

# **ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR FISCAL YEAR 2008**

**WEDNESDAY, APRIL 11, 2007**

U.S. SENATE,  
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,  
*Washington, DC.*

The subcommittee met at 2:33 p.m., in room SD-138, Dirksen Senate Office Building, Hon. Byron L. Dorgan (chairman) presiding.

Present: Senators Dorgan, Murray, Reed, Domenici, Craig, Bond, Allard, and Stevens.

## **DEPARTMENT OF ENERGY**

### **STATEMENT OF HON. DENNIS R. SPURGEON, ASSISTANT SECRETARY NUCLEAR ENERGY**

#### **OPENING STATEMENT OF SENATOR BYRON L. DORGAN**

Senator DORGAN. We'll call the hearing to order. This is the Senate Appropriations Subcommittee on Energy and Water Development. We thank our witnesses for being here today. This is a hearing on the Office of Nuclear Energy, the Office of Energy Efficiency and Renewable Energy, the Office of Fossil Energy and the Office of Electricity Delivery and Energy Reliability.

We're here to take testimony from the four program offices I've just described within the Department of Energy which oversee major aspects of the U.S. Government's energy R&D demonstration and deployment programs. I have a great deal of interest in these issues, as do others on this subcommittee, and I look forward to hearing today from our witnesses.

Passage of the Energy Policy Act of 2005 (EPACT), thanks to my colleagues, Senator Domenici and Senator Bingaman and their leadership, was, I think, a step in the right direction. I was pleased to be on the authorizing committee and to be a part of the work in the passage of that legislation.

But it was only a step. More needs to be done and we will continue to work in the authorization process to do that. The Energy Policy Act, however, only has its full impact if it is properly funded and implemented. Our ability to meet head on the challenges that we tried to describe in our Energy Policy Act will be hobbled by continued baby steps if we do not fully fund many of the issues that we care about. We need to be more deliberate, I believe, in addressing the major challenges that are associated with energy,

since it is the central underpinning of our other economic, social, environmental, and foreign policy goals.

So I believe we should set goals. We need to know where we are going and how we are going to get there; so there are two points that I think are very relevant to this hearing.

First, we need to do a much better job of investing in our energy future. Second, we need to begin making these investments within and across entire energy systems rather than picking and choosing pieces of an energy puzzle.

Note chart 1. In December 2006, a Government Accountability Office (GAO) study gave us this information. The total budget authority for energy research and development has dropped by over 85 percent in real terms between 1978 and 2005. We need to put our energy challenges front and center and we will never be able to move forward with declining investments like that. Research and development figures in a chart like this should indicate increasing funding but regrettably, that has not been the case.

Chart 2 shows that of the Energy Department's \$24.3 billion budget request for 2008, only \$3.1 billion is directed toward energy matters. Let me say that again: Of \$24.3 billion in the Department of Energy budget request, \$3.1 billion is directed toward energy matters and of that only \$2.5 billion is directed at energy technology programs. While I realize the Department has very broad and important mandates, this means that, in simple terms, only \$1 in \$8 in the Department of Energy request is actually going toward energy issues.

On the second point, energy systems have many elements to them and we must undertake improvements along the R&D chain to these systems as wholes. We have two major systems at work, the transportation system and a power generation system. We must be prepared to understand these systems and address them at every stage, not just in bits and pieces.

For example, if we want to promote renewable fuels, and I do, then we need to look at feed stocks, bio-refineries, fuel transportation, infrastructure, vehicles, public education, and marketplace acceptance. The Department of Energy suggests it does not pick winners and losers but I think in many ways that's very disingenuous.

We can see many examples where, with tight budgets and different priorities, some areas have been done well and others not so well. One needs to look only at the Department's fiscal year 2007 spending plan. It demonstrates that two of our witnesses' programs had windfall budget increases while two saw cutbacks.

The Department's consistency in those areas, I think, is an inconsistency in following through on long-term commitments and recognizing the Government's role in investing and directing policies along each stage of the energy system. I understand that we have limited resources and nearly unlimited wants. But we must find a way of addressing those key areas that are crucial to our energy success in the future.

If our energy policy is going to be central to our Nation's future, and energy will be central to our Nation's future, then we're not going to be able to do it on the cheap or do it at the margins. I'm very interested in hearing today from the four witnesses, whose di-

rect activities in the Department of Energy are, I believe, essential and central to the question of whether we will succeed in meeting our energy needs.

Senator Domenici.

OPENING STATEMENT OF SENATOR PETE V. DOMENICI

Senator DOMENICI. Mr. Chairman, I realize that we have a full load of witnesses and many people here to hear what they have to say, including Senators but I would like to give just a brief opening statement. It will not be long.

First let me say, I greatly appreciate the statement you made. I listened to it attentively. Obviously, I'm not sure that I agree with the conclusions that were arrived at by you and your helpers. But I do agree wholeheartedly with the premise and the thesis of what you've said.

Actually, Mr. Chairman, we didn't have a Department of Energy for a long time. It was a Department put together by just piecing all kinds of agencies and then for a long time, nobody knew what the Department of Energy was supposed to do. You knew that from afar. I knew it from inside. We didn't know whether we were supposed to be for nuclear power. We didn't even know if there should be nuclear power mentioned within the Department of Energy for a number of years, Senator Bond. It just wasn't even thought of. So that accounts for many of the ups and downs that you have spoken of.

Today, these four witnesses from the Department of Energy represent major energy supply R&D accounts. They've developed innovative research initiatives such as cellulosic biomass programs, the Global Nuclear Energy Partnership (GNEP), FutureGen and Solar America, which have the potential of deploying cleaner burning fossil fuel technology as well as zero emission technologies such as nuclear, solar and wind generation.

This budget supports many of the research priorities included in EPACT, the bill you alluded to that we passed 2½ years ago. One important goal of EPACT has been to make sure that innovative energy technology doesn't stay in the lab but will be deployed to reduce our greenhouse gas emissions as well as our country's less dependence on foreign energy sources.

It is a fact that our energy markets are based on low cost, conventional generation. High cost renewable energy technologies face a serious challenge in the cost competitive environment.

In addition to supporting additional R&D efforts, I've been focused on implementing the title XVII Loan Guarantee Program. This initiative can be effective—an effective tool in the leveraging of the Federal balance sheet to make the first of a kind renewable and alternative energy technology cost competitive.

I've been surprised by the challenges facing the implementation of loan guarantee programs that we provided in the energy bill, especially in light of the fact that the export/import bank provides \$18 billion in loan coverage to support U.S. commercial investments overseas. This is twice the level provided to support DOE's title XVII.

I know investment overseas is important but I believe we have a serious problem when the administration provides greater assist-

ance to support the sale of nuclear reactors to China than it provides for the deployment of nuclear reactors in our own country. I believe that's wrong and I think somehow we must fix it. It is very hard for us to fix it. I mean, we are going to have to pass specific laws that specifically direct whatever it is we want in this area that we're talking about in terms of loan guarantees.

I'd like to also make a brief point about the Global Nuclear Energy Partnership—GNEP. This is a very exciting initiative. It proposes to close the nuclear fuel cycle. I understand there could be questions about it but I think once it gets on the table, let's the daylight see it all and see how it comes out. It is apt to be a very exciting thing that we should put together and work on.

#### PREPARED STATEMENTS

I ask that the balance of my statement be made a part of the record and thank you, Mr. Chairman, for giving me an opportunity to address these issues and thank you, witnesses. It's good to have you all here.

Senator DORGAN. Without objection. Senator Reed has also submitted a statement for the record.

[The statements follow:]

#### PREPARED STATEMENT OF SENATOR PETE V. DOMENICI

Mr. Chairman, today we have four witnesses representing the Department of Energy's major energy supply R&D accounts. These offices have developed innovative research initiatives such as the cellulosic biomass program, GNEP, FutureGen and Solar America, which have the potential of deploying cleaner burning fossil fuel technology as well as zero emission technologies such as nuclear, solar, and wind generation.

This budget supports many of the research priorities included in EPACT. One important goal of EPACT has been to make sure that innovative energy technology doesn't stay in the lab but will be deployed to reduce our greenhouse gas emissions as well as make our country less dependent of foreign energy sources.

It is a fact that our energy markets are based on low cost, conventional generation and that high cost, renewable energy technologies face a serious challenge in a cost competitive environment.

In addition to supporting additional R&D efforts, I have been focused on implementing the title 17 loan guarantee program. This initiative can be an effective tool in leveraging the Federal balance sheet to make the first of a kind renewable and alternative energy technologies cost competitive.

I have been surprised by the challenges facing the implementation of the loan guarantee program, especially in light of the fact that the Export-Import Bank provides \$18 billion in loan coverage to support U.S. commercial investment overseas. This is twice the level provided to support DOE's title 17 program.

I know investment overseas is important, but I believe we have a serious problem when the administration provides greater assistance to support the sale of nuclear reactors to China, than it provides for the deployment of nuclear reactors in our own country.

