energy and global warming policies that drive innovation and investment towards the creation of a low-carbon energy economy. I look forward to their testimony.

Mr. SENSENBRENNER. Thank you very much, Mr. Chairman.

Global warming is a complicated problem that can't be solved by the United States alone. International partnerships must be an essential part of any global warming policy, and I am pleased that today's hearing will feature the perspective of two CEOs from the United Kingdom who will be able to add some insight from across the pond.

Technology will be another essential part of any essential global warming policy, and all four of today's witnesses will be able to give us more perspective on the technology that holds the best hope of reducing greenhouse gas emissions. Because it is clear that there will be a continued demand for energy from increased economic growth here and around the world, it is clear that the technological breakthroughs are the only real way for countries around the world to continue to meet their energy demands without raising greenhouse gas output.

While today's witnesses may share some views on technology, it seems that there are at least some differences between them. Some investors have different ideas than others about where the future of technology may go. Some consumers will obviously have different ideas about what type of cars they want to drive; and perhaps they won't be the same ideas as government regulators in Washington, London or other parts of the world. I support the development of these new technologies; and I want nothing to stand in their way, especially government mandates.

While I agree with our witnesses that technology needs substantial further development, I am afraid I don't think government mandates will get us there. By picking winners and losers, the government could act to block worthwhile technology development while advancing substandard technology. It is far too early for Congress or any government regulators to begin deciding what technology will be right for our future energy needs.

Another concern I have with mandates is that it will result in economic harm. Technological transitions can benefit the economy, and the Internet is an example of that. However, if government regulations thrust technology into an economy that is not yet ready for it, the results will likely be havoc.

I believe that the free market is powerful enough to sort out the variety of emerging new technologies and integrate them into the economy without hitting our constituents in the wallet.

At the end, we all want to see greenhouse gas reductions, but getting there is not going to be easy. One recent report from a group called Open Europe shows that European-based facilities covered by the EU emissions trading scheme have actually seen an increase in CO_2 emissions by 1 percent. While that is not a tremendous increase, it is certainly not a reduction either; and it goes to show what a difficult task lies ahead.

And nowhere does this task become more difficult than dealing with countries like China and India, whose emissions continue to grow. Already one report puts China's total emissions ahead of the U.S. Countries like China and India will need revolutionary technology of their own in order to slow their emissions growth.

There will be an increasing demand for cutting-edge energy technology in the United States and Europe, Asia and elsewhere

around the world. So there will clearly be business opportunities. I am just concerned that if the government gets into that business, like it has in Europe, the result might not be the ones we expected or hoped to achieve.

I thank the gentleman and yield back the balance of my time.

The CHAIRMAN. The gentleman's time has expired.

The Chair recognizes the gentleman from Oregon, Mr. Blumenauer.

Mr. BLUMENAUER. Thank you, Mr. Chairman.

I am looking forward to the conversation today. The gentlemen that are represented here today are part of what I think is perhaps the single most important element we will be dealing with in climate change and that is the billions of decisions that are made every day by businesses and consumers in our country and around the world. I am interested in being able to explore with them the way that the government can provide a framework to help advance this, to give stability to business, to send a signal about where we are going.

I am pleased to represent a community, Portland, Oregon, where there is a strong commitment to green business initiatives, sustainable development and trying to have a regulatory framework for energy, transportation and housing that helps those pieces work together. I am looking forward to having this conversation here, and I appreciate your scheduling the hearing.

The CHAIRMAN. Thank you. The gentleman's time is expired.

The Chair recognizes the gentleman from Washington State, Mr. Inslee.

Mr. INSLEE. Thank you. I appreciate the witnesses being here.

When you think about this, America does well any time there is a large economic transition, a technological transition. That has been our forte. It is where we have had our growth. When there was a transition to aeronautics, we have done very well. Where there was a transition in the Internet, we have done very well. And now when we go into a transition to other than carbon-based fuels we are going to do very well if—if—the U.S. Congress adopts the free market principles that my friend, Mr. Sensenbrenner, referred to when it comes to the limited capacity of the atmosphere to carry CO_2. And that is why I hope that all of us here will work on a cap-and-trade system that uses the power of the market to drive these technologies forward once there is a price of carbon associated with a, quote, market, a free market on the carrying capacity for CO_2; and I look forward to getting that done.

I just want to note that folks have entered this discussion with fear, and I enter it with amazement at how smart people are. Every time I turn around, there is a new technology. I just got a little BlackBerry about a group called Konarka that is developing a clear, affordable technique for, actually, clear windows. It is just amazing what is going on out there, and I look forward to a way to help these folks move forward.

The CHAIRMAN. The gentleman's time is expired.

The Chair recognizes the gentleman from Connecticut, Mr. Larson.

Mr. LARSON. Thank you, Mr. Chairman.

Mr. Chairman, like the other members, some here on the dais, I look forward to the discussion.

I have a keen interest in fuel cell technology, but also I am interested in the contrast and discussion that exists down here between a cap-and-trade system and a carbon tax and am interested in what the panelists have to say about that in terms of the dynamics, the leverage and how successful they think, for example, European Union's are. And I want to commend the chairman again for his efforts in putting this panel together.

The CHAIRMAN. I thank the gentleman.

The Chair recognizes the gentleman from Missouri, Mr. Cleaver.

Mr. CLEAVER. Thank you, Mr. Chairman. Thank you for calling the hearing.

I would like to express appreciation to our guests for being here. I am particularly excited about your presence because of the advancements that we have seen in the EU and, of course, Chancellor Merkel calling for the need for a global emissions trading system, and I am certainly interested in whether or not you think that is practical and workable.

Of course, the issues that we face here are global because there is no such thing as pollution and greenhouse gases just settling over parts of the world; and so we look forward to your statements and the opportunity to become dialogical.

Thank you.

[The prepared statement of Mr. Cleaver follows:]

U.S. Representative Emanuel Cleaver, II
5th District, Missouri
Statement for the Record
House Select Committee on Energy Independence and Global Warming Hearing
"Business Opportunities in a Low-Carbon Energy Economy"
Wednesday, October 10, 2007

Chairman Markey, Ranking Member Sensenbrenner, other Members of the Select Committee, good afternoon. I would like to welcome our distinguished panel of experts to the hearing today.

For our country and our planet to effectively combat the impacts of global warming, businesses must work with the public to reach energy security and to reduce carbon emissions. Through increased communication through new technology, our economy is becoming more global by the day. In this way, the actions of one country have increasing effects on neighboring countries and on our planet as a whole. For example, the recent settlement by American Electric Power concerning carbon emissions could be a signal of a change in the federal regulation of environmental protection. The lasting impact of such a decision is uncertain, though it certainly brings business into the stage as a vital participant of energy and environment regulation.

Additionally, the variations in international regulations create obstacles for businesses, many of whom operate in an increasingly wide market. Any uncertainty concerning future environmental or energy regulations will undoubtedly influence the actions of the business sector, and these changes should be made when taking in account their effect on business. If we are to be truly successful in fighting global warming, Congress must work with the public and the business sector to form new, effective ideas for changes to current policy and regulations.

I thank the panel for their insight and their suggestions concerning this vital issue as Congress moves ahead with a new national energy and environmental policy.

Thank you.

The CHAIRMAN. Thank you. The gentleman's time is expired.

The Chair recognizes the gentleman from California, Mr. McNerney.

Mr. MCNERNEY. Thank you, Mr. Chairman, for holding this important hearing; and I thank the panelists, some who have come from quite a distance to participate.

This is an important topic because it brings in both the international players and a strong business interest. It is my strong belief that the solutions to global warming will make us more prosperous and sustainable. It will create jobs and enhance international cooperation and understanding. I look at this as an opportunity to be exploited in making this a better world. We here in the United States can learn from Europe's experience and from known business successes.

With that, I look forward to a future of cooperation and understanding; and I yield back the balance of my time.

The CHAIRMAN. I thank the gentleman. The gentleman's time is expired.

The Chair recognizes the gentlelady from Michigan, Mrs. Miller.

Mrs. MILLER. Thank you, Mr. Chairman. I want to thank you for holding this hearing.

I certainly want to thank all the witnesses as well for your attendance today. I am certainly looking forward to listening to you as you share your expertise.

Coming from Michigan, the home of the domestic auto industry, I am interested to hear the testimony regarding the economic impact of legislation on vehicle technology. I do believe that there may be a number of business opportunities in a low-carbon economy.

However, as you might imagine, I am also very concerned by some of the proposals that we should enact legislation to mandate a low-carbon economy. These proposals are making the assumption that the low-carbon technologies exist or will exist in the near future and that, some of these proposals, people would assume that the reason that these technologies have not yet been delivered is because businesses do not choose to develop or integrate them into their business model. And obviously one of the leading examples of this is in the domestic auto industry, constantly suggesting that if CAFE standards were increased or other form of binding legislation were enacted that the automotive industry would just respond with technologies to meet these demands. However, the burden that these regulations would place upon the domestic auto industry could be very severe, particularly at a time when it is well known about the decline that is happening, the economic transition that is happening to the domestic auto industry.

So I would just—as I say, I am very interested to hear about all of the different expertise on this issue. I think it is clear what is happening in other countries around the world where they are investing in R&D and new alternative technologies, et cetera. At the same time, our country really looks to the domestic auto industry to do all of the R&D themselves to work it into their business model and to produce cars that their customers may not be interested in purchasing. So I will be very interested to hear your testimony.

I thank you again, Mr. Chairman.

The CHAIRMAN. I thank the gentlelady. The gentlelady's time is expired.

The Chair recognizes the gentlelady from South Dakota, Ms. Herseth Sandlin.

Ms. HERSETH SANDLIN. Thank you, Mr. Chairman; and thank you for holding this very important hearing.

I look forward to hearing from our witnesses today and exploring with them the business opportunities that do exist based on their experience and insight in a low-carbon energy economy. But, more specifically, in representing a rural district, a farm State, the role that American agriculture and rural America can play in helping find solutions and what the business opportunities are in a low-carbon energy economy in reducing greenhouse gases, what the role of American agriculture can be, whether it be certain farming practices or grazing practices, that relate to participation in a cap-and-trade system, if indeed the United States ultimately adopts one.

So this is an area, whether it is biofuels, wind and solar, carbon storage, I look forward to exploring with our witnesses today; and thank you very much, Mr. Chairman, again for holding this important hearing.

The CHAIRMAN. The gentlelady's time has expired, and all time for opening statements has expired, so we will now turn to our very distinguished panel.

I would first like to recognize Ralph Izzo, who is the Chairman, President and Chief Executive Officer of Public Service Enterprise Group, Incorporated, since April of 2007. This is a company which has electric generating capacity in New Jersey, New York, Pennsylvania, Connecticut, Texas, California, New Hampshire and Hawaii.

He first joined PSEG in 1992 and has served in a number of leadership positions in that company. He is trained as a physicist, and he has also spent time in the offices of Senator Bill Bradley and New Jersey Governor Tom Kean working on science and technology policy.

We welcome you, Mr. Izzo. Whenever you are ready, please begin.

STATEMENT OF RALPH IZZO, CHAIRMAN, PRESIDENT AND CEO, PUBLIC SERVICE ENTERPRISE GROUP INC.

Mr. IZZO. Thank you. Good morning.

Chairman Markey, Ranking Member Sensenbrenner and members of the committee, I am honored to appear before you today on behalf of PSEG.

As the chairman has already told you, PSEG is an energy services company headquartered in New Jersey. But in addition to our regulated utility we own and operate competitive electric generating consisting of coal, natural gas and nuclear power.

We believe that climate change is the preeminent challenge of our time, and with it come significant business opportunities and responsibility. Our company has been a leader in the effort to limit greenhouse gases for more than 15 years. Some of the steps we have taken include being the first utility in the country to sign a pre-Kyoto voluntary greenhouse gas reduction accord. We voluntarily agreed in 2004 to reduce our carbon dioxide emissions by 18

percent from 2000 levels by 2008, and we have been a leading advocate for a national economy-wide cap-and-trade program to reduce greenhouse gas emissions to 1990 levels by 2020 and 80 percent below current levels by 2050. We are also improving the efficiency of our own electric delivery system.

Some initiatives include investing in state-of-the-art distribution cables and energy efficient transformers, using a biodiesel fuel blend in our vehicle fleet and replacing 1,300 cars and light trucks with hybrid electrics and retrofitting 450 bucket trucks with electric drives to power the lifts.

Mr. Chairman, if you ask whether climate policies have influenced our business decisions and whether we think there are significant opportunities for businesses to participate in the climate challenge ahead, the answer is a resounding yes. To do so, PSEG and other companies will need to apply our expertise in new ways to reduce energy demand, spur development of renewable resources and develop carbon-free central station power. In short, we will have to change the way we run our businesses and enter into a new era of collaboration with State and Federal policymakers.

Energy efficiency offers one such opportunity, but it will require a new regulatory compact. These are investments that can be made right now using existing technology. For example, in 1970, a typical refrigerator consumed around 2,000 kilowatt hours of electricity annually. Today, an Energy Star refrigerator of the same size consumes about one-fifth of that amount.

The problem is that customers are not making decisions to invest in energy efficiency opportunities like this refrigerator. Energy utility companies are uniquely positioned to change this dynamic by investing in energy saving appliances and fixtures ourselves and receiving compensation as we do for investing in pipes and wires.

Consider the fact that utilities engage in millions of interactions with customers daily and employ a highly skilled work force that can be engaged to promote efficiency. Also, utilities can make long-term investments and can assure that all customers, especially low-income customers, benefit from energy efficiency.

On the renewable energy front, PSEG has requested State approval to invest $100 million to finance solar projects in New Jersey. PSEG proposes to provide loans to solar developers, making solar energy more accessible and affordable for households and businesses. We are also anxious to explore direct investment in solar energy if Congress enacts a provision in the energy tax package that allows utilities to claim the investment tax credit available to others at present.

Mr. Chairman, I conclude by saying what you already know. For the U.S. to meaningfully address climate change, a uniform national greenhouse gas reduction policy that establishes a market price for carbon is needed. This will drive development of new low-carbon technologies. This should be a single, economy-wide cap-and-trade program and a single greenhouse gas trading market with consistent emissions reduction targets across all States.

Congress should take its cue from the 10-State Regional Greenhouse Gas Initiative and develop a comparable national program that will render regional programs unnecessary. By "comparable"

I mean requirements that are at least as stringent as the so-called Reggie States.

Other key components of a national program should include transition to a Federal allowance auction over a 10-year period and using proceeds to fund research and development and low-income assistance programs. Allocating a portion of allowances at no cost to electric generators based on an updating output-based formula, this approach will spur investment in higher efficiency power plants and provide incentives for investing in advanced low- and zero-carbon technologies.

Mr. Chairman and members of the committee, thank you again for the opportunity to participate in these important hearings. I look forward to your questions.

The CHAIRMAN. Thank you, Mr. Izzo, very much.

[The statement of Mr. Izzo follows:]

Ralph Izzo

Chairman and CEO, Public Service Enterprise Group

U.S. House of Representatives

Select Committee on Energy Independence and Global Warming

October 10, 2007

Chairman Markey, Ranking Member Sensenbrenner, and members of the Committee, I am honored to appear before you today on behalf of Public Service Enterprise Group (PSEG).

PSEG is a diversified energy company with more than $28 billion in assets and more than $12 billion in annual revenues. Our family of companies distributes electric and natural gas energy to more than two million utility customers in New Jersey, and owns and operates approximately 16,000 megawatts (MW) of electric generating capacity in New Jersey, New York, Pennsylvania, Connecticut, Texas, California, New Hampshire, and Hawaii. This is a diverse generating fleet in terms of fuel source and technology and includes about 2,400 MW of coal-fired capacity and almost 3,500 MW of nuclear capacity.

Let me preface my comments by stating that PSEG believes climate change is a real and profound environmental threat and that society's response to this threat represents the

defining issue of our time. In fact, PSEG has been factoring climate change into its business decisions and investments since the 1990s. I highlight below some of the many steps we have or are taking to contribute to a low-carbon future:

- Public Service Electric and Gas company, our New Jersey utility, was the first in the country to sign onto a pre-Kyoto voluntary reduction accord with the Clinton Administration to stabilize greenhouse gas emissions to 1990 levels by 2000. We met this target.

- In 2004, PSEG entered into a new commitment with the Bush Administration to reduce its domestic greenhouse gas emission rate by 18% from 2000 levels. We are on track to meet this commitment by next year, despite increasing total generation output by more than 50%.

- PSEG maintains a comprehensive company-wide greenhouse gas inventory. For over a decade, it has been reporting greenhouse gas emissions to the Department of Energy's Voluntary Greenhouse Gas Reporting program.

- We partnered with the Natural Resources Defense Council and CERES to benchmark power plant emissions of the 100 largest generators in the U.S. to highlight trends and stimulate action.

- PSEG is a Hall of Fame winner of EPA's Wastewise voluntary waste reduction program. The company has been recycling over 90% of its solid waste for more than a decade. Solid waste is a source of greenhouse gas emissions.

- Since 2003, PSEG has been using up to 1.5 million gallons annually of a biodiesel blend in its vehicle fleet. As a result, we have reduced greenhouse gas emissions from diesel vehicles by 20%.

- PSEG is a member of the EPA's voluntary Natural Gas Star program and is making steady progress in reducing leakage throughout its utility's gas delivery system.

- PSEG supports PowerTree Carbon Company, which is currently investing in 6 reforestation projects in the U.S. These projects involve planting 3,600 acres of trees, which are projected to capture and sequester more than 1.6 million tons of CO2 over the project lifetime.

- PSEG is also an equity owner in Clean Air Action Corporation, which is investing in tree plantings in Africa. The program, called TIST, empowers small groups of subsistence farmers in countries such as Tanzania, Kenya, Uganda and India to reverse the devastating effects of deforestation, drought, and famine while capturing and reducing CO2 in the atmosphere. Over 3 million trees have been

planted to date and will result in the sequestration of up to 3 millions tons of CO2 over 30 years.

PSEG recently announced a commitment to further improve the efficiency of our electric delivery system and operations, through the following initiatives:

- PSEG is investing in new, state-of-the-art primary and secondary distribution cables and new energy-efficient transformers. We will be installing approximately 170 miles of new or replacement cables a year. We are already using higher-efficiency transformers that meet the U.S. Department of Energy's recommended 2009 standard, and are on track to invest as early as next year in units that meet the Energy Department's proposed 2013 efficiency standard.

- We are accelerating the transformation of our vehicle fleet by replacing 1,300 cars and light trucks with hybrid electrics. Under this program, we will become one of the first utility companies in the nation to use hybrid electric aerial lifts commonly known as bucket trucks. In addition, we're retrofitting 450 traditional bucket trucks with electric drives to power the lifts.

When fully in place these vehicle fleet and distribution system initiatives will reduce PSEG's carbon footprint by about 150,000 tons a year.

These initiatives show that making investments in carbon reduction can be both good for the environment and good for the bottom line. This is particularly true for utilities if State regulators recognize the importance of carbon reduction and allow investments into rate base.

And yet we recognize that these actions, though significant, represent only a fraction of what needs to be done to move to a low-carbon economy. Charting a path to sustainable growth in a carbon-constrained world will require nothing less than a transformation in how we heat our homes, fuel our vehicles, power our businesses, and farm our land. It will require that we rethink the very way in which we live.

A challenge of this magnitude necessarily creates uncertainties for the affected industries, and that includes the electric sector which is responsible for nearly 40 percent of the nation's greenhouse gas emissions. As I look to the horizon, however, I see business opportunities for energy services companies like PSEG in the areas of energy efficiency, renewable resources, and investment in clean, central station power. I also believe energy utilities are uniquely positioned to help customers participate in the required transformation by helping them make wise energy choices.

A New Regulatory Model for Energy Efficiency and Renewable Technologies

PSEG believes that energy efficiency should be the "first fuel" for meeting energy requirements in a carbon-constrained world. Indeed, some studies indicate that nearly a

quarter of the emissions reductions needed to stabilize atmospheric greenhouse gases at a level protective of the environment (500 parts per million) can be achieved through energy efficiency improvements. These are measures that can be employed right now using existing technology. For example, in 1970 a typical 18-cubic-foot refrigerator consumed around 2,000 kilowatt/hours of electricity annually. Today, an Energy Star refrigerator of the same size consumes about one-fifth of that amount.

Customers must actively decide to participate in this strategy, but it is difficult for most customers to move beyond the upfront cost of an energy efficiency investment. Whether this involves a residential consumer deciding between a traditional incandescent light bulb and a compact fluorescent, or a business manager deciding on the merits of a new, energy efficient boiler, the perceived risk associated with achieving the energy savings is too high. In short, there is a flaw in the current functioning of the market whereby investors (in this case, customers) apply an inappropriately high hurdle rate to energy efficiency investments.

PSEG and other energy utilities are uniquely positioned to change this dynamic. Utilities have brand recognition and have earned the trust of customers. Utilities engage in millions of interactions with customers every day and employ a highly skilled and dedicated workforce that can be engaged to promote efficiency. Utilities can help ensure that all consumers – homeowners, renters, urban residents, low-income customers, and small businesses – as well as large industrial and commercial customers, have access to, and the opportunity to benefit from, energy efficiency. Utilities also have the ability to

make long-term investments that serve the public. Allowing utilities to deploy this kind of "patient capital" and make the efficiency investments on the customer side of the meter will maximize development of energy efficiency across society. After all, this patient capital investment model made universal access to energy and energy services a reality, and a similar approach can make universal access to energy efficiency a reality.

This will all require a paradigm shift in how utilities are regulated. Utility companies must be given an opportunity to earn reasonable returns on these efficiency initiatives so they are viewed the same way as investments in pipes and wires.