Mr. Chairman, I would like to make a brief point about the Global Nuclear Energy Partnership (GNEP). This is a very exciting initiative. It proposes to close the nuclear fuel cycle and make a significant reduction on our spent fuel inventories.

The world has begun to embrace nuclear power as a cost effective energy solution that does not contribute to greenhouse gases. Today, there are plans to build an additional 200 new nuclear plants in countries all across the world.

I commend the administration for their efforts to develop a comprehensive plan that will address spent fuel management and to optimize this energy resource in a safe and secure manner.

This issue is not going away and this country should be part of the global solution.

I am looking forward to hearing from our witnesses, who are working very hard to make our country more energy independent and to reduce greenhouse gas emission to the lowest levels possible.

Gentlemen, I appreciate your service very much.

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PREPARED STATEMENT OF SENATOR JACK REED

Chairman Dorgan and Senator Domenici, I want to thank you for holding this hearing to review the Department of Energy's fiscal year 2008 budget request. Federal funding for energy efficiency and renewable energy programs is very important to me. I want to express my disappointment at the Department of Energy's budget proposal for the Office of Energy Efficiency and Renewable Energy. The fiscal year 2008 budget proposes only \$1.24 billion for EERE—a \$230 million decrease compared to the fiscal year 2007 Continuing Resolution funding level.

Our Nation faces significant challenges as we strive to ensure our energy security, reduce the economic risks of high energy prices, and address global climate change. Energy efficiency and renewable energy programs that improve technologies for our homes, our businesses, and our vehicles must be the "first fuel" in the race for secure, affordable, and clean energy.

Energy efficiency is the Nation's greatest energy resource. We now save more energy each year from energy efficiency than we get from any single energy source, including oil, natural gas, coal, and nuclear power. A 2001 National Research Council report found that for every dollar invested in the 17 Department of Energy energy-efficiency research and development programs, nearly \$20 is added to the U.S. economy in the form of new products, new jobs, and energy cost savings to American homes and businesses.

Unfortunately, under this administration, efficiency funding has fallen alarmingly since 2002. Adjusting for inflation, funding for efficiency has been cut by one-third. The fiscal year 2007 Continuing Resolution provided \$1.473 billion for efficiency and renewable energy. I want to thank Senators Dorgan and Domenici for this increased funding. The \$300 million added in fiscal year 2007 will help to restore the cuts of recent years, but increased investment is necessary. The Energy Policy Act of 2005 authorized over \$3.8 billion for the EERE account. In order to reduce our dependency on fossil fuels and enhance our energy security, this is a time to grow our Nation's investment in energy efficiency, not cut funding.

I want to add that I am disappointed that the Department of Energy's fiscal year 2007 spending plan submitted to Congress cut funding to the Weatherization program. The Senate passed an amendment to the Supplemental Appropriations bill to restore funding to \$237 million. While I hope this amendment will prevail in conference, it is my hope that the Department will reconsider its spending plan and restore the funding for weatherization while maintaining funding for other programs in the intergovernmental account.

In closing, I want to say that I am glad to see the administration's support for cellulosic ethanol and an increase in funding to support cost-shared projects with industry for enzyme development to produce low cost sugars from biomass and for improved organism development for converting those sugars to ethanol. I want to make sure that the Department of Energy is aware of important research being conducted by the University of Rhode Island and Brown University in this field. Researchers in my State are developing biotechnology strategies to increase biomass of native grasses and enzymes for post-harvest digestion of cellulose to improve efficiency of cellulosic ethanol production.

Senator DORGAN. My colleagues, I would prefer to go to the witnesses but if you have a very brief opening statement that you feel like you must make, I'd certainly be happy to respect that.

Senator BOND. That's a challenge, Mr. Chairman. I was going to spend most of my time praising you and the ranking member for the money you put in, the \$300 million increase in funding through the continuing resolution.

Senator DORGAN. Take as much time as you want.

Senator BOND. For efficiency of renewable energy. I strongly support renewable energy, nuclear power, clean coal research. We have a lot of problems in Missouri if we have carbon caps or taxation. For low-income people, LIHEAP only covers one-sixth of them. We've lost jobs overseas from the increased cost of natural gas.

These impose tremendous burdens and the best way we can work, I think, for the future, is through clean coal technology be-

cause right now, I just heard—I don't know, I just heard this fact that by 2012, the timeframe when Kyoto is going to go into place—by that time, China and India will build almost 800 new coal-fired powerplants. The combined carbon emissions from those plants will be five times as much as the total reductions mandated by the Kyoto Accords and even though nobody is meeting them and we can't get China and India to meet them and curb their growth unless we are able to provide them the technology. I commend the President's Asia Pacific Partnership because that—developing the technology here, making it comparable in cost to current technology for coal-fired energy is absolutely essential. We've got to get over the foot dragging and the bureaucracy, get the money released for the EPA Act and I support your efforts and more authorization. I just think this is a critical element if we're going to take care of the needs in our country and not see our efforts overwhelmed by the growth in new coal-powered plants in China and India.

Senator DORGAN. Thank you, Senator Bond. Others?

Senator CRAIG. With reason and concern, I will only accept a slight bump up in the Idaho Lab budget. Other than that, I'll make my comments during the questioning period.

Senator DORGAN. Thank you, Senator Craig.

Senator CRAIG. Dennis, did you hear that?

Mr. SPURGEON. Yes, sir, I heard that.

Senator CRAIG. Thank you very much.

Senator DORGAN. Senator Allard.

#### PREPARED STATEMENT

Senator ALLARD. Mr. Chairman, I have some comments. I'll just submit them in the record.

Senator DORGAN. Without objection.

[The statement follows:]

#### PREPARED STATEMENT OF SENATOR WAYNE ALLARD

Mr. Chairman, thank you for holding this hearing today. I think it is very appropriate that you have asked the offices that are responsible for dealing with some of the most common ways of producing electricity to be here with the Office of Delivery and Reliability. And as we are all aware, no amount of electricity does us any good if we cannot get it to where it is needed.

No one can argue that we are dangerously reliant on foreign sources of energy. We must decrease our reliance on foreign sources of energy by diversifying our energy sources and increasing conservation. I have long felt that a balanced energy portfolio that takes no technology off of the table is what is best for this Nation.

For this reason I am a strong supporter of nuclear energy. Nuclear generation facilities produce vast and reliable quantities of electricity. I am pleased with the recent movement toward increasing our nuclear capacity, which has been the result of the Energy Policy Act passed in 2005. I am hopeful that we can continue this progress.

I would like to extend a special welcome to Mr. Karsner, who oversees the Office of Energy Efficiency and Renewable Energy, which in turn oversees the National Renewable Energy Laboratory in Colorado. NREL makes a major contribution to the development of renewable energy technology and the technologies that are developed at NREL will remain vital to our Nation's energy progress.

Renewable energy is a very important way that we can begin to reduce the demand for oil and, thereby, help make our country more secure. There are great opportunities for solar, wind, geothermal, biomass, fuel cells and hydro to make significant contributions. Research and the input of both government and industry partners are very important to allowing these opportunities to live up to their potential.

Finally, fossil energy will remain important to energy production in this country. Technological advancements have made the use of coal cleaner and more efficient than ever before. In the United States we have vast amounts of domestic resources from traditional oil, coal and gas resources to unconventional sources such as oil shale. I firmly believe that we can and must continue to use these resources responsibly.

I look forward to working with the committee to ensure that research and development in all fields of energy technology are funded in a manner that is responsible, but sufficient to ensure that the development and implementation of new technologies continues.

Senator DORGAN. Thank you very much. Well, let me, on behalf of the entire subcommittee, thank the witnesses. We will begin today by hearing from the Honorable Dennis Spurgeon, who is the Assistant Secretary of the Office of Nuclear Energy. Mr. Spurgeon, let me say to all four of you that your full comments will be made a part of the permanent record and you may summarize. Mr. Spurgeon.

#### STATEMENT OF HON. DENNIS R. SPURGEON

Mr. SPURGEON. Thank you very much, Mr. Chairman. Chairman Dorgan, Ranking Member Domenici and members of the subcommittee, it is a pleasure to be here today to discuss the fiscal year 2008 budget request for the Department of Energy's Office of Nuclear Energy.

The Office of Nuclear Energy has made progress in the last several years in advancing our Nation's energy security and independence in support of the Department's strategic plan. It is my highest near-term priority to enable industry to deploy a new generation of nuclear power plants. We have also made steps toward the developing of advanced nuclear reactor and fuel cycle technologies while maintaining a critical national nuclear infrastructure.

Today, 103 nuclear reactors generate roughly 20 percent of America's electricity, with the 104th reactor, Browns Ferry Unit 1, about to enter service. U.S. electricity demand is anticipated to grow 50 percent in the next 25 years, the equivalent of 45 to 50 1,000 megawatt nuclear reactors must be built just to maintain that 20 percent share.

The United States is at a critical juncture in the future of nuclear power in the United States. Unlike many of our international research partners, our nuclear industry has not been heavily supported, financially and politically, over the past 30 years. Today, the need for increased electrical generation capacity is clear and hopefully undisputed.

#### NUCLEAR POWER 2010

Fortunately, we do have a growth option that allows us to have a diversified electrical generation portfolio that includes a significant carbon emissions-free component and that is nuclear power. To support near term domestic expansion of nuclear energy, the fiscal year 2008 budget requests \$114 million for the Nuclear Power 2010 Program, to support continued cost shared efforts with industry to reduce the barriers to deployment of new nuclear power plants in the United States.

In the past few weeks, we have seen major milestones met in the expansion of safe and clean nuclear power. In early March, the

NRC voted to approve the early site permit for the Exelon Generation Company's Clinton site in central Illinois and 2 weeks ago, the NRC approved the early site permit for the Entergy Corporation's Randolph site in Mississippi. The approval of these two sites is a step toward the ordering of new nuclear powerplants for construction on American soil, a feat that hasn't happened in 30 years.

Why nuclear power? Nuclear power is the only proven base load producer of electricity for new capacity that does not emit greenhouse gases. It is vital that our current fleet of reactors be expanded in order to meet our needs for carbon-free, dependable electric power.

#### GLOBAL NUCLEAR ENERGY PARTNERSHIP

Any serious effort toward expanded global use of nuclear energy will inevitably require us to address the spent fuel and proliferation challenges that accompany such an expansion. To meet these challenges, President Bush initiated the Global Nuclear Energy Partnership or GNEP, a comprehensive approach to enable the expansion of nuclear power in the United States and around the world, to promote nonproliferation goals, to more efficiently use our nuclear fuel resources and to help resolve nuclear waste management issues.

Domestically, GNEP provides a solution to the ever-growing issue of spent nuclear fuel. In conjunction with Yucca Mountain, GNEP provides a solution that outlines a closed fuel cycle, where energy is harvested from spent fuel before the end product is disposed of in a permanent geologic repository. The spent fuel will be recycled in a manner that will be more proliferation resistant than current processes used around the world. A closed fuel cycle will also alleviate some of the burden placed on Yucca Mountain and will possibly eliminate the need for a second geologic repository throughout the remainder of this century. We reiterate though that no fuel cycle scenario will eliminate the need for a geologic repository.

We are all aware of the enormous amount of energy available from nuclear fission. One pound of uranium fuel in a reactor makes the same amount of electricity as 125 million pounds of coal. Recycling, as we planned in GNEP, while decreasing the overall mass of spent nuclear fuel, will also make it possible to use the energy remaining in the used fuel. A recycling facility processing fuel from existing U.S. light water reactors could recover the energy equivalent of the oil delivered by the Alaska Pipeline.

Internationally, GNEP promises to address the growing global energy demand in an environmentally friendly manner. A global regime of countries able to provide a complete portfolio of nuclear fuel services, including Russia, France and possibly Japan, China and Britain, will provide these services to countries wanting to use nuclear power to meet their basic and growing energy needs without the cost and risk associated with the nuclear fuel cycle infrastructure. By providing these services to other countries, we hope to dissuade future states from developing enrichment capabilities like we are encountering in Iran today.

The fact is, the United States is not currently positioned to be an active member of the global regime. We have limited enrich-

ment capabilities and no back end recycling capabilities. Creating the capabilities needed to participate in the global expansion of nuclear power will take at least 15 to 20 years, meaning that in order to become an active participant of the global nuclear expansion, we need to begin now.

Taking those necessary steps enables us to better assure that the imminent expansion will be safe, beneficial and will not promote the proliferation of nuclear weapons.

The Department requests \$405 million in fiscal year 2008 to begin work on developing a detailed, technically sound roadmap for implementing all aspects of the GNEP vision.

#### PREPARED STATEMENT

Mr. Chairman, we appreciate the support we have received from the subcommittee as we seek to address the challenges surrounding the global expansion of nuclear power. We remain confident and optimistic about the role of nuclear energy in providing a solution to our Nation's energy stability and independence.

I would be pleased to answer your questions, sir.

Senator DORGAN. Secretary Spurgeon, thank you very much for your testimony. We appreciate it.

[The statement follows:]

#### PREPARED STATEMENT OF HON. DENNIS R. SPURGEON

Chairman Dorgan, Ranking Member Domenici, and members of the subcommittee, it is a pleasure to be here to discuss the fiscal year 2008 budget request for The Department of Energy's (DOE) Office of Nuclear Energy.

The Department of Energy's strategic plan portrays a long-term vision of a zero-emission future, free from the reliance on imported energy. A portfolio of nuclear programs is provided for in this plan for near-term, medium-term, and long-term sustained advances in nuclear technology.

The Office of Nuclear Energy has made progress in the last several years in advancing our Nation's energy security and independence in support of the Department's strategic plan. The Department remains committed to enabling industry to deploy a new generation of nuclear power plants. We have also made steps forward in developing advanced nuclear reactor and fuel cycle technologies while maintaining a critical national nuclear infrastructure.

Today, 103 nuclear reactors generate roughly 20 percent of America's electricity, with the 104th reactor, Browns Ferry unit 1, about to enter service. U.S. electricity demand is anticipated to grow 50 percent over the next 25 years—the equivalent of 45 to 50 one-thousand megawatt nuclear reactors must be built just to maintain that 20 percent share. With nuclear power as the only proven base load producer of electricity that does not emit greenhouse gases, it is vital that our current fleet of reactors be expanded in order to meet our needs for carbon-free, dependable and economic electric power.

Any serious effort to stabilize greenhouse gases in the atmosphere, while providing the increasing amounts of energy needed for economic development and growth, requires the expanded use of nuclear energy. This will inevitably require us to address the spent fuel and proliferation challenges that confront the expanded, global use of nuclear energy. To meet these challenges, the Department initiated the Global Nuclear Energy Partnership (GNEP), a comprehensive approach to enable an expansion of nuclear power in the United States and around the world, promote non-proliferation goals, and help minimize the amount of nuclear waste disposal.

GNEP is a perfect example of where global cooperation is required to address a changing global energy landscape. The United States has a unique opportunity to influence global energy policy, and more specifically global nuclear energy policy. However, for the United States to have influence abroad, we must have an established domestic policy supportive of a significant role for nuclear power in our energy future, an aggressive nuclear research and development program, and a viable nuclear technology infrastructure. Through the GNEP program, we are pursuing in parallel the development of the policies, technologies, and facilities necessary for the

United States to be a global leader in the nuclear energy enterprise and to ensure our energy security and national security objectives.

The Department's fiscal year 2008 budget request proposes an \$874.6 million investment in nuclear research, development and infrastructure for the Nation's future. This budget request supports the President's priorities to enhance the Nation's energy security while enabling significant improvements in environmental quality. Our request supports development of new nuclear generation technologies and advanced energy products that provide significant improvements in sustainability, economics, safety and reliability, and proliferation and terrorism resistance.

While we have made progress in all program areas, much remains to be done. Our fiscal year 2008 request moves us in the right direction and I will now provide you a report of our activities and explain the President's request for nuclear energy.

#### NUCLEAR POWER 2010

To support near-term domestic expansion of nuclear energy, the fiscal year 2008 budget requests \$114 million for the Nuclear Power 2010 program to support continued cost-shared efforts with industry to reduce the barriers to the deployment of new nuclear power plants in the United States. The technology focus of the Nuclear Power 2010 program is on Generation III+ advanced, light water reactor designs, which offer advancements in safety and economics over the existing fleet of nuclear power plants already operating in the United States. To reduce the regulatory uncertainties and enable the deployment of new Generation III+ nuclear power plants in the United States, it is essential to demonstrate the untested Federal regulatory processes for the siting, construction, and operation of new nuclear plants. In addition, design finalization of two standard plant designs and NRC certification of these Generation III+ advanced reactor concepts are needed to reduce the high initial capital costs of the first new plants so that these new technologies can be competitive in the deregulated electricity market and deployable within the next decade.

The fiscal year 2008 budget request continues the licensing demonstration activities started in previous years. Activities include completion of the last Early Site Permit demonstration projects and continuation of the New Nuclear Plant Licensing Demonstration projects that will exercise the untested licensing process to build and operate new nuclear plants and complete and obtain certification of two advanced Generation III+ advanced reactor designs. Engineering activities in support of the submission of two combined Construction and Operating License (COL) applications to the NRC will continue. In addition, two reactor vendors will continue first-of-a-kind design activities for two standard nuclear plants.