If energy efficiency is the first fuel, renewable resources are a close second. PSEG has announced a plan to invest approximately $100 million to help finance development of solar energy in New Jersey. Under this plan, PSEG would work with solar developers to provide loans covering 40 percent to 50 percent of the cost of solar installations. Availability of this financing will make solar energy more accessible and affordable for households and businesses. We expect this initiative will support development of approximately 30 MW of new solar capacity, enough power to supply 24,000 residential customers. In this case, the market is functioning properly but subsidies are needed to compensate for the cost disadvantages of renewable energy supplies. Utility financing and installation is potentially the least costly method to override these market forces.

PSEG is also advocating for an extension of the federal solar investment tax credit and removal of the exclusion that has prevented utilities from qualifying. This change can

provide a powerful incentive for additional solar energy investment. Extension of the credit and the modification allowing utility participation are included in both the House and Senate energy tax packages and we hope to see enactment this year.

A National Climate Change Program is Essential

Regardless of the strategy selected, be it energy efficiency or renewables, to activate the transformation to a low-carbon economy, we need a national greenhouse gas reduction policy that establishes a market price for carbon, drives the development of new, low-carbon technologies, and provides incentives for investment in and deployment of these new technologies.

Key issues include the type of program, level of reductions, harmonization with state and regional programs, the method for allocating emissions allowances, cost containment mechanisms, and consumer protections.

The best model for such a program is a national, economy-wide greenhouse gas cap-and-trade program that includes the electric sector, transportation, and other major industrial sources of emissions. Congress should enact a cap that requires a reduction in greenhouse gas emissions to 1990 levels by 2020 and establishes long-term targets that will achieve greenhouse gas concentrations in the atmosphere at a level that will protect against the consequences of a warming climate. We believe this means achieving an 80 percent reduction by 2050.

In the absence of a federal program, a number of states, including my home state of New Jersey, individually, and as part of regional compacts, have seized the initiative on climate policy. PSEG is a leading supporter of New Jersey Governor Corzine's directive to reduce energy consumption 20% and meet 20% of the state's energy requirements with renewable resources by the year 2020.

PSEG also supports the 10-state RGGI program in the Northeast that will implement an electric sector greenhouse gas emissions cap starting in 2009. However, it is critical that RGGI ultimately be transitioned into a comparable national program. While states should be able to innovate in areas such as energy efficiency, renewables, building codes, and appliance standards, we need one national, market-based cap-and-trade program, a single greenhouse gas emissions trading market, and consistent emissions reductions targets across all states. A patchwork of different greenhouse gas emissions targets among states and regions would increase costs for consumers in states with more stringent targets and create inequities for companies that compete in multi-state energy markets. It is, therefore, essential that Congress enact climate change legislation that is at least as stringent as the RGGI requirements and facilitates the transition of RGGI into a national program.

The Right Allowance Allocation Methodology

One of the key policy questions that Congress will decide is the method to distribute CO2 emissions allowances to the electric sector. PSEG supports auctioning at least 25 percent

of electric sector allowances at the start of the program, transitioning to a 100 percent auction within 10 years. A portion of auction proceeds should be directed at research and development of advanced energy technologies such as carbon capture and storage and renewable resources. Providing incentives for these technologies serves the dual purpose of helping to reduce emissions while creating business opportunities and jobs in the U.S. And because consumers will bear the brunt of the cost of addressing greenhouse gas emissions particularly in the early years of the program, auction proceeds should also be set aside for low-income assistance.

For those allowances distributed to the electric sector at no cost, is also essential that the allocation be accomplished in a way that provides incentives for the efficient production of electricity and drives the development and investment in advanced, low-carbon technologies. Allowances should not be distributed in a way that simply preserves the status quo.

I often hear that it is the level of the cap that ultimately determines the effectiveness of the program and that the allocation of allowances is an issue that matters only to electric generators. I disagree. Getting the allocation methodology right has implications not only for our industry but for households and businesses we serve, for entrepreneurs working to bring clean technologies to the market, and ultimately for the success of U.S. climate policy. For these reasons, PSEG supports an updating, output-based allowance allocation system that is based on a power plant's proportionate share of electricity produced. This approach will promote efficiency improvements in existing plants, spur investment in

new, higher efficiency plants, and help attract capital to emerging low-and-zero carbon technologies.

The most commonly referenced alternative to an output-based allocation is a system used for sulfur dioxide allowances under the Acid Rain program. This method, commonly referred to as the grandfathering approach, would distribute all allowances to existing generating facilities based on historic emissions (or fuel-adjusted heat input which effectively translates to historic emissions). We strongly disagree with the grandfathering approach because it creates a perverse incentive that should be avoided under a CO2 cap-and-trade program. This system rewards companies with high-emitting, low-efficiency power plants that have made conscious business decisions not to invest in newer, cleaner, more efficient technology.

Cost containment is another important consideration. However, we also must be careful not to provide an easy out that would threaten the integrity of the program and undermine efforts to reduce emissions. In the early years, as low-carbon technology evolves, we would stress the important role for certified offsets. PSEG, in an effort to support a carbon trading system, has joined with four other energy companies to issue a Request for Proposals (RFP) for 10.5 million tons of high-quality carbon offsets. This effort is designed to help reduce the cost of compliance with regional – and anticipated federal – emissions reductions requirements as well as to help develop a robust and reliable carbon offset market. Such an offset market will promote innovative emissions reductions measures throughout the economy.

Mr. Chairman and members of the Committee, we believe that a combination of conservation and energy efficiency improvements, renewable energy, and clean, low-and-zero carbon central station power will be needed to achieve the low-carbon economy we envision. With the proper incentives set forth in national climate change policy and right regulatory models in our states, I am confident we can meet this challenge in a manner that will unleash our nation's innovative skills, create jobs, and truly transform our economy. PSEG looks forward to working with Congress to enact a national, cap-and-trade program that will deliver greenhouse gas reductions on a scale and timetable sufficient to protect the environment, allocate emissions allowances in a manner that will reward efficiency and innovation, and spur development and deployment of new, low-carbon technologies.

The CHAIRMAN. Before turning to our next two witnesses, who are members of the Prince of Wales Corporate Leaders Group on Climate Change, I would like to include in the record a letter that Prince Charles, the Prince of Wales, has sent to the Select Committee. Members have a copy of the full letter, which is in front of them.

[The information follows:]

CLARENCE HOUSE

3rd October, 2007

Dear Mr. Markey,

I just wanted to write and thank the Select Committee on Energy Independence and Global Warming for giving my Corporate Leaders Group on Climate Change the opportunity to give evidence. The Group much enjoyed meeting Speaker Pelosi and members of the Committee when they visited London earlier this year and could not be more pleased to be in front of you today represented by Mr. Neil Carson, Chief Executive of Johnson Matthey P.L.C. and Mr. Alain Grisay of F.&C. Asset Management, accompanied by Mr. Craig Bennett, Facilitator of the Group.

Without delaying proceedings too much, I thought it might be helpful if I introduced the Corporate Leaders Group and said something about its work. It was established in May 2005 under the auspices of my Business and the Environment Programme and brings together business leaders from major United Kingdom and international companies who are united in their belief that there is an urgent need to develop new and longer-term policies for tackling climate change.

I know that this Committee does not need me to tell you anything about the serious threat which climate change poses to humanity. The three recent reports of the Fourth Assessment of the Intergovernmental Panel on Climate Change (I.P.C.C.) emphasized in the starkest terms how the impacts of climate change will fall disproportionately upon developing countries and the poor. Furthermore, The Stern Review on the Economics of Climate Change concluded that failure to mitigate the phenomena could result in a global economic depression equivalent to the two World Wars and the Great Depression combined.

But what I find particularly striking is the latest science, as reported in the I.P.C.C. Fourth Assessment, on how the biosphere is likely to respond to just a couple of degrees or so of warming. As permafrost thaws and rainforests become drier, there is a real danger that these carbon "sinks" will become new sources of greenhouse gases.

The United Kingdom Government's then Secretary of State for the Environment and now Secretary of State for Foreign and Commonwealth Affairs, Mr. David Miliband, put it very well when he commented earlier this year that "the science has only gone in one direction since 2000, which is to say that the situation is more grave and that the need to reduce greenhouse gas emissions is more urgent".

Against this context, the work of my Corporate Leaders Group is crucial in demonstrating that tackling climate change is the way to ensure economic security for the longer term and that it can be done in a way that does not limit the aspirations for growth of rich or poor countries. What is particularly encouraging about the Group's approach is its determination to work with Governments in a genuine partnership. I am delighted that since it started it has been a major contributor to the development of climate policy by the then Prime Minister of the United Kingdom and is now engaged in a similar way with the President of the European Commission. If I might say so, it is a source of great encouragement to all of us that a sister organization has recently been established in the United States of America and my Corporate Leaders Group is working increasingly closely with the U.S. Climate Action Partnership.

Fundamental to my Group's belief is that investing in a low-carbon future should be a strategic business objective for industrialized countries such as the United Kingdom and the United States of America. But the members recognize that all too often the private sector and Governments find themselves in a 'Catch 22' situation in which Governments feel limited in their ability to introduce new climate change policy because they fear business resistance, while companies are unable to invest sufficiently in low carbon solutions because of the absence of long-term policies. To overcome this, the Group is calling on Governments to set strong policy frameworks, including market mechanisms and ambitious mandatory targets, to provide business certainty and create a step-change in the development of low-carbon goods and services.

As I am sure you can imagine, in advance of the 13th Conference of the Parties to the U.N. Framework Convention on Climate Change in

Bali in December, the Group is particularly focussed on the need to express its support for an international, legally-binding U.N. agreement to reduce global greenhouse gas emissions. It is the Group's belief that such agreement is the only way to provide business with the certainty it needs to increase investment sufficiently in low-carbon technologies, and with the certainty that the threat of climate change will be adequately addressed.

I have been following with the greatest attention the most recent policy evolutions in key industrialized countries. To secure the future for generations to follow, I hope that the boldest possible targets can be set, together with the policies needed to implement them – otherwise how can we expect developing countries, such as India and China, to take action? The legally-binding targets that will be put in place in the United Kingdom through the Climate Change Bill, together with those being put in place in the State of California – and steps being undertaken in numerous other states and cities in the United States – are evidence of how policy-makers in both our countries are moving to address this problem.

A challenge of the magnitude of climate change requires a co-ordinated response, based on actions across every sector of society, and the business community is going to be critical in achieving this. The companies which are members of my Corporate Leaders Group are playing a highly strategic role – essentially helping to create a political space in which effective policies can be introduced and global progress can be achieved.

I very much hope that the hearing this week will be productive and that members of my Corporate Leaders Group will be able to work with members of the Select Committee on Energy Independence and Global Warming in the future to develop further policy responses to this most pressing of problems.

This brings you my warmest good wishes.

The CHAIRMAN. I would like to just read a brief excerpt from Prince Charles' letter to us. He said:

"I have been following with the greatest attention the most recent policy evolutions in key industrialized countries. To secure the future for generations to follow, I hope that the boldest possible targets can be set, together with the policies needed to implement them. Otherwise, how can we expect developing countries such as India and China to take action? The legally binding targets that will be put in place in the United Kingdom through the climate change bill, together with those being put in place in the State of California and steps being undertaken in numerous other States and cities in the United States, are evidence of how policymakers in both our countries are moving to address this problem. A challenge of the magnitude of climate change requires a coordinated response based on actions across every sector of society, and the business community is going to be critical in achieving this. The companies which are members of my Corporate Leaders Group are playing a highly strategic role, essentially helping to create a political space in which effective policies can be introduced and global progress can be achieved. I very much hope that the hearing this week will be productive and that members of my Corporate Leaders Group will be able to work with members of the Select Committee on Energy Independence and Global Warming in the future to develop further policy responses to the most pressing of problems. This brings you my warmest good wishes. Prince Charles."

So we thank him for that letter, and we thank the next two witnesses for coming here today.

I would like to recognize a member of the Management Committee for the Prince's Business and Environment Program and the Chief Executive of Johnson Matthey, Neil Carson. He joined the company in 1980 and has served in a variety of positions within the company and on the board before becoming CEO in 2004. He is currently the Chairman of the Business Task Force on Sustainable Consumption and Production.

Mr. Carson, welcome; and whenever you are ready please begin.

STATEMENT OF NEIL CARSON, CHIEF EXECUTIVE OFFICER, JOHNSON MATTHEY PLC

Mr. CARSON. Chairman Markey, thank you very much and thank you, members of the Select Committee. This is an important issue, energy independence and global warming; and I am very honored to be here to present evidence.

As the chairman stated, my name is Neil Carson. I am Chief Executive of Johnson Matthey and a member of the Corporate Leaders Group, which I represent today.

Johnson Matthey is a specialty chemical company. It is nearly 200 years old. Our core skills are in catalysts, in pressures metals and in fine chemistry; and our largest business, as many of you will be aware, is in the business of auto catalysts, that is, supplying catalysts to the exhaust of cars. Lately, trucks and buses also have been included in the legislative framework and other pollution control systems. Also, we are a developer of fuel cell technology and have been for many years.

Our business model at Johnson Matthey is to invest in R&D, to invest in technology; and this we hope will maintain leadership positions in our markets by continuously improving the performance of our products and then better servicing our customers as a result.

I won't go into great detail about the rest of Johnson Matthey's business, because I think the main points of my evidence today to you is that both Johnson Matthey and the Corporate Leaders Group believe that, to address climate change and energy independence, industry and government need to work together and that time is of the essence and that our goals can be met at the same time as growing our economies and growing prosperity.

The idea is not a new one. The idea to set long-term and binding legislation, in this case for CO_2 emissions, is a powerful incentive then for industry like ours and others to invest in technology to find solutions to that issue. And I have got a classic example, which doesn't really need to be raised at this meeting, but, of course, California in 1970 realized that its environment was hostile to human life and it was identified that cars were the culprit. They set demanding legislation into the future, 5 years ahead, and made it clear that in order to sell cars in California that legislation would need to be met. They didn't have very much idea about how the legislation would be met, nor do I think they cared much. They didn't choose a technology. They just set the outcome that they wanted in terms of reduced emissions from vehicles. That was in 1970. And from 1970 to today the population has grown 38 percent in California, the miles traveled has grown 155 percent, GDP has grown 164 percent, but the relevant emissions have fallen 31 percent. A good example that prosperity can thrive over the years and that this has been a low-cost exercise for California.

Now I think we can do the same thing with CO_2. There are many mechanisms. The cap-and-trade mechanism has been mentioned today. There is, of course, taxation as well as an option. However, it is done from an industrial perspective the essence must be to set clear targets for the future and then not pick a technology, not pick a winner, but to allow business to find a solution. The solutions will be higher cost than currently but perhaps not as high cost as clearing up the mitigating, mitigating for the effects of global warming looking forward as identified by the Stern Review.

Other issues for electricity generators are carbon capture and sequestration. These are technically possible, feasible, but expensive mechanisms. But, again, they can be invested in because of the cost of future emissions from carbon.

That brings to the end my summary. Climate change is an urgent issue. With wealth comes responsibility. We should look after the planet for future generations; and the Corporate Leaders Group look forward to working with governments, your government and other governments, to find the solutions.

The CHAIRMAN. Thank you, sir, very much.

[The statement of Mr. Carson follows:]

Select Committee on Energy Independence and Global Warming

"Business Opportunities in a Low Carbon Economy"

Wednesday 10th October 2007

Written Testimony

by

Neil Carson,
Chief Executive of Johnson Matthey plc

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1. Introduction & Thanks

Thank you for this opportunity to address the Select Committee on this important topic of Energy Independence and Global Warming. May I take this opportunity to share with you, on behalf of Johnson Matthey plc and the UK's Corporate Leader's Group (CLG), my views on the exciting opportunities I believe exist for Business and Government to work together to simultaneously tackle these global problems whilst continuing to grow our own economies.

The CLG is comprised of Chief Executives of leading FTSE100 companies and has previously written open letters on this subject to both the UK government and the European Parliament. The combined market capitalization of the companies in the Corporate Leaders Group on Climate Change is over £300 billion. Together they employ over 850,000 people.

1. Overview of Johnson Matthey plc

Johnson Matthey is a FTSE100 specialty chemicals company focused on its core skills in catalysts, precious metals, fine chemicals and process technology. Headquartered in the UK, Johnson Matthey has operations in over 30 countries and employs around 7,800 people. Its products are sold across the world to a wide range of advanced technology industries.

The group's principal activities are the manufacture of autocatalysts, heavy-duty diesel catalysts and pollution control systems, catalysts and components for fuel cells, catalysts and technologies for chemical processes, fine chemicals, chemical catalysts and active pharmaceutical ingredients and the marketing, refining, and fabrication of precious metals.

Johnson Matthey has continued to develop its technology for almost 200 years, demonstrating the company's ability to maintain world leadership by adapting constantly to rapidly changing customer needs. Rigorous in its own environmental policies, many of Johnson Matthey's products have a major beneficial impact on the environment and enhance the quality of life for millions around the world.

The company is organized into three global operating divisions: Environmental Technologies, Precious Metal Products and Fine Chemicals and Catalysts. More information about these Divisions and our products can be found in Appendix 1.

2. Regulation, Environmental Management & Business Opportunity

Many Johnson Matthey technologies have been developed in response to the global need for cleaner air, greater resource efficiency and a reduction in greenhouse gas emissions. We have found that where strong and consistent government actions have created new market opportunities for products that provide environmental benefits, business has invested to develop and deploy these new products. These investments have not only allowed environmental goals to be met surprisingly cost effectively they have delivered competitive advantage to the companies involved. The environmental challenge of reducing carbon dioxide emissions, in particular, is extremely large. Although this may lead to substantial costs, it is our experience that it can also create correspondingly large opportunities for industry. Competition to seize these opportunities leads to investment by industry in better technologies that can reduce the costs significantly. I am convinced that there is no inherent contradiction between regulating for high environmental standards at the same time as maintaining economic competitiveness and stimulating wealth creation. Indeed, I believe that good regulation is an area of strategic importance to business.

It has been Johnson Matthey's experience that, for maximum effectiveness, a combination of financial and regulatory initiatives are required. Government regulation is of particular importance in the environmental sector. Environmental benefits are a social, rather than an individual, good and consumers – as individuals - typically will not drive development of the market alone.

For example, the US Federal Clean Air Acts and the Californian Zero Emission Vehicle Mandate were instrumental in creating the global market for automotive emission control catalysts and for automotive fuel cell development respectively. In the USA, where vehicle emissions controls were first introduced in 1970, until 2002 the US population *increased* 38%, vehicle miles travelled *increased* 155% and GDP increased 164%. However over the same period total acid gas emissions *decreased* by 31%. A California study suggests that the benefits (cost savings) to public health have been 50 times greater than the cost of the introducing the emission control measures. So it is important to look at direct and indirect benefits of legislation.

Comparable regulation in Europe was weaker and for a long time retarded the development of European adoption of automotive catalyst in the same vehicles, but we eventually followed the Californian lead; in the first twelve years from 1990 it led to reductions in NOx levels from a petrol car and particulate emissions from a diesel for example, by more than 80% in just twelve years.

Voluntary Agreements also have their place, and can contribute to environmental improvements, but by their very nature do not provide the same incentives to achieve targets that legislation provides. This weakens the investment case for new technologies and slows down technical progress.

In order to tackle the rise in transport emissions, a voluntary agreement was signed in 1998 between the European Automobile Manufacturers Association (ACEA) and the European Commission to limit the amount of CO_2 emitted by passenger cars sold in Europe. The agreement seeks to achieve a fleet average of 140 g/km CO_2 by 2008 for new passenger vehicles sold by the association's members in Europe, representing a 25% reduction from the 1995 level of 186 g/km. This was intended to cover the foundation work needed to reach an EU Target of average CO_2 emission of 120 g/km by 2012.

However, having achieved only 160 g/km in 2005, the ACEA agreement has come under fire for likely failing to achieve its target. Consequently, in February 2007 the Commission proposed **binding legislation** on the car manufacturers to reduce their average new passenger car fleet emissions to 140 g/km by 2008 and to 130 g/km by 2012, alongside complementary measures to give a further 10g/km reduction in real terms

The effect of this forthcoming binding legislation was clearly demonstrated at the Frankfurt Motor Show in September of this year, where all major automobile manufacturers showcased new lower emission vehicles combining excellent performance with fuel economy using a wide range of advanced technologies.

Where a legal framework is in place or at least being discussed and firmly anticipated, as with forthcoming Euro 5 passenger car emissions limits, companies are able to plan their investment strategies, which can lead to new products being voluntarily brought to market earlier than legally required. A recent example of this is that of diesel particulate filters, which automakers are already fitting as standard in some vehicles, even though the legislation may not take effect until 2009 or 2010. This is a clear example of a long-term view being beneficial to all concerned: the legislators take time to produce good legislation; manufacturers have time to invest wisely; and the public and the environment benefit from early implementation of a new technology. In this example the consumer is also playing an active role by demanding vehicles equipped with diesel particulate filters, especially in Germany and the Benelux countries which had well publicised problems with diesel emissions in their large cities in summer 2005. It also interesting to see a number of cities,

most notably London, applying 'forward technology' to existing vehicles – creating in effect a new market and economy.

Policy and regulations must be carefully constructed so that it is aimed directly at the outcomes it seeks to drive, independent of the choice of technology solutions. For instance, when considering climate change, achieving a reduction in CO_2 emissions is more important than whether the technology is defined as renewable. It is also worthwhile noting that legislation can pull in more ways than one, and nowhere is this truer than with the automotive industry, reducing emissions on one hand and increasing safety on the other. The added weight of new safety features can make it more challenging for manufacturers to reduce vehicle emissions. The task for us in the environmental industry is to ensure that our efforts enable the challenges to be met.

a Corporate Leaders Group Recommendations

Although consultation with industry is required to ensure that workable regulation is introduced, tightening environmental regulation is not always viewed negatively by industry. The **Corporate Leaders Group** co-ordinated the publication of an open letter to the Prime Minister in June 2005 in which the Chief Executives of twelve UK FTSE 100 companies (including Johnson Matthey) gave their support to well-signposted and effective regulation necessary to reduce CO_2 emissions.