In the past few weeks we have seen major milestones met in the expansion of safe and clean nuclear power. Earlier this month the NRC voted to approve the Early Site Permit for the Exelon Generation Company's Clinton site in central Illinois, and just yesterday the NRC approved the Early Site Permit for the Entergy Corporation's Grand Gulf site in Mississippi. The approval of these two sites is a step towards the ordering of new nuclear power plants for construction on American soil, a feat that hasn't happened in 30 years. With nuclear power as the only proven base load producer of electricity that does not emit greenhouse gases, it is vital that our current fleet of reactors be expanded in order to meet our needs for carbon-free, dependable and economic electric power.

The project teams, Dominion Energy and NuStart Energy Development LLC., involved in the licensing demonstration projects represent power generating companies and reactor vendors that operate more than two-thirds of all the U.S. nuclear power plants in operation today. As a result of the Nuclear Power 2010 program and Energy Policy Act of 2005 financial incentives (e.g. standby support), 14 power companies have announced their intentions to apply for combined construction and operating licenses. Several have specifically stated that they are building on work being done in the Nuclear Power 2010 program as the basis for their applications.

The United States is at a critical juncture in the future of nuclear power in the United States. Unlike many of our international research partners, our nuclear industry has not been heavily supported financially and politically over the past 30 years. Today the need for increased electrical generating capacity is clear and hopefully undisputed. Fortunately, we do have a growth option that allows us to have a diversified electrical generation portfolio that includes a significant carbon emissions-free component, and that is nuclear power. To realize this option, we are asking private companies to build plants whose collective cost could be a significant percentage of their net worth. This represents an enormous financial risk that few companies or lenders will be willing to assume without demonstrated certainty in the regulatory process and project cost.

If one accepts the fact that we need more electrical generation capacity, and if one desires to have a component of that new capacity that is carbon free, and one recognizes the financial considerations associated with such a large private investment in technologies that we have not supported in 30 years, then the importance of this program to our future energy security is self-evident. These companies will be building new generating capacity in the very near future, but the question they must first answer is whether this generation will come from clean, safe, nuclear technologies or not.

If widely deployed in the United States these new technologies will create significant business opportunities and will support the rapid growth of heavy equipment fabrication, high technology and commercial construction industries in this country. Moreover, these American technologies and industrial capabilities will be highly competitive internationally and would support our leadership role in the global expansion of safe, clean nuclear power.

#### ADVANCED FUEL CYCLE INITIATIVE

One of the most important and challenging issues affecting future expansion of nuclear energy in the United States and worldwide is dealing effectively with spent nuclear fuel and high-level waste. For the medium-term, the Advanced Fuel Cycle Initiative (AFCI) will develop fuel cycle technologies that will support the economic and sustained production of nuclear energy while minimizing waste in a proliferation-resistant manner. To support the development of these technologies, the fiscal year 2008 Budget request includes \$395.0 million for AFCI.

AFCI's near-term goals are to develop and demonstrate advanced, more proliferation-resistant fuel cycle technologies for treatment of commercial light water reactor spent fuel, to develop an integrated spent fuel recycling plan, and to provide information and support on efforts to minimize the amount of material that needs disposal in a geologic repository. AFCI conducts research and development of spent fuel treatment and recycling technologies to support an expanding role for nuclear power in the United States and to promote world-wide expansion of nuclear energy in a proliferation-resistant manner as envisioned for the Global Nuclear Energy Partnership (GNEP). AFCI is the U.S. technology component of the GNEP.

Specifically, in fiscal year 2008, the Department intends to complete industry-led conceptual design studies for the nuclear fuel recycling center and the advanced recycling reactor Demonstration Analysis. Additionally, DOE will continue start-to-finish demonstrations of recycling technologies, which are expected to produce separated transuranics for use in transmutation fuel development, as well as conduct systems analysis and advanced computing and simulation activities focused on a variety of deployment system alternatives and supporting technology development. As part of GNEP Technology Development, the Department also intends to evaluate small, proliferation-resistant reactors for potential U.S. manufacture and export to reactor user nations.

GNEP seeks to bring about a significant, wide-scale use of nuclear energy, and to take actions now that will allow that vision to be achieved while decreasing the risk of nuclear weapons proliferation and effectively addressing the challenges of nuclear waste disposal. GNEP will advance the nonproliferation and national security interests of the United States by reinforcing its nonproliferation policies and limiting the spread of enrichment and reprocessing technologies, and will eventually eliminate excess civilian plutonium stocks that have accumulated. The AFCI budget request supports the Department's goal of realizing the GNEP vision. AFCI activities in fiscal year 2007 and fiscal year 2008 are focused on developing a detailed roadmap for implementing all aspects of the GNEP vision and informing a Secretarial decision in June 2008 on the path forward for GNEP.

Long-term goals for AFCI/GNEP will develop and demonstrate an advanced, more proliferation-resistant closed nuclear fuel cycle system involving spent fuel partitioning and recycling of long-lived radioactive elements for destruction through transmutation in fast reactors that could result in a significant increase in the effective capacity of the planned Yucca Mountain repository. This capacity increase could ensure enough capacity to accommodate all the spent fuel generated in the United States this century from any reasonably conceivable deployment scenario for nuclear energy. Yet, under any fuel cycle scenario a geologic repository is necessary. Therefore, GNEP and Yucca Mountain are proceeding on parallel tracks.

#### GENERATION IV NUCLEAR ENERGY SYSTEMS INITIATIVE

The fiscal year 2008 budget request includes \$36.1 million to continue development of next-generation nuclear energy systems within the Generation IV program. For the long term, the Generation IV program will develop new nuclear energy sys-

tems that can compete with advanced fossil and renewable technologies, enabling power providers to select from a diverse group of options that are economical, reliable, safe, secure, and environmentally acceptable. In particular, the Next Generation Nuclear Plant (NGNP) reactor concept will be capable of providing high-temperature process heat for various industrial applications, including the production of hydrogen in support of the President's Advanced Energy Initiative.

The NGNP, with an investment of \$30 million within the Generation IV Nuclear Energy Systems Initiative, will utilize a Generation IV Very High Temperature Reactor configured for production of high temperature process heat for the generation of hydrogen, electricity, and other industrial commodities. The Energy Policy Act of 2005 (EPACT) authorized the Department to create a two-phased NGNP Project at the Idaho National Laboratory (INL). The Department is presently engaged in Phase I of the EPACT defined scope of work which includes: developing a licensing strategy, selecting and validating the appropriate hydrogen production technology, conducting enabling research and development for the reactor system, determining whether it is appropriate to combine electricity generation and hydrogen production in a single prototype nuclear reactor and plant, and establishing key design parameters. Phase I will continue until 2011, at which time the Department will evaluate the need for continuing into the design and construction activities called for in Phase II.

The fiscal year 2008 budget request maintains critical R&D that will help achieve the desired goals of sustainability, economics, and proliferation resistance. Further investigation of technical and economical challenges and risks is needed before a decision can be made to proceed with a demonstration of a next-generation reactor.

#### NUCLEAR HYDROGEN INITIATIVE

Hydrogen offers significant promise as a future energy technology, particularly for the transportation sector. The use of hydrogen in transportation will reduce U.S. dependence on foreign sources of petroleum, enhancing our energy security. The fiscal year 2008 budget request for the Office of Nuclear Energy includes \$22.6 million to continue to develop enabling technologies, demonstrate nuclear-based hydrogen production technologies, and study potential hydrogen production strategies to support the President's vision for a future hydrogen economy.

Currently, the only economical, large-scale method of hydrogen production involves the conversion of methane into hydrogen through a steam reforming process. This process produces ten kilograms of greenhouse gases for every kilogram of hydrogen, defeating a primary advantage of using hydrogen—its environmental benefits. Another existing method, electrolysis, converts water into hydrogen using electricity. Electrolysis is typically used for small production quantities and is inherently less efficient because electricity must first be produced to run the equipment used to convert the water into hydrogen. Additionally, the environmental benefits of electrolysis are negated unless a non-emitting technology, such as nuclear or renewable energy, is used to produce the electricity. The Nuclear Hydrogen Initiative is developing processes that operate across a range of temperatures for the various advanced reactors being researched by the Generation IV Nuclear Energy Systems Initiative. These processes, coupled with advanced nuclear reactors, have the potential for high-efficiency, large-scale production of hydrogen.

The objective of this program is to demonstrate the technologies at increasingly larger scales ultimately culminating in an industrial scale that would be technically and economically suited for commercial deployment. Fiscal year 2005 and fiscal year 2006 activities were focused on the validation of individual processes and components; fiscal year 2007 and fiscal year 2008 are focused on the design, construction and operation of integrated laboratory scale experiments. In fiscal year 2008, the Department will complete construction of integrated laboratory-scale system experiments and begin testing to enable the 2011 selection of the technology that could be demonstrated in a pilot scale hydrogen production experiment.

#### RADIOLOGICAL FACILITIES MANAGEMENT

The Office of Nuclear Energy's fiscal year 2008 budget request also includes \$53.0 million to maintain critical research and production facilities for medical isotopes and radioisotope power systems at the Idaho National Laboratory, the Oak Ridge National Laboratory, the Los Alamos National Laboratory, the Sandia National Laboratory, and the Brookhaven National Laboratory. This request also includes funding for University Research Reactors.