A year later we wrote again outlining our belief that the UK should show leadership in the European negotiations over Phase 2 of the Emission Trading Scheme by taking on challenging targets, and we were delighted when they subsequently capped UK CO_2 emissions at the higher end of the range proposed in the Government's Consultation on the National Allocation Plan.

Similarly, in our 2006 letter to President Barosso of the European Commission, the EU CLG wrote:

> *"As the United Nations Framework Convention on Climate Change (UNFCCC) has agreed, the international community needs to stabilize global greenhouse gas emissions at levels that prevent dangerous climate change. We note that in March 2005 EU Heads of State and Government called for developed countries to consider emission reduction pathways beyond 2012. We also note that scientific opinion across the world is virtually unanimous in agreeing on the urgent need to stabilise the concentration of atmospheric greenhouse gases at a sustainable level. As business leaders, our concern is with how we can help bridge the gap between today's economy and the lower carbon future that will be needed to reach these goals.*

Many companies have already made significant investments in low-carbon technologies, processes and products. However, to promote the necessary step-change in investments in low-carbon goods and services, a strong and clear [domestic and international] *policy framework that creates long-term value for carbon emissions reductions is required".*

In order to achieve medium and long-term goals, for example Kyoto's 2020 & 2050 CO_2 targets, it is vital that legislative (and other) activity starts now and demonstrates consistent long-term aims. For example, construction of a hydrogen or any other low carbon energy infrastructure will take up to fifty years and clear signals are vital now in order to commence investment in this process.

3. New Technology is the Key to the Low Carbon Economy

I believe that investing in new technology is the key both to solving the world's energy problems and to mitigating negative effects of Climate Change, and that the innovation associated with tackling climate change could trigger a new wave of growth and creativity in the global economy. It is about "Doing More with Less", the catchphrase of the UK government Business Taskforce on Sustainable Consumption & Production, which I currently Chair.

The UK Government's Stern Review into the Economics of Climate Change concludes that markets for low carbon energy products are likely to be worth "at least $500 billion per year by 2050, and perhaps much more" and recommends that "individual companies and countries should position themselves to take advantage of these opportunities". Johnson Matthey has a range of products that offer such sustainable solutions and is developing new technology to meet the challenges associated with meeting our future energy needs.

Stabilising and ultimately reducing the world's CO_2 levels will require massive changes right across the energy supply, generation and distribution network. The efficiency balance between central and distributed power generation is an important factor, as is the capture of CO_2 when it is produced. Bringing about energy efficiency improvements and mitigating the CO_2 problem whilst securing energy supplies will require a number of innovative technology approaches.

Johnson Matthey's response to Climate Change and Sustainability Concerns

At Johnson Matthey we have two strands to our climate change and sustainability strategy. The first is, of course, to continually improve the resource efficiency in our factories and offices, driving down the amount of the resources per unit output. This puts money directly onto our bottom line. The second strand is about R&D and new product design. We seek to develop products for our customers that not only use fewer resources in production but also give our customers sustainability benefits in use, therefore providing competitive advantage and enhancing margins. Both make good business sense.

Many of the products that we make are very beneficial to the environment and we are committed to developing more technologies that we believe will be instrumental in enabling others to reduce their carbon footprint. We believe that a Low Carbon Economy will make considerable use of Hydrogen, and many of our catalyst products are positioned at this transition, some of which are described below.

We produce a range of catalysts & process technologies for **the generation of hydrogen gas** from fossil or biofuels that have many applications and a wide range of purification catalysts used to remove contaminants such as chlorine, sulphur and mercury from gaseous and liquid hydrocarbons.

We also develop products for the **abatement** of the harmful **greenhouse gases** (e.g. N_2O) produced by some industrial processes, as well as catalysts that enable "Clean Coal Technology", whereby CO_2 is separated out so that it can be sequestered either being used to improve yields from oil fields or stored underground in exhausted wells.

Johnson Matthey's autocatalyst business continues to contribute to the global effort to reduce CO_2 emissions, as well as a reduction in particulate and acid rain emissions. A **diesel-powered vehicle** emits 19% less CO_2 than the petrol-equivalent, or approximately 0.7 Tonne CO_2 per passenger car per year. We have invested heavily in the technology to develop exhaust catalysts that ensure that diesel-powered vehicles are as clean in their NOx & Particulate emissions as petrol-driven vehicles. This has been instrumental in increasing the percentage of diesel vehicles in the European fleet to approximately 50% market share with no detrimental impact on air quality.

Fuel cell technology is ultimately by far the most efficient way of producing electricity from hydrogen, the only by-product being pure water. Fuel Cell hybrid cars are the logical development of

today's fuel efficient petrol hybrids and offer zero emissions. Fuel cells are also particularly suited to distributed generation since they are highly efficient, quiet, non-polluting and are scalable from watts to mega watts. Their waste energy is highly suitable for use for heating or cooling purposes. Through its dedicated Fuel Cells business, Johnson Matthey is developing enabling technology for this new industry. However, even with the increased efficiency of fuel cells, a truly sustainable hydrogen economy will require that the hydrogen is produced from renewable resources such as biomass or renewable electricity and our scientists are working on a range of applications in this area.

Development of these new Technologies is an integral part of the Johnson Matthey Sustainability Strategy which I believe will ensure our business continues to grow up to our 200th anniversary in 2017 and beyond.

4. Overcoming Barriers to Market for New Technology

Many of Johnson Matthey's new environmental products discussed in the previous section are still pre-commercial. Tremendous hurdles have to be overcome in order to bring any new product to market and, never more so than in the environmental sector, where the main benefit is to the community at large rather than the individual customer. This is invariably heavily influenced by government legislation. In simple terms, whilst production volumes remain low, costs will remain high leading to high payback periods for potential customers. High upfront capital investment is generally required to scale up production to bring unit costs down and a high degree of market certainty is thus required to persuade corporations & the investment community that it is worth the risk.

Legislation which provides market certainty can dramatically reduce this risk profile. Therefore, an on-going cycle of discussion between those who frame new laws and directives, and those whose technical expertise will enable requirements to be met is required ensure the markets can be created in a way to allow business to sensibly invest in this new technology.

For example, Johnson Matthey has recently developed catalyst technology that has the capability to achieve up to 90% reductions in N_2O emissions in both nitric acid and caprolactam manufacturing processes. In the last year we have seen the market for our N_2O abatement catalysts rapidly grow in developing nations through the incentives offered to the nitric acid industry by the Kyoto Clean

Development Mechanism, but eradicated in Europe by the failure of the European commission to include N_2O emissions in the European Trading Scheme.

More generally, the **Corporate Leaders Group** was instrumental in encouraging UK government to lobby for stretching targets for phase 2 of the EU Emissions Trading Scheme, recognising that is has been critically important for providing a central signal to European business about the rising cost of carbon. We strongly support measures to strengthen & broaden its impact and to set long-term term targets, out to 2025, injecting a greater degree of certainty in the future to business stimulating new cycles of innovation & markets for new environmental technologies. However its main impact in the short term is likely to be to incentivise the uptake of the cheaper existing abatement options.

a Corporate Leaders Group Recommendations

In addition to such cap-&-trade schemes, there is a need to introduce policies capable of triggering step-changes in technology development in areas such as carbon capture and storage, hydrogen storage, tidal and wave generation and new transport technologies. The Corporate Leaders Group believes that there is a need to explore how best the development of these technologies can be catalysed, and we are offering to work with the Government to assess a range of policy approaches including public investment in infrastructure, progressive 'stretching' regulations and **forward commitment procurement**.

For example, many promising low carbon technologies such as fuel cells and energy efficient LED lighting need further investment to bring down costs and enable them to be commercialised. R&D is relatively cheap and leads to many prototype products but frequently these do not make it to market because the expense of demonstrating products and scaling-up production is not justified by the future sales prospects. . In the private sector, supply chain management techniques allow suppliers to make these investments by clearly articulating future needs and providing a credible indication of future sales. Public sector procurement has the potential to play a key role in creating markets for low carbon products and services at little risk by using the forward commitment procurement techniques common in the private sector. Conceptually the process is simple: a government department or agency offers to buy in the future a product or service which delivers specified carbon emission benefits at a defined volume and at a cost that it can afford. Suppliers can invest against the certainty of this early market to deliver a cost effective product and have the reasonable expectation that low carbon products will be preferred by the wider market once they are shown to have no disadvantages. Governments have in the past done this supply chain management

successfully in areas of national importance such as defence. By providing low carbon products with early markets in which low carbon characteristics are a competitive advantage public procurement can transform their prospects in the wider market and create the investment case for their rapid development and deployment. Procurement policy is an attractive mechanism because of the scope to apply it to many different areas quickly and flexibly in a way not always possible through the use of legislation. Used in conjunction with progressive product standards it can be especially effective.

5. International Partnerships required to mitigate Climate Change

Climate Change effects know no boundaries between countries & governments, private & public sector, rich & poor, though the poor an invariably least well-positioned to defend themselves. With great wealth & power comes great responsibility to care for our planet and the well being of future generations.

To coin a phrase, I heartily believe in "Doing Well by Doing Good". I am here today to encourage the US government to work in partnership with international business to create markets for the new technology that will enable us to reduce the global carbon footprint by > 50% by 2050.

The two key market instruments I commend to you to achieve this are those of good regulation capping and trading emissions, and forward commitment procurement.

The economic costs of adapting to unconstrained climate change could far outweigh the costs of mitigation. The UK Stern Review, for example, calculated that the costs of inaction could result in the lost of 20% of global GDP (equivalent to the two World Wars and the Great Depression combined). In contrast, Stern calculated that to mitigate climate change might cost just 1-2% of global GDP. It is this "no-brainer" which option that business would chose.

NAP Carson
Johnson Matthey Plc

Appendix 1: Overview of Johnson Matthey plc

Johnson Matthey has operations in over 30 countries and employs around 7,800 people. Its products are sold across the world to a wide range of advanced technology industries. Headquartered in Royston, Hertfordshire, UK, the company is organized into three global operating divisions: Environmental Technologies, Precious Metal Products and Fine Chemicals and Catalysts. More information about these Divisions can be found in Appendix 1.

Precious Metal Products

Precious Metal Products Division is organized into three groups; Platinum, Colour Technologies and Gold and Silver.

Our platinum business consists of our worldwide platinum marketing and fabrication activities. Marketing is headquartered in Royston, UK with support facilities in Philadelphia and Hong Kong. We are the world's leading distributor of platinum group metals (pgms) and the sole marketing agent for Anglo Platinum, the world's largest producer of platinum. Our platinum fabrication business makes a wide range of platinum group metal products primarily in the UK and USA. Our Pgm Refining business recovers pgms from spent catalysts and other secondary materials and refines primary pgms from global mining operations. It has refining facilities in the UK and USA.

Headquartered in the Netherlands, our Colour Technologies business manufactures black obscuration enamels and silver conductive materials for automotive glass. It also makes colors, enamels and decorative precious metal products for other glass applications such as bottles and architectural glass as well as for tableware and other ceramic applications.

Gold and Silver comprises our gold and silver refining and bullion manufacturing operations. Johnson Matthey is a market leader in the refining of gold and silver. The business serves the world's mining industries and recycles secondary scrap material. We are also a leading manufacturer of high purity small gold bars for investment and jewellery manufacture. Gold and silver refining operations are located in the USA and Canada.

Fine Chemicals and Catalysts

Fine Chemicals & Catalysts Division is a global supplier of specialty chemical products and services to the fine chemicals and pharmaceutical industries. Its Catalysts and Chemicals business

manufactures base and precious metal catalysts and chemicals from its facilities in the UK, USA, Germany, India and China.

The division's Macfarlan Smith (UK) and Pharmaceutical Materials and Services (USA) businesses manufacture active pharmaceutical ingredients (APIs) and provide services to pharmaceutical companies through every phase of the development and commercial manufacture of a pharmaceutical product. Both businesses specialize in the manufacture of low to medium volume, high value products, especially controlled drugs and provide a full range of commercial scale manufacturing services for APIs to both generic and branded pharmaceutical companies.

The Research Chemicals business is a catalogue-based supplier of specialty inorganic and organic chemicals. It operates under the Alfa Aesar brand name and is based in the USA and the UK.

Environmental Technologies Division

Environmental Technologies Division is focused on technologies concerned with protecting the environment such as pollution control, cleaner fuel, more efficient use of hydrocarbons and the hydrogen economy.

The division operates globally under the market identity of Johnson Matthey Catalysts and consists of three separate business units. Johnson Matthey's Emission Control Technologies (ECT) business, which manufactures catalysts for automobile emission control and the reduction of emissions from industrial processes, the Fuel Cell business which manufactures fuel cell catalysts and catalyzed components and the Process Technologies business comprising the Syngas & Gas to Liquids (GTL), Refineries & Gas Processing, Davy Process Technology and Tracerco businesses.

ECT comprises Johnson Matthey's global autocatalyst, heavy duty diesel and stationary source emissions control businesses. Johnson Matthey are a world leading manufacturer of catalysts for vehicle exhaust emission control and a leader in catalyst systems for the reduction of volatile organic compound emissions from industrial processes. Manufacturing takes place in the USA, UK, Belgium, Mexico, Argentina, South Africa, Japan, Malaysia, India, China and South Korea. A further plant is nearing completion in the Russian Federation. R&D facilities are located in the USA, UK, Sweden, Japan and Brazil.

Process Technologies manufactures base and precious metal process catalysts for the syngas, coal to chemicals, gas to liquids (or GTL), oil refineries and gas processing industries. It has manufacturing facilities in the UK and India. Davy Process Technology develops chemical process technologies and licenses them to customers in the oil, gas and petrochemical industries. It is headquartered in

London and has an extensive R&D centre in Stockton-on-Tees, UK. Our Tracerco business is an industrial leader in specialist technology for the diagnostics, measurement and analysis of process plant conditions across the hydrocarbon chain.

Johnson Matthey Fuel Cells is the world's leading producer of precious metal catalysts and catalyzed components for fuel cell applications, specializing in membrane electrode assemblies (MEAs), anode and cathode catalysts, fuel processor catalysts and coated components for the complete fuel cell system.

Appendix II: Personal Biography of Neil Carson

Neil Carson joined Johnson Matthey in 1980. He was appointed Division Director, Catalytic Systems in 1997 after having held senior management positions in the Precious Metals Division as well as Catalytic Systems in both the UK and the USA.

Neil was appointed to the board of Johnson Matthey as Managing Director, Catalysts & Chemicals in August 1999 and additionally assumed board level responsibility for Precious Metals Division in August 2002. He was appointed as Chief Executive in July 2004. He is currently the Chairman of the Business Taskforce on Sustainable Consumption and Production and is a member of the management committee for the Prince's Business & the Environment Programme.

Appendix III: JOHNSON MATTHEY U.S.

GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: Catalysis & Chiral Technologies
Date: September 6, 2007

Johnson Matthey Contact: Gerard Compagnoni
Telephone: (856)-384-7007

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
NONE					

JOHNSON MATTHEY U.S.

GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: ChemCat
Date: 7th Sep 2007

Johnson Matthey Contact: M. Hausler
Telephone:01763-25-3945

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
NONE					

JOHNSON MATTHEY U.S.

GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: PMM North America
Date: September 7, 2007

Johnson Matthey Contact: T.Murray
Telephone: 610-971-3062

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
Unallocated Pool Accounts PGM	Defense Logistics Agency	First	Not Current – last transaction on account Feb 2006 (metal shipment)	Zero balances in metal pool account	No future business anticipated at this time
Unallocated Pool Accounts PGM	Dept. of Energy UT Battelle		Not Current – last transaction April 2006 (metal transfer)	Zero balances in metal pool account	No future business anticipated at this time
Unallocated Pool Accounts PGM	Lawrence Livermore National Labs		Not Current – last transaction May 2007 (metal shipped out of account)	Zero balances in metal pool account	No future business anticipated at this time

JOHNSON MATTHEY U.S.

GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: JMVTD LLC
Date: 9/4/07

Johnson Matthey Contact: Ian Collingwood
Telephone: (734) 893 6127

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
NONE					

JOHNSON MATTHEY U.S.
GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: PCT Oakbrook/JMPLC
Date: 9/7/07

Johnson Matthey Contact: Simon Doughty
Telephone: 630-678-2710

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
Overall purpose is development of jet fuel blendstock from bio-oils and lipids for use in military aircraft. JM to develop experimental catalysts for processing triglyceride feedstocks to jet fuel. Based on performance of samples, JM to optimize energy efficiency and economics of the performing catalyst(s).	US Army RDECOM Acquisition Center	JMI is subcontractor to Prime Contractor (University of North Dakota Energy & Environmental Research Center); JMPLC will be 2nd tier to JMI	Subcontract details being finalized; expect execution this month.	JMI to receive $685K. 18 month project (April 07 – Sept 08)	

JOHNSON MATTHEY U.S.

GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: PMP Salt Lake City
Date: 7th September 2007

Johnson Matthey Contact: Business Manager
Telephone: +1 801 924 6071

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
Not Applicable - None					

JOHNSON MATTHEY U.S.
GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: Pharm
Date: 9/7/07

Johnson Matthey Contact: Roger Kilburn
Telephone:

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
AVI have received a $22m Federal Grant for evaluating compounds for treatment of Ebola and possibly leading to other indications	USAMRID (US Army Medical Research Institute for Infectious Diseases)	Subcontract - JMPS make the starting materials for all the AVI compounds.	Current transaction – under a Research and Manufacturing Agreement dated 7th Dec 1997.	Since 1997 this contract value is >$30m. Duration is "ever-green" with 60 days notice of termination from AVI for any reason	JMPS makes starting materials for all AVI's needs only some of which are used for the USAMRID project.

JOHNSON MATTHEY U.S.

GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: Johnson Matthey Fuel Cells Inc.
Date: 7th September 2007

Johnson Matthey Contact: Jay Hoffman
Telephone: 610 232 1979

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
Cooperative Development Agreement	Dept of Energy (DOE)	Subcontract	Recently Completed	Total Value = $2,332,156 JM Cost Share = $466,431 (20%) 01 Oct '03– 01 Aug '07	• Primary Contract Holder: Arkema Chemical Co.
Cooperative Development Agreement	Dept of Energy (DOE)	Subcontract	Current	Total Value = $540,896 JM Cost Share = $108,179 (20%) 3 Year Duration DoE Request start date 01 Aug '07	• Primary Contract Holder: Arkema Chemical Co. • Overall Project Award Granted • JMFCI Contract Pending
Cooperative Development Agreement	Dept of Energy (DOE)	Subcontract	Current	Total Value = $1,310,000 JM Cost Share = $524,000 (40%) 3 Year Duration 01 May '07 – 01 May '10	• Primary Contract Holder: United Technologies Corp., Power Group • Overall Project Award Granted • JMFCI Contract Pending
Cooperative Development Agreement Plus Up Funding – Earmarked Funds	Dept of Defense (DOD) US Air Force Labs	Subcontract	Recently Completed (Project Year 1)	Total Value = $755,000 JM Cost Share = $0 1 Year Duration 15 Jul '06 –15 Jul '07	• Primary Contract Holder: Foster-Miller
Cooperative Development Agreement Plus Up Funding – Earmarked Funds	Dept of Defense (DOD) US Air Force Labs	Subcontract	Current (Year 2 Project Continuation)	Total Value = $350,000 JM Cost Share = $0 1 Year Duration 01 Aug '07 – 01 Aug '08	• Primary Contract Holder: Foster-Miller • Owing to success of Project 1, DoD funding an additional Project Year • JMFCI Contract Signed
				Total Value = $3,140,687 JM Cost Share = $1,601,752 (51%)	• Primary Contract Holder: Unidym (previously CNI)

Cooperative Development Agreement	National Institute of Standards and Technology (NIST)	Subcontract	Current	3 Year Duration 01 Oct '04 – 30 Sept '07	• Original Contract expired the end of Sep '07, but a 6 month extension requested by primary contract holder. JM is not expecting to receive significant new funding during the extension period.
Funded program – R&D for Manufacturing of Fuel Cell Components (Cooperative Development Agreement)	Dept of Energy (DOE)	Possible First Tier Or Subcontract	Prospective	Total Value =Up to $2 million JM Cost Share = at least 35% 3-4 Years	• Decision to submit a proposal directly or with a partner not yet made. • Proposal submission required by October 10th, 2007
Material Purchase with Government Funds	CaseWestern Univ. doing work under a Dept of Energy Contract (DOE)	Material Supplier to First Tier Contract Holder	Prospective Quote due to DOE contract holder	One-Time Sale <$30,000	
1) NJ State financial incentive for the installation of a 200 kW clean CHP system. 2) System installation also eligible for Federal Tax Incentive.	New Jersey Office of Clean Energy (program managed by TRC Energy Services)	First Tier	Current Activity Contract for system installation under negotiation.	One time NJ State Incentive of $711,000. Federal investment tax incentive of up to $1,000/kW. Approx. one year value of $159,469.	

JOHNSON MATTHEY U.S.

GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: CT Downingtown
Date: September 5th 2007

Johnson Matthey Contact: L. CABEL
Telephone: 610-873-3203

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
NONE					

JOHNSON MATTHEY U.S.

GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: HDD
Date: September 12, 2007

Johnson Matthey Contact: D. Cetola
Telephone:

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
NONE					

JOHNSON MATTHEY U.S.
GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: Tracerco USA
Date: September 13, 2007

Johnson Matthey Contact: P. Hewitt
Telephone:

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
NONE					

JOHNSON MATTHEY U.S.

GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: JM Tennessee
Date: September 12, 2007

Johnson Matthey Contact: R. Sooy
Telephone: 865-453-7177

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
NONE					

JOHNSON MATTHEY U.S.
GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: Johnson Matthey Medical Products
Date: 5 September 2007

Johnson Matthey Contact: Brian Woodward
Telephone: 858 716 2305

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
Not Known.	Defense	Lockheed Martin Missiles & Space.	Prospective	$101,312. Duration unknown.	1600 pcs quotation for 20010063p202 rev E "Rod, Actuator"
					(This part was purchased in 2001 but there was no record of the transaction as it occurred prior to JM acquisition).