These funds assure that the infrastructure for the facilities meet essential safety and environmental requirements and are maintained at operable user-ready levels.

Programmatic activities, including production and research, are funded either by other DOE programs, by the private sector, or by other Federal agency users.

The Department seeks \$14.9 million to maintain one-of-a-kind facilities at the Idaho, Oak Ridge, Brookhaven, and Los Alamos National Laboratories for isotope production and processing. These isotopes are used to help improve the accuracy, effectiveness, and continuation of medical diagnoses and therapy, enhance homeland security, improve the efficiency of industrial processes, and provide precise measurement and investigative tools for materials, biomedical, environmental, archeological, and other research. Actual operations, production, research or other activities are funded either by other DOE programs, by the private sector, or by other Federal agency users.

The Department also maintains unique facilities and capabilities at the Idaho, Oak Ridge, and Los Alamos National Laboratories that enable the Department to provide the radioisotope power systems for space exploration and national security applications. The fiscal year 2008 budget requests \$35.1 million to maintain the basic facilities and associated personnel whereas mission specific development or hardware fabrication costs are provided by the user agencies. This arrangement is essential in order to preserve the basic capability regardless of periodic fluctuations in the demand of the end product users.

Finally, the Department requests \$2.9 million in fiscal year 2008 to provide research reactor fuel to universities and dispose of spent fuel from university reactors. Currently, there are 27 operating university research reactors at 27 institutions in the United States. Many of these facilities have permanent fuel cores and therefore do not require regular fuel shipments. However, DOE supplies approximately a dozen universities with fresh fuel and shipments of spent fuel as needed.

#### IDAHO FACILITIES MANAGEMENT

The Department is working to transform Idaho National Laboratory into one of the world's foremost nuclear research laboratories. As such, the fiscal year 2008 budget request seeks \$104.7 million for the Idaho Facilities Management Program to maintain and enhance the laboratory's nuclear energy research infrastructure.

The Idaho Facilities Management Program operates and maintains three main engineering and research campuses and the Central Facilities Area at the Idaho National Laboratory. The 3 main engineering and research campuses are: (1) the Reactor Technology Complex which houses the world-renown Advanced Test Reactor, (2) the Materials and Fuels Complex, and (3) the Science and Technology Campus. As the Idaho National Laboratory landlord, the Office of Nuclear Energy also operates and maintains the Central Facilities Area at Idaho National Laboratory, providing site-wide support services and from which various site infrastructure systems and facilities, such as electrical utility distribution, intra-laboratory communications systems, and roads are managed and maintained. Also included within the Central Facilities Area is the Radiological and Environmental Sciences Laboratory operated by the Office of Nuclear Energy.

#### IDAHO SITE-WIDE SAFEGUARDS & SECURITIES

The mission of the Idaho Site-wide Safeguards and Security program is to protect the assets and infrastructure of the Idaho National Laboratory from theft, diversion, sabotage, espionage, unauthorized access, compromise, and other hostile acts that may cause unacceptable adverse impacts on national security; program continuity; or the health and safety of employees, the public, or the environment.

The fiscal year 2008 Budget Request includes \$72.9 million to provide protection of nuclear materials, classified matter, government property, and other vital assets from unauthorized access, theft, diversion, sabotage, espionage, and other hostile acts that may cause risks to national security, the health and safety of DOE and contractor employees, the public or the environment.

#### UNIVERSITY REACTOR INFRASTRUCTURE AND EDUCATIONAL ASSISTANCE

While the University Educational Assistance program has concluded, funding will continue to be provided to the Nation's nuclear science and engineering universities through our applied research and development programs by means of our Nuclear Energy Research Initiative (NERI). NERI funds are competitively awarded to support research objectives of the Advanced Fuel Cycle Initiative, the Generation IV Energy Systems Initiative and the Nuclear Hydrogen Initiative. By increasing the opportunities for university participation in our research programs, the Department seeks to establish an improved education and research network among universities, laboratories, industry and government. Approximately \$62 million in funding for

universities is included in the research programs for fiscal year 2008, a 21 percent increase over the fiscal year 2007 request.

CONCLUSION

This concludes my prepared statement. Your leadership and guidance has been essential to the progress the program has achieved thus far and your support is needed as we engage the task ahead of investing in our energy security.

I would be pleased to answer any questions you may have.

Senator DORGAN. Next, we will hear from Secretary Karsner. Secretary Karsner is Assistant Secretary for the Office of Energy Efficiency and Renewable Energy. Secretary Karsner, we welcome you.

**STATEMENT OF HON. ALEXANDER KARSNER, ASSISTANT SECRETARY FOR ENERGY EFFICIENCY AND RENEWABLE ENERGY**

Mr. KARSNER. I appreciate that. Chairman Dorgan, Ranking Member Domenici, members of the subcommittee, thank you for this opportunity to testify on the President's fiscal year 2008 budget request for the Office of Energy Efficiency and Renewable Energy, EERE.

The request includes \$1.24 billion for EERE, approximately \$60 million more than the fiscal year 2007 request to Congress. To be clear, my statement today is presented primarily in comparison with the administration's fiscal year 2007 request; however, because the Department has now submitted its fiscal year 2007 operating plan, I'm also going to highlight some of the key allocations from that appropriation.

The fiscal year 2008 budget request addresses pressing energy and environmental challenges by accelerating the development of renewable energy and advanced energy efficiency technologies. Much of EERE's funding is an integral part of the President's Advanced Energy Initiative (AEI). The AEI was launched in 2006 to confront our Nation's addiction to oil, lessen dependence on foreign resources and reduce emissions by developing clean sources of electricity generation.

In the 2007 State of the Union Address, the President raised the bar further by seeking legislative action to reduce gasoline consumption by 20 percent within the decade, the 20 in 10 plan. The 20 in 10 legislative proposals include an increased alternative fuel standard and reduced fuel consumption through raising and reforming corporate average fuel economy with a CAFE program.

The President's budget request increases funding for programs that support the 20 in 10 goal, including biomass and biofuels R&D to expand the availability of alternative transportation fuels. While the fiscal year 2007 continuing resolution is a substantial increase over the President's fiscal year 2008 budget proposal, the funds will be used to accelerate critical components of the Advanced Energy Initiative. EERE is directing an additional \$30 million to commercial biorefinery demonstrations, \$10 million additional for plug-in hybrid battery development, and over \$100 million for improvements at the National Renewable Energy Laboratory, NREL. The increase will accelerate the completion of NREL's research support facility, a state-of-the-art building complex. As a national model of LEED certified advanced design, it's going to showcase the renewable energy and energy efficiency technologies that NREL develops

and reduce its operating costs. Preliminary analyses indicate the potential to achieve up to \$122 million of life cycle savings.

The increase will also support expansion of NREL's Integrated Bio-Refinery Research Facility, which provides the industry with a very unique test bed for emerging technologies.

Returning to fiscal year 2008, EERE's overall budget request reflects the goals of accelerating new energy R&D and expanding commercialization and deployment of emerging technologies. The request for biomass and biorefinery systems R&D is \$179.3 million, an increase of \$29.6 million or almost 20 percent over the previous year. This proposal highlights the essential role of the Biofuels Initiative in increasing America's energy security.

The program is focused on making cellulosic ethanol cost-competitive by 2012. EERE will continue to support cost-shared efforts with industry to develop and demonstrate cellulosic biorefinery technologies that enable the production of transportation fuels and co-products. In addition, EERE is engaging in cost-shared projects with industry for enzyme development and for improved organism development or ethanologens for converting the sugars into ethanol. These two projects address major barriers to meeting our 2012 targets.

For the Vehicle Technologies Program, the Department is requesting \$176.1 million for fiscal year 2008 to advance the development of energy-efficient, environmentally friendly, flexible platform technologies for cars and trucks that use significantly less oil and enable industry to comply with the proposed reformed CAFE standards. This request is \$10.1 million higher than the fiscal year 2007 request and will advance the state of the art for energy storage batteries, power electronics and motors, and drive systems and testing needed to accelerate the viability and delivery of plug-in hybrid electric vehicles.

Battery technologies have made significant progress, reducing the cost of next generation hybrid vehicle batteries in each of the past 3 years, from almost \$1,200 per vehicle to \$750 per vehicle. In fiscal year 2008, we expect to bring that down further to \$625 per vehicle and to increase our emphasis on batteries specifically optimized for plug-in hybrid applications.

Next, hydrogen is an important element of our strategy for energy security and environmental stewardship. The President's \$309 million budget request for the Hydrogen Fuel Initiative fulfills his 5-year commitment of \$1.2 billion. The portion of this under EERE is \$213 million, which reflects a \$7.2 million increase over the fiscal year 2007 budget request.

Much progress has been made since the announcement of the Hydrogen Fuel Initiative in 2003. The research has reduced the high volume cost of automotive fuel cells from \$275 per kilowatt in 2002 to \$107 per kilowatt in 2006, a major step toward the ultimate cost target of \$30 per kilowatt.

Our research is going to continue to sharpen its focus to meet hydrogen production objectives through renewable pathways, including performing with bioderived liquids and electrolysis.

For solar energy, the fiscal year 2008 request is \$148.3 million, a level that is nearly twice the enacted 2006 level. The Department's photovoltaic R&D focuses on those technology pathways

that have the greatest potential to achieve more cost competitiveness and grid parity by or before 2015. Industry-led partnerships with universities, State groups and national laboratories, known as Technology Pathway Partnerships, will continue in fiscal year 2008 to address the issues of cost, performance, and reliability.

Other priority key program areas of EERE include Building Technologies, which targets the long-term goal in 2020 of net-zero energy buildings—houses that can produce as much energy as they use on an annual basis. We're going to help industry produce a white light-emitting diode, or LED, lamp, which has already set the world record for LED brightness and efficacy in a power chip.

Wind energy focuses on reducing wind power costs and removing siting and transmission barriers to expand and use wind energy up to potentially 20 percent of our grid capacity in the United States.

Industrial Technologies, which in addition to leveraging successful partnerships with energy intensive industries, will support the development of next generation technologies that can revolutionize the U.S. industrial processes and deliver dramatic energy and environmental benefits.

#### PREPARED STATEMENT

My written statement, of course, includes greater detail on these and other programs but this concludes my opening remarks and I'm happy to answer any questions the subcommittee members may have of me.

Senator DORGAN. Secretary Karsner, thank you very much for your testimony.

[The statement follows:]

#### PREPARED STATEMENT OF HON. ALEXANDER KARSNER

Mr. Chairman and members of the committee, thank you for this opportunity to testify on the President's fiscal year 2008 budget request for the Office of Energy Efficiency and Renewable Energy (EERE).

The President's fiscal year 2008 budget request includes \$1.24 billion for EERE, approximately \$60 million (5 percent) more than the fiscal year 2007 request to Congress. To be clear, because of timing in drafting this testimony and finalizing the Department's operating plan for the fiscal year 2007 year-long Continuing Resolution (CR), my written testimony on the fiscal year 2008 budget request is presented primarily in comparison to the administration's fiscal year 2007 request. EERE received a \$300 million increase in funding under the CR. I am grateful to Congress for its vote of confidence in the energy efficiency and renewable energy programs, but note that this level is above the allocation in the President's request. In allocating the additional \$300 million, EERE will accelerate the priorities reflected in administration initiatives such as the "20 in 10" plan and the Advanced Energy Initiative (AEI), while still carrying out implementation of the Energy Policy Act of 2005 (EPACT).

The fiscal year 2008 budget request addresses pressing energy and environmental challenges facing our country today by accelerating the development of both renewable energy technologies to increase the amount of clean energy produced in the United States and advanced energy efficient technologies, standards, and practices that use less energy. Much of EERE's funding is an integral part of the President's AEI, launched in 2006 to confront our addiction to oil, lessen dependence on foreign resources, and reduce emissions by developing clean sources of electricity generation. Together, new technologies can help change the way we power our homes, businesses, and automobiles.

In his 2007 State of the Union address, the President raised the bar by seeking legislative action for our country to reduce gasoline consumption by 20 percent in the next 10 years, the "20 in 10" plan. The fiscal year 2008 budget request increases funding for programs that may help the Nation achieve the "20 in 10" goal, includ-

ing, for example, biomass/biofuels R&D that may help to expand the availability of alternative transportation fuels.

EERE's applied science R&D contributes to the foundation for transforming the Nation's energy options and energy use. For example, one of this year's R&D 100 awards went to the Department's Idaho National Laboratory for its work with Xtreme Xylanase, an enzyme produced by bacteria found in the hot, acidic waters of Yellowstone National Park. Work on Xtreme Xylanase was funded in part by EERE's Biomass Program. The metabolic versatility of this enzyme (it breaks down cellulose and hemicellulose over a broad range of temperatures and acidic pH conditions) could help make cellulosic ethanol more efficiently and economically. In the field of solar energy, a new world-record 40 percent efficient concentrating photovoltaic solar cell was developed as a result of collaboration between DOE, the National Renewable Energy Laboratory, and Spectrolab. For general lighting applications with solid-state lighting, Cree, Inc., with DOE R&D funding, has released the new XLamp® 7090 power white light-emitting diode (LED), setting a world record for LED brightness and efficacy (at 85 lumens/Watt) in a power chip.

It is essential, however, that we work not only to accelerate R&D for new energy technologies, but address the accelerated adoption of technologies into commercial products that are widely available at reasonable cost to all Americans. Thus, in addition to its historical role of leading Federal applied science on emerging technologies, EERE is taking aggressive steps to catalyze the rapid commercialization and deployment of critical energy advances through innovative partnerships and collaboration with lenders and investment groups, the States, and industry leaders. We seek to help enable and accelerate market transformation toward the use of more efficient and cleaner technologies.

EERE's overall budget request reflects the funding needed to meet our goals. The following EERE programs target and support sectors of energy use and supply that will help lead our Nation to a secure energy future:

#### BIOMASS AND BIOREFINERY SYSTEMS R&D

The fiscal year 2008 budget request for Biomass and Biorefinery Systems R&D is \$179.3 million, an increase of \$29.6 million, almost 20 percent above the fiscal year 2007 request. This proposed funding increase reflects the essential role of the Biofuels Initiative in increasing America's energy security. Biomass is the most viable renewable option for producing liquid transportation fuels in the near term, with the potential to help reduce our dependence on imported oil.

The focus of the program is to make cellulosic ethanol cost-competitive by 2012. EERE will continue in fiscal year 2008 to support its cost-share efforts with industry to develop and demonstrate technologies to enable cellulosic biorefineries for the production of transportation fuels and co-products. The fiscal year 2008 funding increase also supports the validation of advancing biomass conversion technologies and feedstocks in biorefineries at approximately 10 percent of commercial scale. This effort enables industry to resolve remaining technical and process integration uncertainties for the "next generation" of biorefinery process technologies being examined at a significant, but less-costly scale. Ultimately, 10-percent scale demonstrations have the potential to reduce the overall cost and risk to industry along with improving the likelihood of obtaining financing for commercial-scale facilities.

The fiscal year 2008 funding increase will also support EERE cost-shared projects with industry for enzyme development for producing low cost sugars from biomass and for improved organism development or "ethanologen" for converting those sugars to ethanol. These two industry cost-share projects address major barriers to meeting the 2012 cost goal. Overall knowledge gained from section 932 projects, 10 percent validation scale projects, enzyme development, and ethanologen R&D, combined with other key R&D activities, should accelerate industry's ability to produce cost-competitive cellulosic ethanol.

To address biomass resource availability and feedstock infrastructure to reduce the cost and improve the storage of delivered biomass in different geographical areas of the United States, EERE will continue to support the Regional Feedstock Partnership work with the U.S. Department of Agriculture (USDA) and land grant colleges. These partnerships will help identify the regional biomass supply, growth, and biorefinery development opportunities.

In order to capture and coordinate Federal-wide activities supporting the President's goal, the Biomass Program is developing a National Biofuels Action Plan commissioned through the Biomass Research and Development Initiative. The Biomass Program will also establish the framework for an ethanol reverse auction in accordance with section 942 of EPACT 2005. The auction will award incentives on a per gallon basis of cellulosic biofuels produced.

## VEHICLE TECHNOLOGIES PROGRAM

In fiscal year 2008, the Department is requesting \$176.1 million for the Vehicle Technologies Program to advance development of increasingly more energy-efficient and environmentally friendly, flexible platform technologies for cars and trucks that will use significantly less oil and enable the auto industry to comply with reformed CAFE standards. This request is \$10.1 million higher than the fiscal year 2007 request, and will advance the state of the art for energy storage batteries, power electronics and motors, and the hybrid drive systems and testing needed to accelerate manufacturing viability and delivery of plug-in hybrid electric vehicles.

Activities in the Vehicle Technologies Program contribute to two cooperative government/industry activities: the FreedomCAR and Fuel Partnership (where CAR stands for Cooperative Automotive Research) and the 21st Century Truck Partnership. The FreedomCAR and Fuel Partnership is a collaborative effort among the U.S. Council for Automotive Research (USCAR—representing the three domestic automobile manufacturers), five energy suppliers, and DOE for cooperative, pre-competitive research on advanced automotive technologies having significant potential to reduce oil consumption. The 21st Century Truck Partnership focuses on commercial vehicles. The partnership involves key members of the commercial vehicle industry, (truck equipment manufacturers and engine manufacturers) along with three other Federal agencies. The R&D centers on improving advanced combustion engine systems and fuels and on reducing vehicle parasitic losses, meaning frictional and aerodynamic losses, extra loads like air conditioning, and other vehicle inefficiencies that increase fuel consumption.