JOHNSON MATTHEY U.S.

GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: Noble Metals NA West Whiteland
Date: 9/4/2007

Johnson Matthey Contact: Bob Staargaard
Telephone: 610-745-6727

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
Order for fabrication of glass melter to be used in disposal of nuclear waste products. The nuclear waste will be melted with the glass to make stable glass bricks which will be stored indefinitely.	DOE	Washington Savannah River Company(WSRC) subcontractor	First melter order placed with Noble Metals NA on 6/15/2007 and released for production last week after spec details worked out. **Current**	Initial fabrication order worth $71K Project could last 5-10 years @ $1.4 - $2.8 million/year. Each melter contains 290 TO of 80/20RH alloy worth $650K each which will not be returned as the melters become radioactive.	WW have been working on this project for 10 years .
Order for Gold pressure vessel liner	DOE	First Tier Direct	Order placed with Noble Metals NA on 8/22/2007 **Current**	$4K	Normal product order.
Lawrence Livermore quoted for an Iridium Crucible	DOE	Subcontract	Quote made on 8/27/2007 **Prospective**	$18K	WW has been supplying LLNL with Iridium crucibles for the last 20 years.

JOHNSON MATTHEY U.S.

GOVERNMENT PROCUREMENT / NON-PROCUREMENT TRANSACTIONS

Johnson Matthey Business Unit: ECT - SSEC
Date: August 31, 2007

Johnson Matthey Contact: Wilson Chu
Telephone: 484-320-2114

Government-related Transaction & Type *(Describe nature and type)*	**Agency** *(Describe federal agency involved)*	**Tier** *(First tier direct or subcontract)*	**Status** *(Current transaction or prospective)*	**Est. Value & Duration**	**Comments**
DOE Funded Project: Partner with URS Corp., EPRI, Southern Company, TVA, Colorado River Authority and others in contract to demonstrate gold catalyst for the oxidation of mercury in a power plant.	Department of Energy	Subcontractor to URS Corporation	Received P.O. from URS for the gold catalyst prior to August 21, 2007.	Total contract $1,268,817. Catalyst to be installed in March 2008 and data collected through September 2009.	URS is the prime contractor. Johnson Matthey accepted a 25% cost share.
Partner with the National Energy Technology Lab (NETL) in a Cooperative R&D Agreement (CRADA) to develop sorbents for removing mercury and arsenic in syngas from coal gasification. Johnson Matthey licensed the NETL patent on this process.	Department of Energy	Joint partner with NETL	2 year contract extension presently under discussion	No funding from the DOE	PGM sorbent technology being developed by JMPLC Sonning.

The CHAIRMAN. I would now like to recognize Alain Grisay. He is Chief Executive of F&C Asset Management. He was also appointed an Executive Director and a member of the Executive Committee of Friends Provident on January of 2006. Prior to joining F&C in April of 2001, Alain Grisay was at JP Morgan for 20 years as a Managing Director responsible for the investment bank's market client business in Europe.

Mr. Grisay, please begin when you are ready.

STATEMENT OF ALAIN GRISAY, CHIEF EXECUTIVE OFFICER, F&C ASSET MANAGEMENT, PLC

Mr. GRISAY. Mr. Chairman and members of the committee, on behalf of F&C Management and fellow members of the U.K. and EU Corporate Leaders Group on climate change, I would like to thank you for giving me this opportunity to testify before the congressional Committee on Energy Independence and Global Warming.

F&C is a leading European asset management company, nearly 140 years old, that serves a wide range of institutional and retail customers with assets over $200 billion. Our mission is to deliver competitive investment returns to our clients and to act on their behalf to ensure that investee companies generate profits for their shareholders, while ensuring that their businesses will be around for the long term. We take our role as active investors very seriously and, in so doing, do not shy away from taking a strong stand on matters of public policy where we believe these to be a vital interest to our clients. Climate change is one such issue.

I have traveled here today from London to share with you the fruits of our thinking and experience both as an institution investor and as a business that has played a leading role in voicing the concerns of business to U.K. and EU policymakers on climate change.

My message is simple: Business and investors can only play their part in tackling climate change if government takes decisive action to make this possible. The costs of moving forward today in a planned and deliberate way are modest and will even yield profitable business opportunities for many innovative companies along the way. These costs are dwarfed by the costs of inaction when one considers the human, natural and economic consequences of a business-as-usual approach. In short, we simply cannot put our heads in the sand.

Most important of all, this problem will not get solved through market forces alone in the time that we have left to act, because climate change presents a textbook example of market failure. This means that voluntary targets won't do. Business needs a level playing field in order to take on the financial risks that adequate action on climate change require. Business will play a pivotal role in marshaling capital to fund the innovative technologies that will overcome climate change, but it needs government to set clear long-term rules and standards.

I have therefore come here to ask you as legislators of the most powerful nation to play a historical part in this effort. Only with long-term legislative clarity can investment companies like mine return to their day jobs and begin the task of shifting capital on

the scale that is needed to transform the global economy to one that runs on low-carbon energy.

What does this mean in practice? That we investors and the companies in which we invest need the U.S. Government to, first, define climate change policy as a top national priority and set binding national targets that will be translated into clear, long-term rules, regulations and standards; secondly, play a leadership role in engaging other national governments to establish binding global targets and standards; and, thirdly, to introduce policy instruments, including cap-and-trade mechanisms, fiscal measures and regulatory standards that would result in a viable carbon price. So as long as carbon is valued at zero, capital investments in innovative low-carbon technologies will remain embryonic and fail to deliver the economy transformation that is needed.

In conclusion, Mr. Chairman and members of the committee, we have two choices: We can act now, with the benefit of a bit of time and planning, thereby enabling business to manage the transition efficiently and government to cushion the blow for those affected by the inevitable disruption; or we can act later and pay a much higher price. There is no third option. Innovative companies and investors stand ready to act, but we cannot compromise our economic survival without clear signals from government that reflect the new economy reality.

I hope that the work of this committee will help you lead your nation and the community of nations in embracing this challenge and create the conditions for businesses to play a vital role in delivering the solutions to climate change. Thank you very much.

The CHAIRMAN. Thank you, Mr. Grisay.

[The statement of Mr. Grisay follows:]

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Statement by Alain Grisay, Chief Executive, F&C Management Plc,
to the Congressional Select Committee on Energy Independence and Global Warming

Wednesday 10 October, 2007
Washington, D.C.

Mr. Chairman and Members of the Committee,

On behalf of F&C Management and fellow members of the UK and EU Corporate Leaders' Groups on Climate Change, I would like to thank you for giving me this opportunity to testify before the Congressional Committee on Energy Independence and Global Warming.

F&C is a leading European asset management company that serves a wide range of institutional and retail customers with assets of over $200 billion. Our mission is to deliver competitive investment returns to our clients, and to act on their behalf to ensure that investee companies generate profits for their shareholders, while ensuring that their businesses will be around for the long term. We take our role as active investors very seriously, and in so doing, do not shy away from taking a strong stand on matters of public policy where we believe these to be of vital interest to our clients. Climate Change is one such issue.

I have travelled here today from London to share with you the fruits of our thinking and experience, both as an institutional investor, and as a business that has played a leading role in voicing the concerns of business to UK and EU policy makers on Climate Change.

My message is simple: business and investors can only play their part in tackling Climate Change if government takes decisive action to make this possible. The costs of moving forward today, in a planned and deliberate way, are modest and will even yield profitable business opportunities for many innovative companies along the way. These costs are dwarfed by the costs of inaction, when one considers the human, natural and economic consequences of a business-as-usual approach. In short, we simply cannot afford to put our head in the sand.

Most important of all, this problem will not get solved through market forces alone in the time that we have left to act, because Climate Change presents a textbook example of market failure. This means that voluntary targets won't do: business needs a level playing field in order to take on the financial risks that adequate action on Climate Change requires. Business will play a pivotal role in marshalling capital to fund the innovative technologies that will overcome Climate Change, but it needs government to set clear long-term rules and standards.

I have therefore come here to ask you, as legislators in this planet's most powerful nation, to play an historic part in this effort. Only with long-term legislative clarity can investment companies like mine return to their day jobs, and begin the task of shifting capital on the scale that is needed to transform the global economy to one that runs on low-carbon energy.

Registered in Scotland, Company Registration No. 73508. Registered Office: 80 George Street, Edinburgh EH2 3BU

What does this mean in practice? That we as investors, and the companies in which we invest, need the US Government to:

1. Define Climate Change policy as a top national priority, and set binding national targets that will be translated into clear, long-term rules, regulations and standards.

2. Play a leadership role in engaging other national governments to establish binding global targets and standards.

3. Introduce policy instruments, including cap-and-trade mechanisms, fiscal measures and regulatory standards that will result in a viable carbon price. So long as carbon is valued at zero, capital investment in innovative low-carbon technologies will remain embryonic and fail to deliver the economic transformation that is needed.

In conclusion, Mr. Chairman, Members of the Committee, we have two choices: we can act now, with the benefit of a bit of time and planning, thereby enabling business to manage the transition efficiently and government to cushion the blow for those affected by the inevitable disruption. Or we can act later, and pay a much higher price. There is no third option. Innovative companies and investors stand ready to act – but we cannot compromise our economic survival without clear signals from government that reflect the new economic reality.

I hope that the work of this Committee will enable you to lead your nation, and the community of nations, in embracing this challenge, and create the conditions for business to play its vital role in delivering the solutions to Climate Change.

Thank you very much.

F&C Investments

BACKGROUND NOTE

Overview:

- Although investment in climate-friendly technologies has accelerated in recent years, it has yet to reach the scale required to achieve a wholesale shift to a low-carbon global economy, because the risk-reward ratio of this investment is too high to attract large pools of capital.

- The only way to solve this conundrum is for the risk levels associated with investment in low-carbon products and services to be reduced. To achieve this, we need government to introduce clear, long-term policies that ensure that the true cost of carbon is fully reflected in economic transactions and capital planning. This requires binding policy instruments such as a carbon cap-and-trade system, carbon taxes and regulatory standards on energy efficiency.

- This process has begun to a modest extent, through the introduction of the European Emissions Trading Scheme, which has started to affect some energy-intensive sectors in the EU. The ETS is in its very early stages and has yet fully to deliver on its promise, but it is a very welcome start, and needs to be extended and strengthened, through a clear global commitment to achieving significant cuts in carbon allocations.

- The scale of the challenge is such that a combination of policy tools must be considered.

    - **Cap-and-trade** offers real benefits insofar as it can enable the greatest possible carbon savings at the lowest possible cost – but its success requires strict, independently-set targets to ensure the emergence of a strong carbon price.
    - **Fiscal measures** can influence capital flows by penalizing high-carbon energy and rewarding low-carbon alternatives.
    - **Regulation and energy performance standards** can accelerate investment and purchasing decisions when poor information and inertia interfere with economically rational choices.

F&C supports:

- **Binding global targets** on emissions reductions that flow through to legally-binding national legal laws and regulations.

- Development of national and international policy frameworks that **map the next 30 years or more**, thereby enabling business to factor future estimated carbon prices into its capital planning.

- The emergence of a **US cap-and-trade system** that is consistent with the European Emissions Trading Scheme and other national/regional systems that may emerge.

- A strong commitment by the leading industrial countries to **engage and support the G20 nations** in tackling climate change.

- Strong product and energy performance **standards** for more energy-efficient goods.

- Rationalization of **fiscal policies** to remove hidden subsidies for higher-carbon fuels, penalize dirtier fuels and rewards cleaner ones.

F&C Investments

F&C's view on biofuels:

- Biofuels have great potential to cut transport emissions.
- But evidence is growing that many biofuels are coming from unsustainable sources, and may actually be resulting in more CO_2 emissions than they are saving (e.g. where forests are destroyed to grow them).
- Strong standards for sustainable sourcing of feedstock need to be in place to prevent these unintended consequences.
- In the long term, the answer lies in new technologies that can use non-food crops grown on non-forested, non-cultivated land, as well as agricultural waste.
- National subsidies that favour domestic sources of biofuel over imported ones can have extremely perverse outcomes. It is vital to carry out a complete life-cycle analysis of carbon emissions of any given biofuel when determining tax and regulatory policies, so as to ensure that there is a net climate benefit.

The CHAIRMAN. I would like to now recognize our final witness, Jonathan Lash. He is President of the World Resources Institute and a founder of the U.S. Climate Action Partnership. In 2005, Rolling Stone described him as the environmentalist who has done the most to bridge the bitter divide between industry interest and green groups committed to halt global warming. His long career in State and local government and environmental organizations as a litigator and a leader is a testament to this well-deserved description.

We welcome you, Mr. Lash. Whenever you are ready, please begin.

STATEMENT OF JONATHAN LASH, PRESIDENT, WORLD RESOURCES INSTITUTE

Mr. LASH. Thank you, Mr. Chairman and members of the committee.

I appreciate the opportunity to appear before you and particularly appreciate the energy the committee is putting into addressing a compellingly important issue for the country, to develop legislation that will be both in our national environmental interest and in our national economic interest. I think that is really our subject today.

My organization, the World Resources Institute, is an environmental think tank that works on global issues, including global climate change, and has partnered with businesses for 15 years developing low-carbon alternatives, finding ways for them to reduce emissions to purchase green power and developing the accounting protocol which virtually all companies that measure greenhouse gases now use to measure and report greenhouse gas emissions.

I am here today on behalf of the United States Climate Action Partnership, a group that now includes six national environmental organizations and 27 companies from virtually every sector, including GE, GM, Ford, Chrysler, Caterpillar; six utilities, including Duke Energy, the third largest user of coal in the United States; Dupont, Dow, Pepsi, Rio Tinto, which is the third largest producer of coal in the United States; Conoco, John Deere and many others.

The group last January issued a call to action, which, first of all, emphasized our agreement that climate change is real, immediate and urgent. In fact, it is proceeding more quickly than the scientists predicted, with impacts that are occurring earlier than we expected.

The group, of course, shares the committee's perception that we must and can address climate change in ways that help the U.S. economy to move forward and compete when tomorrow's markets begin to demand low-carbon alternatives. Specifically, the United States Climate Action Partnership has recommended that Congress adopt a mandatory economy-wide cap-and-trade system that slows, stops and then reverses the growth in U.S. emissions, that achieves 10 to 30 percent reductions within 15 years and 60 to 80 percent reductions by 2050. The group urges the inclusion of the capacity to use graphics in order to meet reduction targets and that the policy be complemented by other policies to accelerate efficiency improvements and advance technology.

So why? Why are 27 major companies, many of them heavy energy users and heavy coal users, recommending stringent action on climate change?

First, they believe we have to act and that it is better to get started sooner, that delay will be expensive and increase the eventual cost to them.

Second, they want to compete in tomorrow's markets; and they believe tomorrow's markets will be demanding low-carbon technology, services and products. There will be booming demand. They want to be there to meet that demand.

Third, they are making massive technology investments in technology that will be in use for 50 years; and they want to know what the rules will be in the future.

Fourth, they need a carbon price. You have already heard several times from this panel the importance of a carbon price. If we want to let the market choose winning technologies, the market has to have a price signal to be able to do it.

Finally, they want a level playing field. We now have 17 States that represent the majority of the U.S. economy that are imposing their own carbon restrictions. It is an impossible environment for multi-national companies to operate in in the United States.

I would make one quick comment that does not represent the U.S. Climate Action Partnership findings. Since you are in the final process of approval of an energy bill, there are extraordinarily important provisions in the energy bill which would help both energy security and climate change. Those include efficiency measures and renewable measures.

But it is important to realize that not all measures that would improve energy security will help with climate change. An example is the proposed subsidies for coal to liquids. Since the process of producing liquid fuel from coal is energy intensive, it results in far higher GHG emissions than other liquid fuel alternatives.

Thank you very much, Mr. Chairman. I look forward to your questions.

The CHAIRMAN. Thank you, Mr. Lash, very much.

[The statement of Mr. Lash follows:]

Statement of Jonathan Lash
President
World Resources Institute

To the
Select Committee on Global Warming
U.S. House of Representatives
October 10, 2007

Chairman Markey, distinguished members of the Committee, thank you for the opportunity to join you this morning. I appear before you today both in my capacity as President of World Resources Institute and as a founder of the US Climate Action Partnership.

The United States Climate Action Partnership (US CAP) believes climate change is an urgent problem, that we know enough to act, and that policy delay will only increase the costs to our economy and our environment. We are 33 leading companies and non-profit organizations with market capitalization over US $2.2 trillion and environmental groups with over 2 million members. We have tripled in size since our launch last January.

The CEOs of this consensus driven, leadership group continue to meet to refine and expand our policy recommendations. The companies have been clear that they are prepared to make very large long term investments in new products, technology and infrastructure to shift to a low carbon economy, but to do this they need:

- A long term road map of reductions required
- A carbon price
- Clear rules
- A level playing field

What they have so far is no carbon price, no road map, no clear rules, and States stepping into the leadership vacuum to create a national patchwork rather than a level playing field. I'd like to spend some time this morning reflecting on what type of policy action is required to tackle global warming – and how climate legislation can help the U.S. economy become more competitive, create new jobs and become a positive economic force.

The Roadmap

There are four reasons why laying out the pathway of steadily declining emissions is important:

- It is what is required to control global warming;
- It will signal future market conditions for companies making choices regarding new technologies and products;
- It will encourage investors to support innovative low carbon technologies;
- It will greatly enhance U.S. credibility in seeking international agreement on reductions.

Deep cuts in emissions will require fundamental changes in our energy systems over a period of decades. Legislation should focus on a step-wise, cost-effective approach -- US CAP efforts focused on targets over the next 20-30 years that would harness the innovation and entrepreneurial nature of the private sector through markets for new technologies.

US CAP recommends that legislation be designed to be consistent with limiting global atmospheric concentrations of greenhouse gases to a level of 450-550 parts per million – a level that scientists tell us will be required to avoid the most disruptive climate impacts. In light of that goal, US CAP seeks mandatory targets that slow, stop and reverse the growth of U.S. emissions, achieving emissions levels of:

- Between 100-105% of today's levels within five years of rapid enactment
- Between 90-100% of today's levels within 10 years
- Between 70-90% of today's levels within 15 years

We suggest a long-term goal of reducing emissions by 60-80% by 2050. Since markets play an important role in shaping behavior, we believe there needs to be a price for GHG emissions for all sectors of the economy – an economy wide approach.

A Carbon Price

Our environmental goal and economic objectives can best be accomplished through an economy-wide, market driven approach that includes a cap-and-trade program with specific limits on greenhouse gas emissions. By signaling a price on carbon now, and for the next 40 years, investors seeking to make decisions today will factor in a cost of carbon into investment decisions. Cap-and-trade creates an obligation on regulated entities to meet specified targeted reduction levels.

Cap-and-trade provides both certainty and flexibility. Sources can choose whether to make reductions or buy credits. Innovators can invest in technology to produce and sell excess credits. Cap-and-trade creates a market that chooses the best solutions.

Cap-and-trade programs like the SO2 program in the Clean Air Act have a demonstrated track record of creating environmental value at acceptable economic cost. As the SO2 program was being debated in Congress, there were many who thought the costs of controlling acid rain would ruin U.S. competitiveness. It did not, and CO2 trading will not. According to venture capitalist John Doerr, who endorses cap-and-trade, "The choice is clear: Are we going to innovate and prosper, or stagnate and suffocate?"

If cost control measures are used in climate policy, US CAP believes they would need to be designed to:

- Enable a long-term price signal that is stable and high enough to ensure that the investments in low and zero emitting technologies are not undercut;
- Ensure that the integrity of the emissions cap;
- Preserve the market's effectiveness in driving reductions, investment and innovation.

Clear Rules

According to the International Energy Agency, the world will spend $20 trillion on new energy infrastructure in the coming decades (and approximately $4 trillion in North America alone). If those investments are made in old fossil fuel-based technologies, the opportunity to prevent dangerous climate change will be lost.

There is tremendous interest around the world in transitioning to low carbon energy sources, efficient cars, electronics, homes, and breaking the link between energy and living standards. The U.S. can choose to lead or follow. U.S. businesses in US CAP recognize this is a global market and an opportunity for them to thrive in a marketplace that seeks solutions.

The solution lies in a shift in energy technology development and deployment at an unprecedented rate. The change in technology must affect the three primary uses of energy – power, transportation, and heating – all basic elements to modern life, whether in industrialized or developing economies.

The catalysts for this shift are straightforward: government policy and private sector investment. Importantly, the transformation of the energy sector to a diversified, low-carbon system need not be an economic hardship. Rather, it offers an opportunity to manufacture and develop cutting-edge technologies that will clean the air, improve people's health, and provide greater economic and political stability.

US CAP recognizes that in addition to an economy wide cap-and-trade program, there may be a need for complementary policies to overcome market failures and behavioral inertia – a suite of complementary policies may be required.

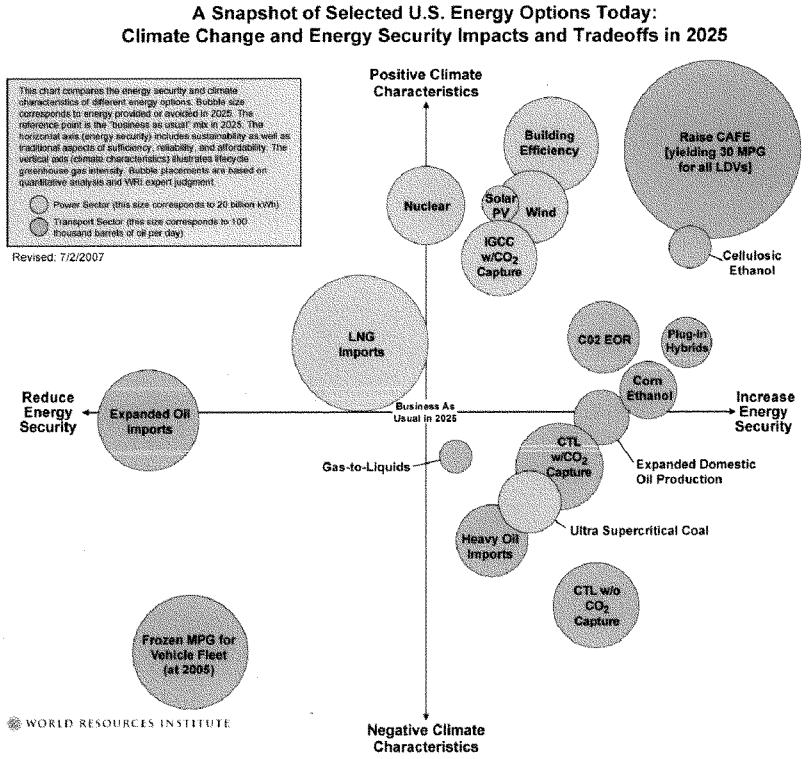
Table 1 provides a sense of the types of policy action that may be required immediately and over the long term by sector.

Table 1: Policy outcomes required to achieve reductions

Sector	Near Term Priorities	Medium term Priorities	Long term priorities
Power	Avoid lock-in of conventional coal by setting performance standards and a creating a price on carbon through tax or cap and trade program	Post-combustion CCS; Renewable Energy at scale	Biomass + CCS; safe nuclear
Buildings	Avoid lock-in of inefficient buildings Energy efficiency	Carbon neutral building design	Regenerative buildings
Transport	Avoid lock-in of inefficient infrastructure Increase efficiency	Sustainable fuel systems Vehicle innovation Advanced mass transit	Transport innovation
Industry	Avoid lock-in of inefficient production	Advanced industrial production	Low emissions intensity material use
Land Use	Slow deforestation	Enhance sinks; change Agricultural practices	

The U.S. Congress faces a variety of policy and technology choices as it reviews energy security and climate change issues. However, not all options are equal in terms of greenhouse gas emissions, and choices made in the name of energy security may have significant and detrimental impacts on the climate. The trade-offs are represented in **Chart 1**, below.

Chart 1: Energy Technology choices and security and climate impacts



The chart looks at U.S. energy options today and calculates and compares selected energy technology options and the impacts these choices would have on our relative energy security and climate performance in 2025.

As you can see, energy technologies in the upper right quadrant have a positive impact on climate change and energy security, while those in the lower left have a negative impact on both. Those in the other quadrants involve tradeoffs. The size of each bubble represents the potential of that technology to meet future energy demand.

Key take-away messages from this review:

- Increasing fuel efficiency standards has the potential to make the biggest contribution to meeting our energy needs. In addition, this option has very strong positive implications for both energy security and climate.
- While coal-to-liquids can make a small contribution to increase U.S. energy security in this timeframe, pursuing this option would have significant negative impacts to the climate. Even if most of the CO_2 from the conversion process is captured and stored, climate impacts are still negative compared to petroleum.
- Ethanol from corn would deliver significant new energy and increase U.S. energy security, but would deliver relatively small benefits to the climate. This is due to the high energy input required to produce and process corn – and the fact that most of this energy is derived from fossil fuel (in particular, coal). Cellulosic ethanol will likely deliver slightly less energy than corn-based ethanol over this timeframe, but has a greater positive impact on climate change on a life-cycle basis.

The options graphed here are not drawn from specific pieces of legislation, nor are they part of an energy forecast. Different policy designs would lead to different placement of "bubbles" on the chart as well as influence the size of the bubbles themselves.

A Level Playing Field

Without federal leadership, states move ahead on their own to stem greenhouse gas emissions, recognizing the critical role their legislation can make in preparing their states and economies for a carbon-constrained world. They see the impacts of climate change already – they seek investments in clean technologies, and they act as innovators of policy. California, Oregon and Washington already require power plant operators to purchase offsets for a portion of their CO2 emissions and are crafting a Western regional climate initiative, and the Regional Greenhouse Gas Initiative cap and trade program in the Northeast will be operational January 1, 2009. But this creates a patchwork of regulation, and does not send a uniform signal throughout the economy. It does not scale up technologies and investment into those technologies. A strong federal program is required.

States and regions differ in their power generation sources, their renewable resource base, and their energy efficiency. An emission allowance allocation system in a cap-and-trade program can help mitigate economic transition costs. Allocations can help the regions or groups relatively more adversely affected by GHG emission limits and recognize those who have made investments in higher cost, low-GHG technologies.

Recognizing that there are differences between states, regions and among companies, US CAP suggests that a significant portion of allowances should be initially distributed free to capped entities and to economic sectors particularly disadvantaged by a cap, including the possibility of funding transition assistance to adversely affected workers and communities. Free allocations to the private sector should be phased out over a reasonable period of time. Early actors should be recognized.

We must act now if we are to preserve all our options for cost-effective greenhouse gas reductions and engage the international community. We in the U.S. must take the first step by reducing our own emissions. And we hope Congress will urge the Administration to re-engage the international community at it discusses post-2012 policies. International cooperation is necessary, and can also help to improve cost-effectiveness, but U.S. action is imperative from both an environmental and political perspective.

This year, the IPCC offered as stark a picture of the scale and immediacy of the environmental challenge we face as I have ever seen. And the economic assessment completed a year ago by Sir Nicholas Stern offered a vision of significant risks associated with climate events – contrasted with a more moderate economic impacts if we act today to put the wheels in place for a smooth transition to a global economy fueled by clean energy technologies.

The transition to a clean energy future can be met with new jobs, new opportunities and American ingenuity. Without significant mandatory federal policy, however, markets are unlikely to receive direct signals that spur investment and sustain change. Delays in federal action only hinder our ability to innovate and invest in solutions.

I look forward to the opportunity to work with you and your colleagues across the House and Senate on both sides of the aisle as you take up global warming legislation. We urge you to continue exploring this topic, and request that Congress move rapidly from debate to enactment of policy solutions. Thank you for the opportunity to join you today.

The CHAIRMAN. The Chair will now recognize himself for a round of questions. We will begin with you Mr. Izzo.

PSEG is primarily a northern company. A couple of weeks ago, we actually had the Vice-President of the Southern Company who testified before us. He told us that solar energy would not work for the Southern Company down in Florida and Georgia. And yet we hear from you today up in New Jersey and the States surrounding New Jersey that you are making a massive investment in solar energy.

And it seems kind of curious, because I think that New Jersey seniors as they leave New Jersey to go to Florida say the same thing that Massachusetts seniors say as they leave for Florida, which is I hate the winters up here; I am going to Florida. So why is it that you, a northern company, can make such a massive investment so optimistically in solar energy, but the Southern Company says that it won't work down there?

Mr. IZZO. Well, I can't talk for the Southern Company. I can tell you the logic that we put into this.

Solar energy will work in New Jersey. Its estimate, depending upon assumptions you make, is it would cost anywhere from $5,000 to $8,000 per kilowatt. That is more expensive than conventional gas-fired power. So one could take the approach that, quote, it doesn't work. I would simply say it is more expensive.

However, that would be looking at only one side of the equation. Clearly, the benefits of solar are not only in terms of greenhouse gas reductions but also in terms of traditional pollutant reductions: NO_X, SO_2, mercury, fine particulates. So it is our responsibility, I believe, to educate consumers that, while there are some places energy efficiency, where you can improve the environment at a lower cost, there are other technologies where improving the environment will result in higher cost, but it will work.

The CHAIRMAN. Now, we just voted in the House a standard that would be national, 11 percent renewable electricity by 2020 and 4 percent from efficiency. Can you meet that up in New Jersey?

Mr. IZZO. The answer to that is yes. The question that others will ask is, at what cost? And my response is—that is for policymakers to decide. We will do it at the least cost possible.

But to answer your question, Mr. Chairman, yes, we can meet it. And I think through using utilities we have a lower cost to capital, more patient capital, longer amortization schedules, and by removing the investment tax credit exclusion which right now undermines a utility's ability to invest in that we can do it at the least cost for customers.

The CHAIRMAN. Thank you.

Mr. Carson, we are also debating auto efficiency here in the United States. Can you bring us up to speed on what is going on in Europe? What are the standards that are being debated across the EU?

Mr. CARSON. Yes certainly, Chairman. I don't have the actual numbers to hand, but we talk in Europe about fuel economy in terms of grams of CO_2 per kilometer. I think the average for the fleet is about 160 grams of CO_2 per kilometer, and I would imagine that relates to about 40 miles to the gallon. They may be slightly more. I think that compares to the fuel economy in the U.S. of

maybe 20. Again, I don't have those figures to hand, but they are rough numbers.

The auto makers in Europe have been working to a voluntary program to reduce their emissions of CO_2 for the fleet, and that has had some success. But, more recently, the governments have decided they want more success than that and are pressing the car companies to reduce from 160 to around 140 in a couple of years time and then 120 and ultimately to below 100. So very significant miles per gallon that equates to.

Having made that announcement earlier in the year, the Frankfort Motor Show, which was in September, it was interesting to note that every single car company showcased high-fuel-efficiency vehicles. So these fuel efficiency vehicles are available.

Of course, it is easy to blame the car companies for selling vehicles that don't have high efficiency. So the consumers take some blame here in what they want to purchase. I accept that point. But the other thing that has happened in Europe is that there has been a push to diesel vehicles which are 19 percent more fuel efficient on a like-for-like basis; and now 50 percent of new car sales in Europe are for diesel fuel vehicles, up from something like 32 percent 5 years ago. So quite a dramatic change in the engine type used in Europe.

The CHAIRMAN. My time is expired.

The Chair recognizes the gentlelady from Michigan, Mrs. Miller.

Mrs. MILLER. Thank you very much, and I will follow up on my chairman's comments.

Mr. Carson, as I mentioned to you, coming from the Motor City, Detroit, Michigan, I obviously have a very large interest in this; and I appreciate the fact that you are trying to articulate the differences in what we have as the government regulation for CAFE standards, as we call them here, and in Europe, of course, they are voluntary.

I will just make a personal observation. As you travel to many of the major European cities, whether it is Brussels, Berlin, Rome or whatever, you see all these buildings that are practically blackened. We don't have that here, and that obviously has had an impact. I am not sure how all the voluntary standards are working there, but I certainly commend the European automobile industry to be looking at doing these kind of things as well.

I might ask, if I could, when—and you mentioned in your comments, Mr. Carson, as well, about that you were heavily invested in hydrogen fuel cell technologies, et cetera. Perhaps you could flesh that out a bit for me. How does your company interact with your government as far as any research and development dollars either for hydrogen fuel cell or lithium-ion batteries or some of the various alternative energy sources?

Mr. CARSON. Well, firstly, the comment on the black buildings, if I may, in Europe. I don't know the cause exactly of that. But the latest technology which has been driven by legislation for the emissions of diesel vehicles, it is now possible to get diesel vehicles to exactly the same emissions performance as petrol vehicles; and that is for U.S. legislative limits, too. So I think that the emissions from diesel and petrol vehicles in the future will actually be the same, so not a differentiating factor.

The fuel cell business is focused on many applications. The biggest one in the future we believe will be cars, and we are stimulated to work on fuel cells by the car companies who pretty much all have some kind of programs to put fuel cell engines into vehicles at some stage in the future.

This is quite a long-term issue. I think influential here has been California in driving towards zero emission vehicles which the car companies obviously have their eye on.

So our main motivation is to work with our customers. We are the recipients and grateful to be the recipients of some government funds in the area of fuel cells, but our main expense and our main driver is through our desire to develop products for future generation cars and residential buildings in collaboration with our customers.

Mrs. MILLER. Thank you.

Another difference, of course, between our two continents is the way that we tax the usage of gasoline, petrol, and a huge tax burden in the EU which we don't have here, although there is a lot of talk about using taxes as a way to disincent driving.

One of the things I think that is very important between the U.S. and the EU is that we do have an overlay, a mesh of the regulatory standards between our two economies and that we don't have any kind of unintended consequences with some of the various regulatory policies that we have had, as we did with the Sarbanes-Oxley. Unfortunately, with the financial services there was an overreaction, I guess, in some ways and we didn't really talk to our European friends about that. So we want to make sure in the environmental area that we do so.

If I could ask a question, again to my European friends here, and we certainly appreciate you coming, I was very interested in what is happening with the focus of the entire EU really on the airline industry, although that is apparently only 3 percent of the emissions as you have interpolated it there, but yet there is a huge focus in Europe to utilize the emissions trade. If you could just talk a little bit about that.

Because I noticed in your written background, Mr. Grisay, that you were saying the emissions trading scheme really hadn't delivered on its promise. How is that all working?

Mr. GRISAY. Well, that is a very interesting point. It is certainly one that attracts a lot of attention in the public and a growing awareness of the public in respect of the responsibility of airline companies, and you see quite a bit of lobbying in that respect.

As a fund manager, I can assure you that, for instance, in the case of the socially responsible funds that we run, and they happen to be the largest in Europe, we exclude investments in airline companies for that reason. I think that it is also linked to a degree to the growing success in alternative public transportation, in particular fast trains. So this is indeed a comprehensive review of what the alternatives are and certainly a growing pressure for greater efficiency. I don't believe airlines will disappear. I don't believe we should stop flying. But putting pressure on both airlines and airports for greater efficiency is certainly the right thing to do.

Mrs. MILLER. Thank you. Has my time expired?

The CHAIRMAN. Yes, your time has expired.

The Chair recognizes the gentleman from Oregon, Mr. Blumenauer.

Mr. BLUMENAUER. Thank you, Mr. Chairman.

Mr. Izzo, in your testimony, you indicate that there is going to be a paradigm shift that is going to be necessary in terms of how utilities are regulated to provide some incentives for reasonable return on energy efficiency. In my community, our gas company actually was a pioneer in decoupling to disconnect the rate of return from just the volume of gas. Are there other specific ideas that occur to you that we should be considering in terms of changing that regulatory scheme?

Mr. IZZO. Yes. Decoupling is a necessary but not sufficient condition, to use an old mathematics expression, in that it holds a utility harmless. But, today, if I invest in a bigger wire so that more electricity will flow, I can get a return on that investment. If I subsidize a compact fluorescent light bulb, I get zero return on that investment. It is strictly what is known as a pass-through. There is only so much time in a day, there is only so much management attention I can put to certain things, and at the end of the day I have to show a certain amount of earnings growth. So I tend to therefore focus on the things that produce the profitability that my investors seek. So what I would encourage is truly putting energy efficiency on a level playing field with supply options and allowing you to at least earn returns on energy efficiency.

Mr. BLUMENAUER. I would welcome some thoughts that you or any of the other panel members might have in specific ways that we might adjust the State regulatory scheme. This looks to me to be one of the real gaps; and I, for one, am willing to encourage higher rates of return for the types of behaviors we want. The specifics would be of great interest.

Mr. BLUMENAUER. Mr. Lash, on page 5 of your testimony you have these charts here that——

Mr. LASH. The bubble charts.

Mr. BLUMENAUER. The bubble charts. There is one bubble that I noticed that was not there, and that is vehicle miles traveled. We have people, Urban Land Institute, Smart Growth America, a number of folks who have done an analysis that suggests that even if the Chairman's CAFE standards are reached, that the exponential increase in vehicle miles traveled from outdated regulatory schemes, land-use patterns and fewer transportation choices for folks will overwhelm any energy savings.

Do you have any thoughts about that missing bubble and policy initiatives that might help address that balance?

Mr. LASH. I do. I would make two comments.

First, the explanation of why the bubble isn't there is, in order to make it readable, we tried to only portray those policy initiatives that seemed to be immediately before the Congress. So we put CAFE there because there was an ongoing debate on CAFE. The same with coal liquids. We didn't see a proposal that was before the Congress, when we developed it, on vehicle miles traveled.

You are absolutely right. In fact, the evidence is what has happened over the last 20 years, the U.S. auto industry has made spectacular increases in performance and efficiency, but they have been erased by increased size of the vehicles and by increased vehicle

miles traveled. So our consumption has gone up. We have not put it into reduced consumption of gasoline.

The recommendations of the United States Climate Action Partnership include the recognition that any policy on transportation has to address the technology of the vehicle, the fuels and vehicle miles traveled. That means a combination of policies that address alternative transportation means and getting at some of the land-use issues that tend to force us to travel long ways to get to work.

Mr. BLUMENAUER. Mr. Chairman, I would hope that there would be time in our agenda at some point, actually maybe even a hearing in Oregon, where we have done some of this work—Mr. Inslee has some of it in his book—where we could look at some of the policies that would give people more choices that would end up reducing vehicle miles traveled.

In our community, because we drive four miles-per-day less on average than the national average, we are saving hundreds of thousands of gallons of gasoline and over a billion dollars in savings to our constituents. I think it is something that would be a lot of fun to explore, and would love to offer some suggestions about where to do it.

The CHAIRMAN. We will be in Portland, Oregon, before long, we promise.

Mr. BLUMENAUER. Thank you, Mr. Chairman.

The CHAIRMAN. Thank you.

The gentleman's time has expired. The Chair recognizes the other gentleman from Oregon, Mr. Walden.

Mr. WALDEN. And after the Portland hearing, you could come out to, say, Burns or somewhere and look at great distances traveled and the need for bigger vehicles. We would like to take a look at that, because we need to get efficiency in those as well.

I want to talk—Mr. Izzo, you made a statement, and I just want to make sure I heard it correctly, that solar power was at $5,000 a kilowatt hour to $8,000 a kilowatt hour?

Mr. IZZO. Hopefully I did not use the units kilowatt hour.

Mr. WALDEN. You did.

Mr. IZZO. Okay. Kilowatt. The installed value is $5,000 to $8,000 per kilowatt installed.

Mr. WALDEN. Now, could you translate that, as a rate payer, what is it per kilowatt hour?

Mr. IZZO. Per kilowatt hour, depending upon the amount of sun and the conditions, but in New Jersey that would be typically about 70 cents per kilowatt hour, which is quite a bit more expensive than fossil fuel.

Mr. WALDEN. And what would the fossil fuel rate be today?

Mr. IZZO. Typically, about 7 cents per kilowatt hour.

Mr. WALDEN. So about 10 times.

Mr. IZZO. Yeah, some would say that it could be as little as seven times, but it is many multiple times more expensive.

Mr. WALDEN. And what is the energy efficiency rating for solar versus some of these other——

Mr. IZZO. If I am interpreting your question right, in terms of dollars per ton of CO_2 saved, solar would cost about $500 in New Jersey for a ton of CO_2. But that, then, doesn't account for any of

the NO_X savings, SO_2 savings, the mercury savings, the particulate savings.

Mr. WALDEN. Sure. But what about energy generation efficiency?

Mr. IZZO. About a 15 percent conversion rate in New Jersey.

Mr. WALDEN. Okay. Now, I want to make sure you and I are talking the same talk here, because, like, I am told for hydro power, which we have a lot of in the Northwest and in other select areas around the country, we are almost 90 to 100 percent efficient in generation conversion. So are we talking the same thing here? The solar is what percent?

Mr. IZZO. No, we are not talking the same thing in that regard.

Mr. WALDEN. All right.

Mr. IZZO. I was talking about how often the solar energy is available to be converted into electricity.

Mr. WALDEN. Right.

Mr. IZZO. I don't know the answer to that question about the overall efficiency of the solar panel in converting the sunlight into electricity. We could get that for you. I don't know that.

Mr. WALDEN. Okay. We are actually working on a project in my district that would incorporate at least solar and perhaps wind on an old military installation. And I am fascinated by the prospect. We are working with the Air Force to try to work with the National Guard to try to free up the site with the State and develop these alternative sites. And I am just curious as to the efficiencies and the costs and all and how we can move that one forward.

Mr. Carson, I think, back to the issue of vehicle emissions and all, it seemed to me, when I was on the Energy and Air Quality Subcommittee trip to Europe, there was a lot of discussion we had about the differences in air quality legal standards in Europe versus the United States, and perhaps we have a much higher standard under the Clean Air Act than Europe.

And I am curious if you know about that and what the differences are, especially as they relate to diesel fuel usage in Europe and the emissions there and the deaths that are attributed to that versus here. I think it is about 10 times as many people die from the dirty air in Europe as here. And we don't want to go down a path that exports that here, for example.

Mr. CARSON. I think, yeah, the issue you are referring to is that, in Europe, the strategic decision was made by the governments to give a different emissions standard to petrol vehicles than to diesel vehicles.

Mr. WALDEN. Okay.

Mr. CARSON. Different in that it was recognized that diesel vehicles were much lower emitters of CO_2——

Mr. WALDEN. Sure.

Mr. CARSON [continuing]. But they were higher emitters of other pollutants like NO_X and particulates. So Europe has been tolerant to that issue and had two different standards for the different vehicles, whereas here in the U.S. there was no tolerance to that issue. So the standards are the same, whichever kind of engine is used. And that made the supply of diesel-engined vehicles in America very difficult——

Mr. WALDEN. And if you——

Mr. CARSON [continuing]. For a number of years until now—sorry to interrupt you—where the technology has been driven forward.

Mr. WALDEN. Right.

Mr. CARSON. And now it is possible to meet the same standards in diesel and petrol engines with more advanced catalyst technology.

Mr. WALDEN. Did I hear you say the standards in Europe for the petrol vehicle are the same as in the United States now for emissions?

Mr. CARSON. Broadly, yes, and they always have been broadly.

Mr. WALDEN. So the new standard for diesel in Europe would pass air quality standards in the United States?

Mr. CARSON. It is very hard to do a like-for-like, because the drive cycles are all so different in Europe. The driving pattern in Europe is somewhat faster than in the U.S., so the test is actually different. But broadly, the emissions standards in 2010 in Europe for both diesel and petrol vehicles will be pretty much the same as the emission standards in the toughest States in North America.