Vehicle Technologies Program activities that support the goals of the FreedomCAR and Fuel Partnership focus on high-efficiency and flexible platform vehicle technologies such as advanced combustion engines and their enabling fuels, hybrid vehicle systems (including plug-in hybrids), high-power and high-energy batteries, lightweight materials, and power electronics. These technologies could lead to substantial oil savings if adopted by industry participants and included in their manufacturing plans.

The FreedomCAR goals include reducing the volume production cost of a high-power 25kW battery for use in hybrid passenger vehicles from \$3000 in 1998 to \$500 by 2010. In 2006 we projected through the modeling of research data that lithium ion battery cost could be reduced to \$750 per 25 kW battery system when produced in mass quantities. This year's request increases the emphasis on plug-in hybrid vehicle component technologies. Cited by the President as a key part of the strategy for reducing America's dependence on oil, these technologies offer the potential to make significant additional improvements in petroleum reduction beyond that achievable with standard hybrid configurations.

Combustion engine efficiency has made good progress over the past 3 years (2004–2006), with our R&D increasing the efficiency of light-duty passenger vehicle diesel engines from 35 to 41 percent. This means that if manufacturers were to produce these more efficient engines, a car that previously got the CAFE average of 27 miles per gallon on gasoline could potentially get 37 miles per gallon with an advanced, clean diesel. In fiscal year 2008, we expect to reach 43 percent efficiency for passenger vehicle diesel engines, approaching the 2010 goal of 45 percent. These advanced combustion engines have the potential to achieve the efficiency goals for cars and trucks while maintaining cost and durability with near-zero emissions. Battery technologies have also made significant progress toward program goals, having reduced the cost of next-generation hybrid vehicle batteries in each of the past 3 years, from almost \$1,200 per vehicle at the beginning of fiscal year 2004 to \$750 at the end of fiscal year 2006. In fiscal year 2008, we expect to bring that down to \$625 per vehicle, and to increase our emphasis on batteries specifically optimized for plug-in hybrid vehicles to have battery technology ready by 2014 that will enable automobile manufacturers to economically produce competitive plug-in hybrid vehicles having a 40 mile all-electric range.

R&D programs will also continue to accelerate materials research directed at light, strong vehicle structures to enable the production of lighter vehicles that could result in higher efficiency fleets, and to develop thermoelectric materials for efficient energy recovery from heat. Other activities will focus on expanding efforts to promote the adoption and use of petroleum-reducing fuels, technologies, and practices, principally by working with industry partners, fuel providers, Clean Cities coalitions and their stakeholders, and end-users on activities ranging from using more alternative fuel vehicles and renewable fuel blends to driving smarter, minimizing wasteful idle time, and purchasing vehicles that get better fuel economy. Accordingly, the Vehicle Technologies Deployment budget request (including Clean Cities) will increase by over 100 percent relative to the fiscal year 2007 request.

## HYDROGEN TECHNOLOGY PROGRAM

Hydrogen is an important element of our Nation's long-term strategy for energy security and environmental stewardship. It could enhance our energy security by providing a transportation fuel that may be produced from a variety of domestic resources; and it should serve our environmental interests by allowing vehicles to operate using fuel cells, without generating any tailpipe emissions. The Department's research is focused on pathways that produce and deliver hydrogen from diverse origins including emission-free nuclear, and renewable resources.

The President's \$309 million fiscal year 2008 budget request for DOE for the Hydrogen Fuel Initiative fulfills his commitment of \$1.2 billion over 5 years. The portion of this under our purview in EERE is \$213 million, which reflects a \$17.2 million increase over the fiscal year 2007 budget request. The proposed increase will accelerate and expand efforts to research and develop hydrogen-storage systems to improve performance, and fuel cell materials and components to reduce their cost, and improve durability. It will also support accelerating cost reduction of renewable hydrogen production technologies as well as critical delivery technologies.

Much progress has been made since the announcement of the Hydrogen Fuel Initiative in 2003. The research has reduced the high-volume cost of automotive fuel cells from \$275 per kilowatt in 2002 to \$107 per kilowatt in 2006—a major step towards the ultimate cost target of \$30 per kilowatt. In fiscal year 2008, we will continue projects on fuel cell catalysts and membranes, and cold-weather start-up and operation. In addition to reducing cost and improving performance, this work will help us achieve our 2010 durability target of 5,000 hours, which should enable a vehicle lifetime of 150,000 miles.

We have also achieved our 2006 hydrogen cost goal of \$3 per gasoline-gallon equivalent for hydrogen produced by distributed reforming of natural gas, a potentially economical early market pathway. Our research will sharpen its focus to meet the same objective through renewable pathways—including reforming of bio-derived liquids and electrolysis. We are also working with the Department's Offices of Nuclear Energy, Fossil Energy, and Science to develop nuclear-based hydrogen production, hydrogen from coal—exclusively with carbon sequestration—and longer-term biological and photoelectrochemical hydrogen production pathways.

Our diverse hydrogen-storage portfolio is also showing promising results, with innovative materials being developed in areas such as metal hydrides, chemical hydrides, and carbon-based materials. Research conducted at our "Centers of Excellence," and by independent projects, has continued to increase material storage capacity. Substantial breakthroughs are required to reach our goal of providing consumers with enough storage for a 300-mile driving range, without compromising a vehicle's interior space.

Developing hydrogen technologies that can be manufactured domestically will also improve our economic competitiveness. Our manufacturing R&D effort addresses the need for high-volume fabrication processes for fuel cells and many other components, which are all currently built one-at-a-time. This is essential to lowering the cost of these technologies, and to developing a domestic supplier base.

In addition to these R&D activities, we are addressing other challenges significant to realizing the benefits of hydrogen fuel cells. Our Technology Validation Program has brought together teams of automobile manufacturers and energy companies to operate and evaluate fuel cell vehicles and hydrogen stations under real-world conditions. To date, the program has placed 69 fuel cell vehicles on the road, served by 10 hydrogen fueling stations.

Furthermore, we are working to ensure safe practices, and—through support of existing codes and standards development organizations—we are laying the groundwork for developing technically sound codes and standards, which are essential to implementing hydrogen technologies.

Finally, our education activities focus on overcoming the knowledge barriers inherent in the introduction of new technology. Last month, we released a multimedia web-based course that introduces hydrogen to first responders. In the coming year, we will continue to expand the availability of training and conduct outreach to raise awareness of the technology.

The effects of the Department's broad-based efforts in the Hydrogen Program are being seen nationwide, and progress has been substantial. Investments are not only occurring at the Federal level, but also at state and local levels. These diverse investments increase our probability of success in overcoming existing technological barriers, which will allow industry to make fuel cell vehicles that customers will want to buy, and encourage investment in a hydrogen refueling infrastructure that is profitable.

## SOLAR ENERGY PROGRAM

The Solar Energy Program sponsors research, development, and deployment of solar energy technologies and systems that can help our Nation meet electricity needs and reduce the stress on our electricity infrastructure. Through the Solar America Initiative (SAI), the Solar Program aims to accelerate the market competitiveness of solar electricity as industry-led teams compete to deliver solar systems that are less expensive, more efficient, and highly reliable. The Solar Program supports three technology areas: photovoltaics (PV), concentrating solar power (CSP), and solar heating and lighting. The fiscal year 2008 budget request for Solar Energy is \$148.3 million, a level that is nearly twice the enacted fiscal year 2006 level.

To lower costs more rapidly and improve performance, the Department's PV R&D, budgeted in fiscal year 2008 at \$137.3 million, focuses on those technology pathways that have the greatest potential to reach cost-competitiveness and grid parity by or before 2015. Industry-led partnerships with universities, state groups and National Laboratories, known as "Technology Pathway Partnerships," will continue in fiscal year 2008 to address the issues of cost, performance, and reliability associated with each pathway. Work on PV modules, the heart of PV systems, will be conducted, as well as other "balance-of-system" components.

To catalyze market transformation, DOE will promote the expansion of the solar marketplace by seizing opportunities for growth and by lowering barriers to entry. The Department will provide technical outreach to States and utilities, continue pressing work on codes and standards issues, and solicit new applications for its Solar America Cities activity. These market transformation activities help pave the way for technologies developed by our industry partnerships to enter the marketplace.

We will emphasize the importance of interconnection standard procedures and net metering regulations that are designed to accommodate solar and other clean distributed energy systems. A precondition for large-scale solar market penetration in America is to have the proper means for homeowners and businesses to connect solar systems to the grid, as well as to be paid for excess electricity they feed back into the grid. We are working with our colleagues in the Department's Office of Electricity Delivery and Energy Reliability to develop "best practice" recommendations for States to use as they undertake consideration of interconnection procedures and net metering regulations and make implementation decisions pursuant to sections 1251 and 1254 of EPACT 2005. Fiscal year 2008 funding will also be used to offer technical outreach to States and utilities to enhance solar connectivity issues.