Mr. WALDEN. Thank you.

Thank you, Mr. Chairman.

The CHAIRMAN. The gentleman's time has expired. The Chair recognizes the gentleman from Washington State, Mr. Inslee.

Mr. INSLEE. Thank you.

Mr. Lash, I wanted to ask about your suggestions, cap suggestions about the cap-and-trade system. You testified that—you suggested that a significant portion of the allowances be initially distributed free to capped entities and economic sectors particularly disadvantaged by the cap.

Could you talk about what you think should be that targeting of those? If we are going to have some free allocation, you know, how should that be targeted?

Mr. LASH. On behalf of USCAP, I can't tell you very much more, because, for now, what we have agreed on is the language you just read outloud. So let me offer some thoughts as an individual.

There are 20, 25 States in the country whose electrical utilities are heavily dependent on coal. And any way you look at it, if we begin to put a price on carbon, the rates will go up more quickly in those States than the others that have nuclear, hydro, et cetera. So there is a belief that an allocation to those utilities for some transitional period will help ease any price shock.

A second option is to look at earned allocations. So if a utility proposes, for example, to make a major investment in carbon capture and storage, free allocations would be one way that the legislation could reduce the cost, which is another 30 percent or so on the cost of a power plant to set up carbon capture and storage.

A third option would be to look through the utilities to the rate payers and try to find some way of equalizing burdens for rate payers. I personally believe that is quite complicated.

Mr. INSLEE. You went on, "CAP also suggests the free allocations be phased out over a reasonable period of time." Why? I mean, could you give me the rationale for an auction, I guess, to begin with?

Mr. LASH. An auction is economically most efficient. You are assuring that those who make the biggest investment in reducing CO_2 get the biggest economic benefit. So a covered entity, whether it is an industry or a utility that makes major investment, for example, in methane to electricity from a landfill and is essentially operating at zero CO_2 emissions, ought to get a very large benefit. One way to assure that is to have an auction of credits, and then they don't have to buy any credits.

A second question is how you use the revenues from the auction. It gives you a chance to put the revenues back into programs, as I think Mr. Izzo recommended, to accelerate the adoption of technology or offset costs to low-income consumers.

Mr. INSLEE. And, by the way, we haven't talked about this, and I agree with you that a huge portion of investment would come from the private sector, but would any of you like to talk about the pathetically weak U.S. R&D budget from the Federal Government, which is one-sixth of what it was on the Apollo Project? Would any of you like to agree with my assessment on that?

Thank you. That is unanimous. I will take that.

I want to ask my friends from Europe, if you want to give us a critique of the cap-and-trade system, maybe the top three lessons you have learned from your experience. We were in Europe looking at it, and we drew some conclusions. I would be interested in yours.

Mr. GRISAY. Well, I think that is a very interesting question. Europe has a trade system in carbon certificates which did not work at the beginning. And I think we should learn from that. It did not work because there were simply too many certificates issued at the beginning. And the reason for that was that each country was allowed to issue as many certificates as it felt was necessary. So they all protected their own industry and issued as many as possible.

So, as a result of that, the price of carbon collapsed, and it obviously failed to reach the objectives set. The lesson is, obviously, to be much more restrictive of the level of the number of certificates to be issued. And I think you can expect the European Commission, at the end of this year, to set targets for 2009 that will be a lot more restrictive.

The second observation is that it is probably wrong to let every national entity decide how many certificates they need to issue. This should be brought at E.U. level, for obvious coordination reasons.

And, in fact, that leads to a third lesson, which is probably to say at some stage, recognizing that the fight against global climate change is a global fight, one could envisage a situation where it would be a supranational entity that would be in charge of issuing carbon certificates. Whether that is some sort of subset of the U.N., some sort of equivalent to the World Bank for carbon trade, I leave open to your own wisdom.

Mr. INSLEE. The presidency of that would be determined by the winner of the World Cup, too.

The CHAIRMAN. Thank you.

The gentleman's time has expired. The Chair recognizes the gentleman from Connecticut, Mr. Larson.

Mr. LARSON. I thank the Chairman, and I thank the panelists.

And I want to continue along this same line of questioning, having had the fortunate opportunity to travel to Europe with the Chairman and the Speaker. But my question is a little bit different. I believe that the best system for us to proceed on is a carbon tax. I believe that it is more simplified, it is more direct, and you don't have to have any specific economic knowledge to implement it. You don't create any new bureaucracy. Many countries in Europe have utilized it successfully and are greener and farther ahead.

I understand the pragmatic political applications here in our own country. You say "taxes" and our colleagues on the other side of the aisle just go into almost apoplectic seizure. And there isn't, you know, in election years oftentimes the desire to move forward, albeit I am agnostic with respect to a cap-and-trade system.

But on an issue as vital as this, as critical as this is to the Nation and, as Mr. Grisay said, to the globe—and we project out into the future, and while it is very important for the United States to step up to the plate and lead the way, ultimately we are looking at major nations on the verge of industrial lift-off, like India and China, whose major resource is carbon, and ironically turn to Western Europe and the United States and say, "So, you want to put a cap-and-trade system on us after you have already put up most of the carbon into the atmosphere."

So my question is, isn't it fairer and more direct and more efficient to go to a system that taxes carbon, taxes something that we know is bad and know is harmful, and, in return, have payroll deduction relief for American citizens? Your response?

Mr. CARSON. Chairman, can I make a quick comment on that? I am sure my colleagues will also want to comment.

But I guess the beauty of the cap system is that, in Europe, the debate has been revolving around how do we keep the level of CO_2 in the atmosphere below a certain level, be it 550 parts per billion or whatever that level is, in order to limit the temperature rise of the planet in the future. And if you have a cap, I guess you have some certainty that you will get to that.

Mr. LARSON. Where is the transparency and the accountability in that?

Mr. CARSON. Well, there could be some calculations done, I am assuming, that will mean a cap has more bearing on the outcome than a tax, which I guess, ahead of time, you don't know how much tax you have to set, and then you don't know the effect of that tax in reducing CO_2 output. Again, I guess the experts are the governments of Europe who have come to that decision.

Mr. GRISAY. What I would like to add to that is I don't think any measure taken on its own is going to provide the right solution. So I think that, if we take a long-term view, you are probably looking at a mixture of cap and trade, fiscal and long-term standards.

Now, to comment on the long-term standards, I think it is really, really important that we provide industry with a long-term certainty in respect of the standards they will have to meet, because that will drive them to do the long-term, very expensive investment that they would be required to do to meet or beat those standards. And by setting them up front now, we give our respective industries the opportunity to become market leaders in those tech-

nologies. And that is how we will basically be able to deal with the threat, the competitive threat of emerging countries.

The reality is I don't think we can escape the consequences of climate change. And what looks like moderately embarrassing or annoying regulations today or taxations today would be very mild compared to what will be needed in 10-years' time or 15-years' time if we don't do this. So by pushing it now, by incentivizing this research now, we give industry the chance to really become very, very competitive by the time it would be required.

Mr. LARSON. Mr. Lash.

Mr. LASH. As you know, USCAP recommended cap and trade rather than a tax, although a tax could be included as a complementary measure to pick up those parts of the economy that a cap system isn't applied to. The reasons are really the ones that were just explained by Mr. Grisay, the wish for certainty as to the level of emissions and the path of reducing emissions.

I would add one observation, myself. I know, Congressman, that you have been looking closely at the idea of tax shift, which is very appealing as a way of improving equity as well as the environment. Our experience in working with companies for 15 years now has been that price signals don't work as quickly as they should. I know economists say there are no $10 bills lying on the floor, but with the companies we have worked with there have been some, quite a lot. And this is a case where we need to get the action started from large emitters quickly.

The CHAIRMAN. The gentleman's time has expired. The Chair recognizes the gentleman from Missouri, Mr. Cleaver.

Mr. CLEAVER. Thank you, Mr. Chairman.

Mr. CARSON, we are, of course, having some debate here over a carbon tax. And as Mr. Larson mentioned, you know, the word "tax" in some quarters is almost reason for civil war. But is it at all possible for Europe to have one system and the United States another, considering the fact that we are if not already a global economy, we are moving almost hourly toward that?

Mr. CARSON. I think the important issue is that all the economies get to do something, and harmonization of that something is something that ought to follow later. That is my personal view. We have never had the same system of tax regime on fuel for cars for a very long period of time. And that has driven differences in the market. And I understand that, you know, a tax on fuel is an emotive issue here. It seems it has been less emotive in Europe over the last 20 years.

So I think if there is a view that we must wait until everybody is lined up with the same system before implementing it, then that will take too long, is my personal view. And some action, just like in Europe with the action on cap and trade, which wasn't perfect—at least it was a starting point from which we can build. And I think that ought to be the way we operate and head toward a global agreement later.

Mr. CLEAVER. Do you or Mr. Grisay have any idea of the estimate of the carbon dioxide output per individual in the U.K.? I think Germany, for example, is around 11; the United States is 20.

Mr. GRISAY. I think the U.K. has a modest, but nevertheless frightening, 2 percent contribution to total emissions, so one reason why the action needs to be lower and not just restricted to the U.K.

But if I can come back just to what——

Mr. CLEAVER. Yes.

Mr. GRISAY [continuing]. He was saying a second ago, I think there are two different objectives in my mind. One is to get the carbon level down fast across the globe, and that may imply indeed different approaches on different continents and different countries.

But there is a second objective, which is to make sure that industry remains competitive, that we create a growing economy, that we do create jobs. And that is about making industry competitive. And that is where I am coming back to making sure that standards are being set so there is a long-term guidance as to where industry needs to reach. It would be much more practical to have similar standards, because, otherwise, those countries that have the strictest standards are, by definition, going to be a lot more competitive, going forward.

So I would add a word of warning there. You may take a different point of view on taxes, but on standards I think it would be very useful if we had some sort of global approach.

Mr. CLEAVER. Thank you.

Just one last question. Mr. Lash, are you at all familiar with the American Electric Power settlement with the EPA and a number of other not-for-profit entities?

Mr. LASH. Yes.

Mr. CLEAVER. Do you think that settlement, $4.6 billion over a 10-year period, will have any impact upon corporate America? I mean, a positive impact, where people recognize that if you pollute, you are going to have to pay enormously, and therefore people will move into some kind of compliance without Government?

Mr. LASH. Congressman, I started working on environmental issues in Washington about the time that Congressman Markey arrived in Washington. And I started as a litigator for NRDC, suing companies because they seemed to just refuse to meet national standards.

Mr. CLEAVER. My kind of lawyer.

Mr. LASH. Yeah. And I have moved to a completely different approach to these issues. Now I spend half my time working with the CEOs of big companies. I don't think that is just because I have, you know, crossed the 60-year-old line. We have seen a huge change in approach and attitudes from companies, as a new generation has taken over. They see it as in their commercial interests to address environmental issues proactively. And I think that is what gives me hope that we are going to be able to address the climate change issue.

I do think that the good companies need to be backed up by EPA, by knowing that if there are companies that violate the laws, they are going to be penalized. Otherwise, there is always the risk that a company that is meeting high standards has to compete with somebody who isn't.

The CHAIRMAN. Great.

The gentleman's time has expired. The Chair recognizes the gentlelady from South Dakota, Ms. Herseth Sandlin.

Ms. HERSETH SANDLIN. Thank you.

And thank all the witnesses today.

I would like to explore an area that we haven't touched on yet, and that is agriculture as a participant in a cap-and-trade system.

And in response to Mr. Inslee's questions, Mr. Grisay, I think you had a number of helpful observations on what has worked effectively, maybe what hasn't worked effectively, and lessons to be learned.

We did come to find, when we traveled earlier this year in some meetings in London, that agriculture is not a participant in the European emissions trading system. I, for one, feel strongly that if the United States adopts a cap-and-trade system that agriculture must be a participant, and have some constituents and companies in South Dakota and throughout our region that are working on appropriate measures for how you value what grazing or farming techniques and how you measure those.

The response that I received in the London meeting about why agriculture isn't part of the European system is sort of disagreement of how you accurately measure and appropriately measure. So I am wondering if you would cite that as a lesson learned and, moving forward, including agriculture.

And, Mr. Lash, if you have any thoughts, as well.

Mr. GRISAY. I think it is a very relevant question. Agriculture, in my mind, should be included. I think the whole issue about biofuels is really one of first recognizing that there is probably very substantial potential in that industry, but that we need to do a better job at understanding the full life cycle of the development of those products. Because it appears that the so-called first generation of biofuel products may not come from sustainable sources, and that we may, in the course of producing them, either be totally inefficient or actually cause damage.

So the issue, in my mind, is to be very open-minded toward agriculture and biofuels, but making sure that we have a number of new technologies and the so-called second generation of biofuels, which would come, for instance, from sustainable lands, probably not from food crop, and probably use mostly waste land or high-fiber-contained products.

So there is a future there but, again, one that requires investments and investigation.

Mr. LASH. I was hoping you were going to bring up this issue. One aspect of it needs to be addressed in whatever climate change legislation you pass, and that is the question of whether agriculture can participate as a seller of credits into a trading system under a cap. It is an opportunity for farmers and larger-scale operators to make reductions to sequester carbon and then to get credits for it.

A second—the question of measurement I think we have made some progress on. The Voluntary Carbon Exchange that operates in Chicago, Chicago Climate Exchange, has, in fact, done quite a lot of work on measurement of agricultural offsets so that they could be included in the CCX system. The USCAP recommendations would allow agricultural offsets to be included.

The second set of issues are ones that would be covered in other legislation relating to the whole issue of biofuels, technical assist-

ance to the agricultural community, and the movement from corn-based ethanol to cellulosic ethanol from waste materials or forest products.

Ms. HERSETH SANDLIN. Thank you.

And that leads to my other questions, in terms of beyond biofuels, wind, solar, the health of our forests and enhancing them as carbon sinks.

But would you agree with me that to achieve the potential that we have with the renewables of wind and solar, in particular, but then with biofuels and the flex fuel vehicles that are being manufactured and getting CAFE credits, but yet the availability of the fuel not being as comprehensive as we would like, that, in addition to whatever investments we make at the Federal Government level and R&D combined with private-sector investment in technology, that the Federal Government has to make investments and perhaps impose requirements as it relates to transmission capability across the country to get the wind resources from the Great Plains to other parts of the country, as well as the fuel distribution infrastructure to make sure that we are achieving both the objectives of energy security and the positive climate impact?

Mr. LASH. Again, not speaking on behalf of USCAP, because we haven't addressed this, the transmission issues are very, very real, particularly because wind power is growing so fast.

I would defer to Mr. Izzo in terms of the specifics of how best to address that.

Mr. IZZO. We are a firm believer in open access to transmission; however, not simply designating what type of supply would get earmarked a slice of that transmission, but letting the market determine what the best solutions are for moving power back and forth.

But the specific answer to your question is, yes, there is clearly a need for transmission infrastructure to move renewable energy from the places that are more suitable for siting and building those facilities.

Ms. HERSETH SANDLIN. Thank you.

And thank you, Mr. Chairman.

The CHAIRMAN. The gentlelady's time has expired.

Here is what I would like each of you to do: Give us a 2-minute summation of what you want the committee to remember as we are moving forward. We have an energy bill that we are trying to resolve between the House and the Senate over the next 6 weeks, which would be the most historic energy bill in the last 30 years here in the United States.

And subsequent to that, we have an intention to take up the debate on climate change in terms of a cap-and-trade system or, as Mr. Larson is saying and Senator Dodd, a carbon tax. But the Speaker of the House has said that she wants a bill that passes that has a mandatory cap-and-trade system that reduces our emissions by 80 percent here in the United States.

So this energy bill is up right now, and hopefully we can resolve that in the next 6 weeks, and then we will move on.

So let us go in reverse order, give each one of you a 2-minute summation so that you can tell us how you believe we should be viewing these issues and your recommendations as to how we should proceed.

We will begin with you, Mr. Lash.

Mr. LASH. Thank you, Chairman.

I would begin by echoing what you were saying just a moment ago. The energy bill is a very good first step. The energy efficiency provisions, the renewable provisions will make a significant difference for both of the issues mentioned in the title of this committee. And it is there, it is available, it is waiting to be passed. It will reduce costs for the country, ultimately.

Secondly, we should not assume that it isn't possible to pass strong greenhouse-gas-reduction legislation in this Congress. I met with Senator Lieberman yesterday. I believe that the Senate Environment Committee will get a strong bill out this year, and I think there is a real potential.

The important thing is to keep our eye on the ball, to remember that we need legislation that gives industry and investors a long-term road map that we are going to start reductions and continue reductions over a period of decades, so that they can make investments in light of those signals.

The CHAIRMAN. Thank you, Mr. Lash.

Mr. Grisay.

Mr. GRISAY. Thank you, Chairman.

I would just summarize conversations I have had before with Prime Minister Blair, Brown, and President Barosso on that very question. And I think the strong message that I would like to share with you is that there is a need for urgent action. We just cannot wait. And there are opportunities and risks in front of us, but the costs of delay are just absolutely staggering.

And maybe one suggestion there is to see the U.S. Congress supporting the equivalent to a stern review, as was done in the U.K., in case there were still people around who had some doubts.

Practically speaking, I look forward to implementing, as part of the energy bill, binding regulations. And I would certainly welcome a mixture of cap and trades, fiscal measures, and standards for energy efficiency going forward, because I think all three are necessary for the reasons that we discussed.

The CHAIRMAN. Thank you, Mr. Grisay.

Mr. Carson.

Mr. CARSON. Similar message from me, Chairman. Urgent action required. Not one solution, but very many solutions to this issue. Some are simple, and some we must be getting on with right away.

And I am sure business is now getting on with its resource efficiency issues, because that is going to save money. But the others that need a technology solution also need to go hand in hand with a framework for future binding targets, in order that industry can spend its own money in finding those solutions. And we and our colleagues are very keen to work together with governments to try to make that happen sensibly.

The CHAIRMAN. Thank you, Mr. Carson.

Mr. Izzo.

Mr. IZZO. With regard to the energy bill before the Congress now, there are two imperatives that we would identify. Number one is elimination of the investment tax credit exclusion for utilities to participate in solar energy so that we can help develop solar power in a least-cost method. Number two would be incentives for States

to encourage utility participation in energy efficiency in ways that benefit both customers and investors.

On the broader issue of the global climate change legislation, we would argue that a bill with reduction targets and timetables that are strong enough to obviate the need for regional and State programs is an imperative. Regional and State programs will create competitive distortions that could actually not only raise rates for customers, but result in environmental degradation through a phenomenon known as leakage. We have heard already about the importance of harmonization at the international level and at the E.U. level. It seems to me that a single national greenhouse-gas-emissions credit-trading market would be an obvious first place for us to begin here in the United States.

Thirdly, a fair allocation approach in the electric sector that acknowledges the investments already made by companies in cleaner technology and incents those types of investments going forward.

And lastly, consumer protections in the form of assistance for low-income customers from any proceeds that are derived from the auctioning of allowances.

The CHAIRMAN. Thank you, Mr. Izzo, very much. And as you know, much of what you are recommending is in either the House or the Senate energy bill right now. And we will fight to maintain that, because I do agree with you that the utility sector has a huge role to play, and we have to construct a newer and smarter set of incentives for the utility industry to fully participate.

And I want to actually tell you this, too, especially our friends from across the ocean, that the energy bill that we are considering and we are debating over the next 6 weeks, if the best elements of it remain intact and are in the final package, it would meet, by 2030, 40 percent of the United States' goal to reduce heat-trapping gases that the United States has to do in order to save our planet—40 percent of our goal.

So, because we are dealing with the electric utility industry and the automotive sector, buildings, all of the appliances in our country, combined, that 40-percent number is something that is very realistic in terms of contribution to climate change, and I think sets the stage, as Mr. Lash said, for a more comprehensive climate change bill. But not to understate what 40 percent means in terms of demonstrating the resolve that the United States has to deal with these issues and send a signal to the rest of the world that we no longer will be the laggard but, rather, a leader in setting standards. And I think that is a very important statement for us to make.

So this bill that is pending before us is very, very important. And if we have a 40-percent solution by 2030, I think that the rest of it will be able to be followed on, because it will give the utility industry, the automotive industry and all other sectors a stake, then, in finding a way to put together a comprehensive cap-and-trade system, which, ultimately, I think will become a model for the rest of the world, partnering with the E.U.

So we thank each of our witnesses. We thank Prince Charles for his contribution to our hearing today.

And, with that, this hearing is adjourned.

[Whereupon, at 11:15 a.m., the committee was adjourned.]

Responses of Ralph Izzo
President, Chairman and CEO
Public Service Enterprise Group
May 2008

1) As we look at decreasing carbon emissions and increasing energy needs, would you agree that we simply must include the use of nuclear energy as a green source of power since it does not emit any carbon?

Last year when Congress began examining the threat of climate change, scientists indicated that we would need to limit greenhouse gas emissions to 450 parts per million by the year 2050 in order to avoid the worst consequences of climate change on our communities and planet. Now we are hearing that the maximum emissions level may be closer to 350 parts per million. Achieving this level of reductions will require a fundamental shift in the way we produce and consume energy. We will need to engage utilities on a massive scale to drive energy efficiency among end-users, we will need to make a significant commitment to generation from renewable energy sources, and, yes, we believe that the continued need for clean central station baseload power means that nuclear energy must be part of our energy future.

2) Do you support tax incentives as a mechanism to promote clean energy technology and environmental controls?

PSEG strongly supports a long term extension of the investment tax credit for solar energy and removal of the exclusion that has prevented utilities from claiming the credit. We also support a long term extension of the production tax credit for wind.

3) You all seem to imply that the federal government should preempt what states are doing in the area of cap and trade. Is that what you envision a federal policy for cap and trade to do?

States have been innovators in the area of climate change, as they have been on many other environmental issues. They have been a catalyst for federal action and should continue to be part of the national effort to reduce greenhouse gas emissions. However, we believe it is very important to provide clarity in the federal program as to the ways the states and federal government can best work together. For instance, states can complement federal efforts by helping its citizens meet the federal cap through initiatives in areas such as energy efficiency, renewables, enhanced building codes, local transportation planning, adaptation programs, and assistance to local communities.

At the same time, duplicative cap and trade programs at various levels of government would undermine the efficiency of the national effort, complicate efforts to link to international efforts, and add costs without necessarily adding environmental benefit. Similarly, enabling individual states to set more stringent emissions targets for stationary sources covered under the federal program could distort regional wholesale electricity markets, creating competitive disadvantages for certain companies and displacing the production of power to less efficient generation in other states.

Therefore, it is critically important that we create a single, national trading market for greenhouse gas emissions with a single currency and a national emissions cap at least as strong as what has been enacted in the RGGI region.

4) How do you feel about cost containment mechanisms as we look at possible cap and trade legislation?

PSEG has not endorsed a specific cost containment mechanism. If the federal program contains a cost containment approach (other than offsets), it must not violate the integrity of the cap nor set a price so low that it thwarts investment in low-carbon technology.

5) What are your thoughts on the fairest way to allocate emissions allowances?

First, we must make sure we do not give away too many free allowances. A sizeable portion of the allowances must be dedicated to federal auction in the early years of the program in order to fund technology research and provide low-income assistance. The longer we wait to enact a federal program, the more allowances should be auctioned rather than allocated. States such as those in the RGGI region should receive allowances from the federal program in order to carry out state based efforts to reduce greenhouse gas emissions under the framework described above.

To the extent that we do provide allowances to generators, the purpose should be to send a price signal that encourages investment in efficient, low-carbon generation. Therefore, an allowance allocation on the basis of total megawatts of electricity makes the most sense.

Greenhouse gas emitters need to see a price signal that causes them to change their investment decisions. Providing free allowances to generators on the basis of their historical emissions dampens that signal.

6) I read the impressive list of accomplishments that PSEG has made toward improving the environment. You have done all of these voluntarily, is that correct?

Correct.

7) According to the Energy Information Agency, New Jersey has the 10th highest price per kilowatt hour at 10.60 cent per kilowatt hour for a personal residence and your service area is home to 6 of the top ten states in kilowatt per hour . Therefore, is it fair to say that your emissions reduction program is a significant factor in these high electric rates for your customers?

It's fair to say that the policy decisions made by New Jersey and other states in the Northeast have tended to drive the production of electricity toward natural gas as a fuel source. This means that electricity prices will be higher when natural gas prices are high. Emissions reductions requirements in our region have certainly also contributed to higher prices.

Not surprisingly, the regions of the country that have relied almost exclusively on coal to generate electricity have enjoyed prices far below the national average for several decades. In addition, many of these regions have not had the same stringent requirements to mitigate emissions of SO2, Nox and mercury.

It is important to design a federal program that asks those who are emitting the most greenhouse gases to shoulder most of the cost of reducing those emissions.

8) I agree with you that energy efficiency is a key issue to promote, but while your statement notes that there is a "flaw in the current functioning of the market" for energy efficient investments, I would say that there is a flaw in the marketing of energy efficiency. Don't you think that if we do a better job of explaining the long term savings of an energy efficient appliances and the like that we could get more people to buy them? Or is it just that there is not a real consumer demand that we act quickly on global warming?

Additional education and marketing can certainly help to promote adoption of efficiency measures, but it will not be enough. Many customers demand pay-back on efficiency investments over a very short time period – when it may take a few or

more years. Utilities have a history of taking a longer view and accepting a return over a longer time period when making infrastructure investments that are important to society. Utilities can also help penetrate the market by building upon customer relationships and piggybacking on service visits to bring efficiency opportunities to customers.

9) Does your company plan to build any nuclear plants in the near future?

We are currently examining the possibility of an investment in new nuclear, and we have put a team together to look at our options. This consists of assessing the suitability of our site as well as monitoring the activities of others.

10) Your service area has the potential for developing off-shore wind power. Do you have any plans to build off-shore wind turbines? Are you looking into any other renewable energy sources at this point?

PSEG has formed a new competitive subsidiary called Renewable Generation, which recently filed a response to a solicitation from the Office of Clean Energy (BPU) for a pilot to develop a 350 megawatt wind farm 17 miles off the coast of New Jersey.

In addition, the New Jersey Board of Public Utilities has approved a $100 million investment in loans that PSE&G will begin offering for the installation of solar systems on homes, businesses and municipal buildings throughout its electric service area. Initially, however, the program will only be available to non-residential customers. PSE&G needs approval from the NJ Department of Banking and Insurance to provide direct loans to residential customers. This a modest beginning and if the program is successful, we hope to add another "0" to the utility's solar investment in New Jersey.

PSE&G has also invested in hybrid vehicles and biofuel, as well as energy efficient wires and transformers. The utility has also proposed a carbon abatement pilot

program that would provide energy-saving measures such as home energy audits, programmable thermostats, attic insulation and high-efficiency lighting upgrades to residential and business customers.

11) On page 7 of your written statement, with respect to renewables, you say "the market is functioning properly but subsidies are needed to compensate for the cost disadvantages of renewable energy supplies." You note utility financing and installation – can you explain how this works?

We believe the utility is the best business to invest in renewable generation because it has regulatory predictability and a lower cost of capital. The costs of renewable projects do not change, but the cost of the risk goes up with uncertainty. The lower risk associated with a utility means it can offer the projects at the lowest price.

In addition, the benefits provided by renewable energy are not always evidenced in the market because the market is not very good at pricing long-term environmental impacts.

Having said that, we intend to invest in renewables on the utility side as well as the competitive side of our business through a newly-created subsidiary to evaluate the most cost-effective approach.

THE SELECT COMMITTEE ON
ENERGY INDEPENDENCE AND GLOBAL WARMING

NOTE: Answers to the questions are given in italics below.

Dear Mr. Carson,
Following your appearance in front of the Select Committee on Energy Independence and Global Warming, members of the committee submitted additional questions for your attention. I have attached the document with those questions to this email. Please respond at your earliest convenience, or within 2 weeks. Responses may be submitted in electronic form, back to me at aliya.brodsky@mail.house.gov. Please call with any questions or concerns.

Thank you,
Ali Brodsky
Chief Clerk
Select Committee on Energy Independence and Global Warming

1) **As we look at decreasing carbon emissions and increasing energy needs, would you agree that we simply must include the use of nuclear energy as a green source of power since it does not emit any carbon?**

Yes, nuclear should be included as a low carbon power source. Nuclear is an established and proven technology and its use should be assessed on an economic basis along side other technologies. Any assessment should include the costs of waste disposal and end of life de-commissioning.

2) **Do you support tax incentives as a mechanism to promote clean energy technology and environmental controls?**

Yes. It is important that any incentives do not seek to promote one particular technological solution over another, but that they remain focused on supporting all forms of low carbon energy.

3) **You all seem to imply that the federal government should preempt what states are doing in the area of cap and trade. Is that what you envision a federal policy for cap and trade to do?**

Yes. In matters of great importance it is vital that the federal government shows leadership both at home & abroad. A federal policy sends clear messages to the international community that the U.S. is committed to tackling the issues of climate change through the promotion of clean energy technologies. It also establishes a level playing field for industry across the U.S. so that all can compete on an equal basis.

4) **How do you feel about cost containment mechanisms as we look at possible cap and trade legislation?**

The market should be able to deal with any potential discontinuities provided that the cap is initially set at an achievable level and that proposals are signaled well in advance. Normal market mechanisms will continue to ensure that investment is directed to the lowest cost of carbon abatement. However, as with all measures there will be both winners and losers. It has the advantage that for the majority it is a cost that can be largely avoided if appropriate energy saving and low carbon investments are made.

5) **What are your thoughts on the fairest way to allocate emissions allowances?**

They should be based on historical emissions data from businesses. Mechanisms need to be included to allow for business expansion. Also some energy intensive sectors may require special arrangements.

6) **You say that Johnson Matthey has continued to develop its technology for almost 200 years and that the company can adapt constantly to rapidly changing customer needs. What percentage of your technology would you say has required government intervention in order to promote innovation?**

Circa 40% of Johnson Matthey's current product portfolio is comprised of environmental catalyst technologies (stationary & transportation) that are governed by legislation; these are also our highest volume products. Many of our other products have applications related to the production of hydrogen and low carbon energy. Thus, I anticipate that this percentage will rise as new legislation begins to encourage these markets.

7) **On page 3 of your written statement, you noted that a combination of financial and regulatory initiatives is required. What kind of financial initiatives would you support?**

I favour financial initiatives that support the introduction of new low-carbon products into the market place during the early take-up period. At this stage, products are being produced at relatively low volume and do not have the benefit of scale, and thus are more expensive to produce. Industry does not expect government to bear the full additional cost, but does need help with creating certainty in the market so that they can make the necessary investment to scale-up to low-cost, mass production.

Funding to encourage technology partnerships and the development of the low carbon supply chain is important. Similarly the use of government procurement to create the necessary market volume to bring down costs can be a key driver of change, particularly the so called Forward Commitment Procurement (FCP) mechanism.

[FCP - Government sets a performance specification for a product (that does not yet exist in the market place) that they would like to buy in the future. A contract is brokered with a group of suppliers; such that government agrees to purchase a certain number of the future product at a fixed price in x years time (the size of the order must be sufficiently large to enable the supplier to cover scale-up manufacturing costs in his quote). There is no risk to the public purse because if they do not achieve the specification the government does not have to pay, and the risk to the supplier is reduced by the guarantee that the government will definitely buy if they do achieve the spec., and they will then have a scaled-up product they can sell into the wider marketplace at competitive prices.]

8) **On page 5 of your testimony you say, "Policy and regulations must be carefully constructed so that it is aimed directly at the outcomes it seeks to drive, independent of the choice of technology solutions." I agree with that statement. My question to you is what concrete advice do you have for constructing such policy?**

When framing environmental policy, it is important not to try to predict which technological solution will achieve the desired outcome. For example, the Californian Clean Air Act, merely legislated for maximum allowable vehicle emissions, it did not say anything about how those emissions reductions should be achieved e.g. engine modification, catalytic converter, fuel quality, vehicle weight…were all potential solutions. It is likely that we may not yet have invented many of the technological solutions that will be important to climate change, however legislating for outcomes will ensure that they will emerge, unencumbered by out current view of what we believe to be the key low carbon technologies of the future.

9) **On page 5 of your testimony, you mention – and I think wisely – that "legislation can pull in more ways than one, and nowhere is that truer than with the automotive industry, reducing emissions on one hand and increasing safety on the other. The added weight of new safety features can make it more challenging for manufacturers to reduce vehicle emissions." How do you propose that we formulate policy that strikes the important balances that are needed to not only help the environment, but also take into account other needs as they arise?**

The solution is to involve industry technical experts at all stages of formulating the legislation so that the potential conflicts can be managed whilst still maintaining a central theme of requiring lower carbon emissions. There is always a balance to be struck between the environmental objectives of legislation and the technology pull that this can engender. Legislation needs to be finely balanced to be technology forcing, pulling new technology into the market without being specific about the technology. This has to be based on well designed progressive and signposted legislation that allows business to plan and invest with confidence that there will be a market at some future date. Government needs to maintain a healthy skepticism of those interests intent on maintaining the status quo.

10) **Can you talk a little bit about what you have done as a company to improve the resource efficiency in your factories and offices? Do you know what your cost savings have been?**

Johnson Matthey has been running energy efficiency programs in its factories since 2000. A series of incremental improvements and investments in current energy efficient technologies, including CHP, has already enabled us to reduce our energy usage by 30% at our largest UK manufacturing sites and has put us on track to meet our 20% reduction target for all UK sites by 2010. All investment in energy saving has been driven by normal rules governing capital investment in Johnson Matthey.

Additionally, I have recently launched a expansive business sustainability program, which required all businesses to set targets and integrate plans in to our formal budget process covering the three strands of sustainability i.e. Economic, Environmental and Social issues. Progressing our sustainability plans is now a routine part of our business management systems. Carbon Management is a key focus of this programme.

11) Can you tell us more about the work that your company has been doing in Clean Coal Technology and CO2 separation and sequestration?

Johnson Matthey produces several types of catalysts that are useful in the processes that are under development to create so-called "clean energy" from coal and sequester the resulting CO2 emissions, as well as a number of reactor technologies that can be adapted to control the processes. We are currently customising these for specific applications in partnerhip with clients in the mining and energy generation sectors.

We produce syngas catalysts that enable the gas produced from coal to be converted to H_2/CO_2 and sell a wide range of purification solutions (to clean up H_2S, halides, Hg, As etc) for these gases.

We also produce gas-to-liquid catalysts that enable cleaner & more versatile fuels to be produce directly from coal e.g. methanol, SNG, diesel.

NAP Carson
17/12/07

THE SELECT COMMITTEE ON
ENERGY INDEPENDENCE AND GLOBAL WARMING

Dear Mr. Grisay,
Following your appearance in front of the Select Committee on Energy Independence and Global Warming, members of the committee submitted additional questions for your attention. I have attached the document with those questions to this email. Please respond at your earliest convenience, or within 2 weeks. Responses may be submitted in electronic form, back to me at aliya.brodsky@mail.house.gov. Please call with any questions or concerns.

Thank you,
Ali Brodsky
Chief Clerk
Select Committee on Energy Independence and Global Warming

1) As we look at decreasing carbon emissions and increasing energy needs, would you agree that we simply must include the use of nuclear energy as a green source of power since it does not emit any carbon?

As a global investor we do not take a view either way on whether nuclear energy should or should not be part of the energy mix. Individual governments will make their own decisions, based on factors such as public acceptability and cost.

2) Do you support tax incentives as a mechanism to promote clean energy technology and environmental controls?

Yes, as part of the overall policy mix. We believe that trading schemes, tax incentives, and regulation all have a role to play. Tax incentives have proven particularly effective in the promotion of renewable energy, such as the German feed-in tariff scheme. Conversely, we believe that fiscal reform is needed to eliminate incentives that have accumulated over time and favour relatively carbon-intensive technologies and products.

3) You all seem to imply that the federal government should preempt what states are doing in the area of cap and trade. Is that what you envision a federal policy for cap and trade to do?

We believe that a federal system would be preferable to separate state-level systems, as it would provide greater consistency and certainty for businesses. A federal scheme would also have the advantage of scale, creating a deeper and more liquid carbon market – particularly if linked to the EU scheme (see below). However, to the extent that the federal government proves unable to act quickly enough, we welcome the actions taken by certain states so far, particularly by the larger ones with de facto *standard-setting power, and would continue to regard such developments as preferable to no action at all.*

4) How do you feel about cost containment mechanisms as we look at possible cap and trade legislation?

We have two concerns with the "safety valve" proposal. One is that the level of the price cap may be set too low, reducing incentives to act. The second is that a scheme with a safety valve may be incompatible with the EU scheme, making it harder to link the two. Most importantly, while we appreciate the need to be pragmatic and enable policy changes to avoid sharp disruption to the economy, we also are concerned about the uncertainty this could create by signaling that government will lose its nerve the moment measures start to bite. Investors in clean technology need to be reassured that the risks they are taking will be rewarded.

5) What are your thoughts on the fairest way to allocate emissions allowances?

We believe that allowances should be allocated in a way that is efficient consistent and predictable, using benchmarks where possible; and that care should be taken not to create perverse incentives for companies to emit more now in the hope of getting more permits in the future. We see auctioning as the best long-term solution to allocation, although we realise there may have to be a brief period of transition to allow industry and consumers to adjust to the costs.

6) You noted in your testimony that business needs government to set clear long term rules and standards, I want to focus on the standards part of that statement. You know in the United States there are many entities that help to set standards, for example the Financial Accounting Standards Board sets accounting standards. Are there currently international bodies that you believe can help in setting standards for the emissions trading industry?

We believe that bilateral discussions between policymakers involved in emissions trading – particularly between the US and EU – are the most important mechanism for creating unified standards. The appropriate UN bodies are best placed to regulate CDM and JI credits.

7) You state in your testimony that the leading industrial countries need a strong commitment to engage and support the G20 nations in tackling climate change. What is your definition of strong commitment?

We see a need for strong political commitment, including through constructive negotiations in the G8 process and the UN climate negotiations. In particular, we believe that measures are needed to help developing countries adapt to the impacts of climate change; and that mechanisms such as the CDM should be improved to help create the financial flows that will help emerging economies to pay for new emissions reduction technologies .

8) Do you support policies that include all forms of low-carbon emissions, including nuclear energy?

See answer to question 1 above.

9) Do you support higher taxes on gasoline? If so, how much would you increase the gas tax? 50 cents, which has been proposed, or higher?

We strongly support measures to cut emissions from the transport sector, which makes up a large and growing proportion of total greenhouse emissions. There are a number of ways this can be done, including higher mandatory CO2 emissions standards for cars, biofuels (see question 12), and higher fuel tax. We consider that a combination of all three is needed, and that taxation, though politically unpopular, is an essential part of the mix. We are not qualified to specify an exact figure for US gasoline tax, but note that taxes are much lower than in the EU, and also that diesel is disadvantaged relative to gasoline, despite the lower CO2 impact of diesel cars.

10) You support a cap and trade program, but wouldn't a carbon tax also provide a price for carbon that would in effect drive the market in the same way without creating a huge regulatory scheme?

Both emissions trading and carbon taxes put a price on carbon and provide incentives for emissions reductions. We prefer trading on the basis that it allows for a more global approach to the problem, through linking schemes in different parts of the world and providing a market for emissions reductions from developing countries. A global carbon market will means that emission reductions will take place wherever they are cheapest, bringing down the cost to the economy.

11) You note in your written background that the EU's Emissions Trading Scheme has not delivered on its promise. Can you talk about what needs to improve in order for this scheme to be effective, since clearly it is not? Further, why should the U.S. adopt a cap and trade system that is

consistent with the EU system that is not working? How would expanding this scheme to the US and other nations help it deliver on its promise of lowering carbon emissions at the lowest possible cost?

While it is true that Phase I of the EU emissions trading scheme (2005-7) delivered disappointing results in terms of establishing a firm carbon price,, this is not to say that it has been an outright failure. Phase I suffered from an over-allocation of permits, which led the price to be driven down to zero – but it also enabled the EU to get the system off the ground and working. In Phase II, this lesson was learned and allocations of permits were much tighter, resulting in a positive price of carbon, which is now genuinely starting to influence investment decisions. The main problem was the overly politicised allocation process, and a lack of consistency over the application of the scheme across member states. These issues are being tackled in Phase III, with the Commission looking set to propose an EU-wide cap. The US has the opportunity to benefit from the experience of the EU, while linking schemes globally will provide a deeper, more liquid carbon market, and spread emissions reductions over a wider area, meaning that emissions cuts will take place wherever they are cheapest.

12) You have a section in your written position that discusses biofuels. You note that "biofuels have great potential to cut transport emissions." However, it is not clear to me from the rest of the section that there are any biofuels that you actually support. Could you tell us which biofuels you do support?

We believe that biofuels have great potential to help emissions reductions, but that the industry faces serious challenges over sustainability. We have called for governments to make incentive payments conditional on sustainability standards, including genuine greenhouse gas reductions. Progress is now being made in this direction in the EU. We believe that non-food crops (such as jatropha) can help to ease supply bottlenecks for first-generation biofuels, and that second- and third-generation technologies (such as cellulosic biofuels and algae, respectively) offer real long-term promise.

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December 26, 2007

Ali Brodsky
Chief Clerk
Select Committee on Energy Independence and Global Warming
aliya.brodsky@mail.house.gov

Dear Mr. Brodsky,

Thank you for the opportunity to respond to these additional questions following my testimony before the Select Committee on Energy Independence and Global Warming. I look forward to continuing this dialogue with the committee in the coming months.

Best regards,

Jonathan Lash
President
World Resources Institute

1) As we look at decreasing carbon emissions and increasing energy needs, would you agree that we simply must include the use of nuclear energy as a green source of power since it does not emit any carbon?

Nuclear power is a low-carbon electricity technology but not necessarily a "green" source of power. Congress should first look to energy efficiency and conservation as the lowest cost and most environmentally sound energy solutions; second to renewable energy; and lastly to low-carbon energy sources where there are potential adverse health, security or environmental impacts. However, the scale and significance of global warming leads me to believe that any technology that can help de-carbonize our economy should not be taken off the table.

The unique benefit of market-based climate mitigation policies are their ability to incent change without choosing specific technology "winners." The price signal created through a well-designed cap and trade program would allow the market to internalize the costs of carbon intensive energy sources. Low-carbon emitting technologies such as renewables and fossil fuels generation equipped with carbon capture and sequestration – as well as nuclear – will all benefit if there is a carbon price. However, a carbon market does not recognize other non-climate externalities. In the case of nuclear power, waste disposal, water consumption, and security issues must be resolved for nuclear to be a safe and clean alternative. Careful consideration must be given before bestowing further incentives on this technology to avoid choosing a technology that may be less environmentally friendly with greater, negative lifecycle impacts than other energy options.

2) Do you support tax incentives as a mechanism to promote clean energy technology and environmental controls?

Because of market barriers in U.S. energy markets, tax incentives are an important policy tool in the effort to deploy new, clean energy technologies. For example, tax incentives could be used to:

- diversify U.S. power generation,
- reduce pollution and waste, and
- develop new industries and bring technologies to scale.

Tax incentives may be particularly relevant in the case of low carbon technologies. Currently, energy providers do not factor the carbon intensity of technology choices in to their investment decisions. Tax incentives such as the production tax credit or the investment tax credit have proven useful in deploying environmentally preferable energy sources. In particular, the production tax credit (PTC) has resulted in a significant scale-up of wind technologies for developers able to access the credit to overcome market barriers and ensure a favorable return to investors. However, experience with the PTC has also pointed to problems with tax policy as a means to stimulate investment and new technology: the lack of consistent political support has meant an erratic and uncertain level of tax support, which in turn has resulted in market and investment uncertainty. If policymakers are to use tax incentives to most effectively support environmentally preferred technologies, these should be designed to be both stable and cover a much longer term so as to help fundamentally reshape the market.

Even the best designed incentives, however, rely on policymakers to select specific technologies. A production tax credit will only benefit the technologies that have been included in a list of eligible resources. As a result, politically attractive, rather than cost-effective technologies, may be incentivized. In some cases this is clearly desirable: it is clear the US will need to significantly advance our renewable technology capacity if we are to address problems of both energy diversity and climate change. Currently, renewable energy faces a number of non-market hurdles including higher risk premiums for investment and siting constraints. A PTC helps overcome these. However, to promote optimum efficiency, a price on carbon (either through a tax or cap-and-trade program) may better enable the market to develop least cost and lowest emission technologies over the longer term.

3) You all seem to imply that the federal government should preempt what states are doing in the area of cap and trade. Is that what you envision a federal policy for cap and trade to do?

Historically, states and the federal government have played complementary roles in national environmental policy. The federal government creates relatively uniform rules under which states are able to address local needs as well as to innovate. Historically, the division of responsibilities and authorities between states and the federal government has been a matter of considerable tension. Cap-and-trade is not likely to be different; considerably more communication between these two levels of government will be required if a robust and workable solution is to be found

To date, States have taken the lead on the development and enactment of mandatory climate change policy, and are just now beginning to reach out to federal decision makers to explore and identify what options may be available. In designing a national program, Congress could benefit significantly from the work of the leading states.

Overall, it is clear that a federal approach to cap and trade would be more efficient and environmentally effective than multiple state and/or regional programs. One uniform market with common rules for trade and compliance allows greater liquidity and certainty over time. A stringent cap that covers all 50 states would be more likely to achieve necessary emission reductions than a linked system of regional markets that does not include large emitting states.

A federal cap-and-trade program need not preempt state programs, however. Maintaining the authority of states to pursue innovative climate policies will likely accelerate the deployment of new technology and enable the nation to achieve greater GHG reductions over the long term. Such flexibility for states may well be necessary if the U.S. is to fully meet the challenge of mitigating climate change. The chief example of a successful cap-and-trade program in the United States, the federal sulfur dioxide cap-and-trade program under Title IV of the Clean Air Act, does not preempt more stringent state programs. Rather, the Clean Air Act preserves a state's authority to require reductions beyond those required by the federal program.[1] A cap-and-trade program aimed at reducing greenhouse gas emissions could follow a similar approach.

[1] For a more complete review and discussion of the relationship between state innovation and federal policy action see Aulisi, et al. 2007. Climate Policy in the State Laboratory: How states influence federal regulation and implications for U.S. policy. Available at: http://www.wri.org/publication/climate-policy-in-the-state-laboratory

If the intent of allowing State derogations is to maximize the effectiveness of the overall program instead of only shifting the burden from one state to another, additional rules may be required: When a state imposes more stringent state requirements on sources covered by a federal cap, the result is that federal emissions allowances are freed up in the state to be sold and "burned" somewhere outside the state. This can be addressed if the federal program requires that states imposing more stringent standards retire a certain number of federal emissions allowances. Through such a mechanism, the federal program can provide a great deal of national uniformity through a federal cap, while also allowing flexibility for states to continue to innovate.

4) How do you feel about cost containment mechanisms as we look at possible cap and trade legislation?

The United States must limit its greenhouse gas pollution emissions and it must lead by example in implementing its reduction commitments. The US commitment must be based on science, the implementation approach can be based on markets. The science is demonstrating that the impacts of climate change will be far more costly than to move forward with technology investments today that change emissions trajectories.

A Cap and Trade approach is designed to help achieve reductions at the lowest possible economic cost by providing flexibility to schedule and invest in technologies along a firm or industry's cost curve. But we must set and achieve a cap in emissions, recognizing that the long-term operability of a cap and trade program will critical. Concern has been raised that should the allowance prices rise too high (or rise too quickly), the market will collapse, or political pressure will be brought to bear to eliminate the program. It is to avoid these exigencies that it has been proposed to establish cost containment mechanisms. To be effective, such mechanisms should seek to:

- Preserve the long-term environmental integrity of the emission cap;
- Smooth and support the functioning of a nascent carbon market;
- Provide price relief and support should there be economic or natural disaster related emergencies; and
- Enable a long-term price signal that is stable and high enough to drive investment in low- and zero-emitting technologies, including carbon capture and storage.

It is clear that the most powerful cost control measure is a robust cap and trade program since markets do the best job of controlling costs over time. As policy makers weigh additional cost control options, it is important for them to consider who and what portions of the economy are impacted, the time duration of the impact and remedy, international competitiveness, the implications for international emissions trading, and how the measure impacts the price signal necessary to stimulate investment and technological innovation. Economic impact can be mitigated – but the limit on emissions must not be violated.

Through partnerships such as the US Climate Action Partnership (www.US-CAP.org), WRI is engaging a variety of stakeholders to discuss what cost control mechanisms would best achieve the environmental goal while maintaining a transparent, simple and predictable market for carbon emissions. I look forward to elaborating further on this topic as these discussions mature.

5) What are your thoughts on the fairest way to allocate emissions allowances?

A portion of allowances should be initially distributed free to capped entities and to economic sectors particularly disadvantaged by the secondary price effects of a cap including the possibility of funding transition assistance to adversely affected workers and communities. According to recent studies, however, only a share of the allowances in a cap and trade program would be needed to compensate the emitter for the revenue lost in complying with the GHG limits.[2] Thus, as an initial distribution matter, the allowance allocation system should seek to mitigate economic transition costs to entities and regions of the country that will be relatively more adversely affected by GHG emission limits or have already made investments in higher cost low-GHG technologies, while simultaneously encouraging the transition from older, higher-emitting technologies to newer, lower-emitting technologies. Free allocations to the private sector should be phased out over a reasonable period of time.

State cap and trade programs may also offer lessons in allocation strategies. In the case of the RGGI states, the determination of allocation was left to each state to decide, allowing for local issues and needs to frame local choices. To date, nearly all the RGGI states have chosen to auction 100% of their allowances – although it should be noted the system only covers the electric power sector, so is only a partial model. The RGGI states have also proposed some common standards for the use of a share of the proceeds from auctioning permits to help address questions of distributional equity.

Through its partnerships, WRI is engaging a variety of stakeholders to discuss the most appropriate method of allowance distribution. The method of distribution, quantity of allowances allocated and duration of free allocations all require careful consideration to ensure an equitable cap and trade program capable of effectively transitioning the U.S. to a low-carbon future. I look forward to sharing the insights drawn from these discussions in the coming months.

[2] Burtraw, Dallas, 2006. "Simple Rules for Targeting CO2 Allowance Allocations to Compensate Firms." Resources for the Future (Washington DC: 2006).

6) In your written statement, you say that one of the policy problems that you face is "States stepping into the leadership vacuum to create a national patchwork rather than a level playing field." So do you support a federal program that preempts state programs in order to end the patchwork approach?

Please see response to question number three.

7) You note on page 3 of your written statement that there is estimated to be a $20 trillion investment in new energy infrastructure in the coming decades and that you are concerned that "If those investments are made in old fossil fuel-based technologies, the opportunity to prevent dangerous climate change will be lost." So my question is, with China building an enormous amount of coal-fired power plants, shouldn't we be incredibly concerned about China's role in greenhouse gas emissions? How would you propose we engage emerging economies in reducing their emissions?

The average Chinese emits less than a quarter as much as the average American, and China's cumulative historical contribution to global warming is considerably smaller than that of the United States. However, China's emissions are now at approximately at the same annual level as the US, and China is adding on the order of 100 GW of new coal power generation capacity every year. As such, China is clearly a key contributor to climate change and the rapid growth of China's emissions means that the world cannot stabilize emissions at a safe level without meaningful engagement by China.

Developing countries have explicitly stated that they will not adopt legally binding targets under an international climate treaty to reduce emissions (in part because we ourselves have yet to do so). China cannot be expected to adopt legally binding targets to reduce emissions without leadership first by the United States. However, they are already taking steps – in many cases more significant than our own – to reduce emissions.[3] For example, China has adopted a goal of increasing renewable energy to 15% of their total energy mix. They have taken measures to increase forest cover, a successful program that is already reshaping the countryside. They have also set a target to reduce energy per unit of GDP by 20% between 2006 and 2010 – a rate more than double that called for by President Bush (although they start from a much higher energy intensity than the US does). China's new coal plants are among the most modern in the world. China now has leading supercritical technology, and the National Development and Reform Commission (NDRC) now has a policy requiring all new coal plants to be very efficient - either supercritical or ultra-supercritical. At the same time the Chinese government is closing down the small, inefficient, highly polluting plants. It has a scheduled phase out for all coal-fired plants 50 MW or less.

A successful international framework must include a structure to allow these actions to be recognized and reviewed – and provide encouragement for continuing and building on them. In negotiations in Bali, Parties agreed to text that opens the possibility for recognizing this kind of measure as a commitment by

[3] WRI maintains a database of such policies and measures at http://projects.wri.org.

non-Annex I countries; China and other developing countries supported this text, explicitly acknowledging that they will play a role in future GHG emissions reductions efforts.

This increased engagement from developing countries demonstrates progress, but more will certainly be needed. One major impediment to more ambitious Chinese action is the stance of the United States. Chinese policy makers argue that if a country richer, more capable and more emission-intensive than theirs will not take action, it is unfair to put the onus on developing countries. Clear, ambitious US policy is an essential precursor to meaningful engagement with China and other major emerging economies.

One of the most critical aspects of a successful climate policy will be in the development and rapid deployment of new and cleaner technologies. China has demonstrated considerable interest in technology collaboration. The Chinese themselves are investing heavily and are seeking partners for technology development and deployment. On carbon capture and sequestration (CCS) for instance, the Chinese are involved in the FutureGen project, and they also have an agreement with the EU to build a zero emission demonstration power plant. Joint Chinese-American partnerships can have benefits for the climate – and for both the American and Chinese economy. New technologies will lead to new jobs, to increased imports and exports, and to reduced GHG emissions. Providing the right incentives for such joint efforts should be a high priority.

The UNFCCC negotiations provides one forum for technology discussions. In particular, all countries have expressed a desire to use the UNFCCC to discuss options for the transfer of technology to least developed nations on a preferential basis.

However, for the larger discussion on technology development and diffusion, there is a need for a broader platform of engagement, promoting more robust markets and engaging in cooperative R&D programs, for instance. These may be facilitated through language in the UNFCCC, but ultimately will be successful more through bilateral efforts by governments, supported by private sector engagement. Within the United States, this will entail new incentives for technology development and deployment, government purchase agreements – and importantly, a price on greenhouse gases to stimulate new technology uptake.

8) On page 6 of your written testimony, you note that states and regions differ in their power generation sources. Do you agree that we need to allow for flexibility for states to make their own choices about what type of power they use, whether it is traditional or renewable?

In order to achieve the emission reductions necessary to avert climate change, all states will need to reduce their reliance on carbon intensive energy sources. Policies that encourage shifts towards less greenhouse gas intensive power generation are required. Nevertheless, it is important to build flexibility into any Federal energy policy to minimize undue impacts on any region of the country. Allowing states to comply with renewable electricity standards through the purchase of nationally sourced renewable energy certificates would be one example of such a flexibility mechanism. Even though generation might be concentrated in specific regions, regulated entities from all states would pay a common market rate for renewable power. Thus, the lift required to achieve a desired environmental outcome would be distributed equitably across all states.

Some critics argue that such flexibility mechanisms would result in unnecessary transfer payments between states. However, the same can be said of the wealth transfers resulting from our current, fossil-fuel heavy generation mix: Eighty percent of natural gas comes from six states, sixty percent of U.S. coal comes from states with two percent of the U.S. population, and Texas, California and Alaska are responsible for 56 percent of U.S. crude oil production[4]. On the other hand, renewable resources can be found in every region of the country. Solar is abundant in the Southwest and Southeast; biomass in the Pacific-Northwest, Northeast and Southeast; geothermal in the intermountain west; wind in the Great Plains and on the East coast and significant energy efficiency improvements are possible in all regions. Requiring the United States as a whole to switch to new, clean technologies would lead to a greater diversity of states able to act as energy providers.

[4] Energy Information Administration, Annual Coal, Natural Gas and Petroleum Reports - 2005.

9) On page 6 of your written statement you suggest that "a significant portion of allowances should be initially distributed free to capped entities and to economic sectors particularly disadvantaged…" but aren't you concerned that these free allowances will cause some of the same problems with the carbon price that the EU had with their Emissions Trading Scheme?

Most analysts agree that the free distribution of allowances under the EU Emissions Trading Scheme (EU ETS) was one critical factor in the substantial transfer of wealth from consumers to those entities that receive allowances[5]. For example, according to the California Market Advisory Committee, under the EU ETS, the electric sector in the UK received free allowances and enjoyed windfall profits of £500 million in the first year of the program alone.

The free allocation was primarily made to protect consumers from rising electricity rates associated with GHG mitigation costs. Unlike much of the United States, the EU has a deregulated electricity market. This has meant that while electricity generators receive their allocated emission allowances at no charge, they can pass through their projected costs to electricity consumers. The result is that consumers pay for compliance that may not cost suppliers anything. When initial EU market projections suggested the market would be considerably "short" (with inadequate supply for the demand); allowance prices rose quite high – prices that were passed through to consumers. Once it became evident that there were considerable excess allowances in the system, prices collapsed and the risk premiums passed through to consumers turned into significant windfall profits.

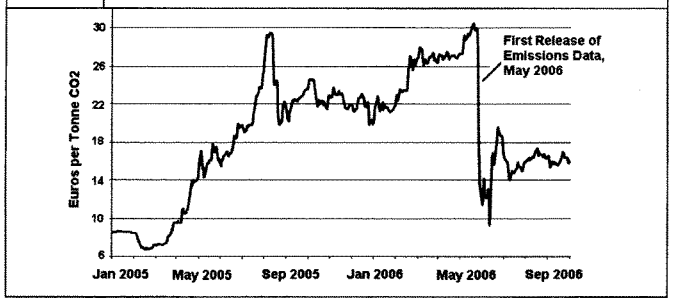
However, while the free allocation of allowances did increase the size of these profits, a significant cause of the problem was the lack of information that led to uncertainty and risk for the generators. All new markets experience some period of price discovery – however, the experience of the EU ETS can be avoided.

Much of the US electricity market is regulated. In these instances, regulators can adjust rates and returns to balance the price of carbon and avoid windfall profits. Nevertheless, in those areas of the United States where electricity is deregulated, market dynamics and assessment of risk will shape corporate response.

[5] See for example, California Market Advisory Committee, "Recommendations for Designing a Greenhouse Gas Cap-and-Trade System for California," June 30, 2007.

Even in deregulated markets much can be done to protect against the windfall profits experienced in Phase I of the EU ETS. Before setting national emissions caps and allocating allowances to emitters, many EU Member States did not have rigorous data collection systems in place. Trading began in January 2005 in the absence of such data. In the early months of this program, a lack of emissions data led to rising prices and significant volatility, exposing suppliers to risk. As a result, suppliers increased electricity rates to cover the projected cost of compliance. The first release of verified emissions data, in May 2006, revealed that the total number of allowances in the program (i.e., the cap) exceeded total emissions, such that there was not scarcity in the market. Accordingly, the market price of emissions allowances dropped dramatically (see Figure 1). Improved data collection and availability from the start of the program would have minimized risk and uncertainty for power providers. Such simple improvements in this young market have reduced the problem of windfall profits for power suppliers.

Figure 1 | **Emissions Allowance Price in the EU-ETS, 2005-2006**



However, it is clear that under an adequately stringent cap, utilities will face real compliance costs. In order to smooth the transition to full compliance (likely to take a number of years), providing some allowances or free will limit the exposure and minimize disruption to this sector. Over time, the share of allowances that might be provided gratis could decline: many economists (see, Dallas Burtraw, RFF) suggest that to hold the sector harmless will ultimately require a free allocation of thirty percent or less.

The lessons for US design are thus fairly clear: assure the maximum level of transparency in the inventory and reporting of emissions; limit the ability of utilities to pass costs to consumers without demonstrating a compliance cost, and over time, reduce the level of free allocations – ultimately to zero.

10) On the last page of your written statement, you say "Delays in federal action only hinder our ability to innovate and invest in solutions." I find that disturbing. Since when do businesses who make money off being innovative, believe in the need for federal action to be innovative?

Businesses excel at innovation, but they are more likely to do so under clear and stable market rules. When consumers demand a product or service, American businesses are exceptionally good at providing new and innovative solutions. These market signals are what drive our economy. In the case of climate change, these market signals are non-existent or mixed at best. Most people want a stable climate but there are currently no direct market signals in the U.S. that businesses can respond to because there is no price tag on greenhouse gas emissions. This lack of a price signal does not just stifle innovation in new clean technologies such as carbon capture and storage and plug-in hybrid vehicles, it causes a significant amount of uncertainty for business as they consider making new investments.

Businesses cannot plan for the future if they are not certain as to what regulations await them down the road. Without knowing what the rules are it is difficult for companies to know what the most profitable innovations are and when to pursue them. This lack of regulatory certainty, in other words the lack of a price on carbon, stifles innovation as companies defer investments and product roll outs until they are sure of what the best move will be. Most companies believe that climate change regulations are coming, indeed many are already operating under them in Europe and many more soon will be in certain U.S. states. This is why companies believe they need federal action. They require a clear set of rules under which they can be free to make money off of investments in new innovative technologies that will reduce GHGs, create jobs and enhance our energy security. Without this regulatory certainty innovation will fail to meet its full potential.

11) What effect would a cap-and-trade scheme have on electricity bills?

One must be careful to differentiate between a cap and trade's impacts on electricity rates and electricity bills. A cap and trade encourages change by creating a price signal where none existed before. Due to increased cost of compliance and investment in clean technology on the part of power providers, electricity rates are likely to increase. Regionally, these rate changes will differ, depending on both the electricity generation mix and the type of electricity market. In all regions, however, the price increases would provide the signal needed to incent change on the part of the consumer.

However, a growing body of analysis shows that a cap and trade program, accompanied by well planned complementary policies, has the potential to reduce electricity bills even as rates increase. In recent modeling conducted for the Illinois Climate Change Advisory Group, a policy package including cap and trade, and enhanced efficiency and renewable electricity standards was projected to increase 2020 *rates* 3.7 percent relative to the reference case. However, increased efficiency resulting from these same policies would result in 2020 reductions in electricity *costs* of 19.4 percent.[6]

The impacts of rising electricity prices can be further mitigated through careful design of the cap and trade program. By allocating to electricity consumers either by providing allowances to load serving entities, to states, or to citizen groups, policymakers can target economic support to communities most adversely impacted by global warming and GHG emission regulation. Energy efficiency programs can help consumers by offering them technologies and strategies to lower their monthly energy use. With lowered energy consumption, the impact on the consumers' monthly bill could remain neutral despite increased electricity costs.

[6] ICF International, "Modeling of Policy Proposals," Presentation to Illinois Governor Rod R. Blagojevich Climate Change Advisory Group on September 6, 2007.

12) What price on carbon would be efficient to have companies invest in low carbon energy resources?

A report by McKinsey ("A Cost Curve for GHG Reduction," by Enqvist, Naucler and Rosander, 2007) states that if we are to stabilize global concentrations at 450 to 500 ppm in the atmosphere, we need a cost of at least $40/ton by 2030. At this price, it is expected that various backstop technologies, including capture and storage of CO_2 from coal-fired power generation, would be economic. A more recent report, also by McKinsey, ("Reducing U.S. Greenhouse Gas Emissions: How Much at What Cost?" by Creyts, Derkach, Nyquist, Ostrowski and Stephenson, 2007) finds that the United States could reduce emissions in 2030 by 3.0 to 4.5 gigatons of carbon dioxide equivalents with technologies that would be deployed for less than $50 per ton.

However, it is difficult to know the appropriate price that will drive new technologies, and a number of concerns have been raised with regard to the barriers and consequences of government seeking to set and maintain market prices. Essentially, picking a price is a variant of picking a specific technology—and governments have been historically poor at picking specific technologies to solve problems. Technologies that may today have a price higher than the cap are less likely to be developed. If instead the desirable emissions level is picked and price not specified, companies have a considerably greater incentive to seek least-cost near- and long-term compliance opportunities rather than working only on options that are below the price cap level.

13) How does one regulate car emissions from a cap-and trade scheme?

The most straightforward approach to including automobile emissions within a cap-and-trade system is to cover these emissions "upstream," regulating the producers and importers of transportation fuels. This is the approach taken in the Lieberman-Warner bill, as well as in the Lieberman-McCain, Olver-Gilchrest, and Bingaman-Specter bills. However, it is commonly believed that including transportation fuels in an economy-wide cap-and-trade program is unlikely to achieve significant reductions in the transportation sector. Studies have shown that drivers are not particularly responsive to the price of gasoline ("Reducing Gasoline Consumption: Three Policy Options," Congressional Budget Office, 2002), and therefore that reductions will most likely come primarily from regulated entities within the electricity generation and industrial sectors, rather than in transportation.

For this reason, policies to complement cap and trade are likely needed in order to achieve reductions in transportation emissions. The carbon content of fuel is one contributor to the sector's emissions, but vehicle fuel economy and driving behavior are equally important. (The three are sometimes called the "three legs of the stool" of transportation emissions.) It is administratively impractical to regulate thousands of individual vehicles (or individual drivers) through a cap-and-trade program. For this reason it is critical to complement such programs with meaningful standards on the fuel economy (or greenhouse gas emissions) of vehicles, as well as land use and public transit policies to promote lesser dependence on automobiles.