Work will continue on the multi-year solicitations launched in fiscal year 2007 that promote adoption of market-ready solar technologies and a new effort will support benchmarking, modeling, and analysis for the systems driven approach, and market, value and policy analysis needed to support the SAI. EERE's PV activities are increasingly coordinated and when possible convergent with solar energy activities in the Building Technologies and the Federal Energy Management programs, and the research activities of the DOE Office of Science.

The fiscal year 2008 budget request for CSP—systems that utilize heat generated by concentrating and absorbing the sun's energy to drive a heat engine/generator to produce electric power—is \$9.0 million. The development of advanced thermal energy storage technologies will be expanded, along with continued support to develop next generation parabolic trough concentrators, solar engines, and receivers. For distributed applications, research will focus on improving the reliability of dish systems through the operation and testing of multiple units. Technical assistance will be provided to industry in its development of a 1.0 MW dish system in California that is expected to be the precursor of several much larger plants. Technical support will also be provided to the Western Governors' Association and several southwestern utilities to assist their CSP deployment activities.

The Solar Heating and Lighting program, a \$2.0 million request, will focus on R&D to reduce the cost of solar heating in freezing climates. The program will also support collaboration with EERE's Building Technologies programs to integrate photovoltaic systems, solar water heating, and solar space heating into home design and structure. Such deployment efforts will help to seize market expansion opportunities.

## BUILDING TECHNOLOGIES PROGRAM

Energy use by residential and commercial buildings accounts for over one-third of the Nation's total energy consumption, including two-thirds of the electricity generated in the United States. Addressing that significant sector of energy consumption, the \$86.5 million requested this year for the Building Technologies Program represents a \$9.1 million increase of 12 percent over the fiscal year 2007 request.

The funding supports a portfolio of activities that includes solid state lighting, improved energy efficiency of other building components and equipment and their effective integration using whole-building-system design technique, the development of codes and standards for buildings and appliances, and education and market introduction programs, including ENERGY STAR and EnergySmart Schools.

Funding for Residential Buildings Integration aims to enable residential buildings to use up to 70 percent less energy, and to integrate renewable energy systems into highly efficient buildings to achieve the long-term goal in 2020 of net Zero Energy Buildings—houses that produce as much energy as they use on an annual basis. During fiscal year 2008, research for production-ready new residential buildings that are 40 percent more efficient will continue for four climate zones.

The \$19.3 million request for solid state lighting will advance development of the organic and inorganic LEDs that has the potential to double the efficiency of fluorescent lighting technology. The fiscal year 2008 requested funding will be used to develop general illumination technologies with the goal of achieving energy efficiencies of up to 93 lumens per Watt with improved visual comfort and quality of light and focus on applied research that enables the industrial base to manufacture LEDs.

The fiscal year 2008 request reflects the Department's commitment to clear the backlog of equipment standards and test procedures that had accumulated in the prior 12 years and meet the statutory schedule for rulemakings for new products covered by EPACK 2005. The Department will continue to implement productivity enhancements that will allow multiple rulemaking activities to proceed simultaneously, while maintaining the rigorous technical and economic analysis required by statute.

Funds for the Building Technologies Program will also support development of highly insulating and dynamic window technologies and integrated attic-roof systems needed to achieve long-term zero energy building goals. Efforts to accelerate the adoption of efficient building technologies by consumers and businesses include expanded ENERGY STAR specifications and labels for more products, promotion of advanced building efficiency codes, and public-private partnerships to advance efficient schools, hospitals, commercial lighting, and home building.

#### FEDERAL ENERGY MANAGEMENT PROGRAM

The Federal Energy Management Program (FEMP) assists Federal agencies, including DOE, in increasing their use of energy efficiency and renewable energy technologies through alternative financing contract support and technical assistance, and coordinates Federal reporting and evaluation of agency progress each year. As the single largest energy consumer in the United States, the Federal government must set an example and lead the Nation toward becoming a cleaner, more efficient consumer by using existing energy efficiency and renewable energy technologies and techniques. On January 24, 2007, President Bush signed a new Executive Order to strengthen the environmental, energy, and transportation management of Federal agencies which includes a requirement for agencies to reduce their energy intensity by 3 percent each year until 2015, compared with a 2003 baseline.

The fiscal year 2008 request for FEMP is \$16.8 million, a slight decrease of \$0.1 million from the fiscal year 2007 request. We are requesting \$7.9 million for FEMP alternative financing programs that help agencies access private sector financing to fund energy improvements without the use of current appropriations. We expect to achieve not less than \$160 million in private sector investment through Super ESPCs, Energy Savings Performance Contracts, and Utility Energy Service Contracts (UESCs), which will result in about 15 trillion Btus in energy saved over the lifecycle of the projects. Furthermore, we are requesting \$6.5 million for Technical Guidance and Assistance to help Federal energy managers identify, design, and implement new construction and facility improvement projects that incorporate energy efficiency and renewable energy. FEMP will assist Federal agencies in meeting the increased energy efficiency goals, established by the new Executive Order, by orienting its Technical Guidance and Assistance, Training, and Outreach activities towards attracting private-sector financing for investment into energy efficiency at Federal facilities. In addition to the focus on facility energy consumption, FEMP also tracks alternative fuel use in Federal vehicle fleets.

In fiscal year 2008, the Departmental Energy Management Program (DEMP) is being discontinued. FEMP will still provide policy guidance and technical assistance to the Department, but DOE has determined that the management of energy efficiency and renewable investments at its facilities can be more effectively conducted by those facilities. While not reported separately, DOE national labs and other facilities spend significant funding (direct and indirect) on energy efficiency improvements, while also using ESPCs and UESCs where appropriate.

## WIND ENERGY PROGRAM

The Wind Program focuses on reducing wind power costs and removing barriers to resource utilization of wind energy technology in the United States. The program's fiscal year 2008 request is \$40.1 million.

As a result of 30 years of R&D, wind turbines can now provide cost-effective, reliable clean energy in high wind speed areas. While we will continue to do R&D to improve wind energy technologies in low wind speed areas, we are also focusing on near-term actions to remove existing barriers to increasing the use of wind energy, building on the current robust market for wind energy in the United States. These efforts could help to set the path for the wind industry to accelerate its penetration of delivered emission-free energy, significantly expanding beyond the roughly one percent of installed electrical generating capacity today.

The program is expanding application and deployment-related activities. The \$12.9 million requested for Systems Integration and Technology Acceptance will help wind technologies entering the market to overcome key obstacles such as grid integration, siting, permitting, and environmental barriers. In addition, there will be increased support to address issues of pre-competitive turbine reliability and performance via efforts of National Laboratories and Cooperative Research and Development Agreements or "CRADAs" with industry. The Wind Program will also establish a Federal interagency siting group to minimize regulatory delays on wind projects.

The Wind Program is funding a broader effort on distributed wind technologies and applications to advance the full scope of diverse opportunities for wind energy on the distribution side of the electric power system.

A U.S. wind industry-wide roadmapping analysis, being supported by the DOE wind program, is underway to determine the technical feasibility for wind energy to generate 20 percent of our Nation's electricity. To achieve this vision it would require grid modernization, expansion, and integration, and removal of other deployment barriers. Success would enable delivery of more than 300 gigawatts of new, clean, affordable, and domestic production capacity to our urban load centers and be a substantial contributor to economic growth, manufacturing, and rural prosperity. EERE will work with DOE's Office of Electricity Delivery and Energy Reliability on several studies aimed at expanding electricity transmission between remote wind resources and urban areas.

## WEATHERIZATION AND INTERGOVERNMENTAL PROGRAM

In fiscal year 2008, we are requesting \$204.9 million for Weatherization and Intergovernmental Activities, a \$20.1 million decrease from the fiscal year 2007 request. The reduction is primarily related to the decrease in the amounts requested for the Weatherization Assistance Program, which will enable greater investments in advanced R&D within the EERE portfolio to address national priorities: reducing dependence on foreign oil, accelerating the development of clean, emission-free electricity supply options, and developing highly efficient new technologies, products, and practices for our homes and buildings.

The requested \$144 million for the Weatherization Assistance Program will fund energy efficiency audits and upgrades for at least 54,599 low-income homes. DOE works directly with States and certain Native American Tribes that contract with local governmental or non-profit agencies to deliver weatherization services to homes in need of energy assistance.

The \$45.5 million requested for the State Energy Program provides financial and technical assistance to State governments, enabling them to target their high priority energy needs and expand clean energy choices for their citizens and businesses. This request includes \$10.5 million for a competitive solicitation that will seek regional and state partnerships to replicate smart energy policies and programs among States. The regional context is outlined in EPACT and aligns with our electricity transmission infrastructure.

Clean electricity generation is targeted by the Renewable Energy Production Initiative, which provides financial incentive payment to public and Tribal utilities and not-for-profit electric cooperatives for renewable generation systems that use solar, wind, geothermal, or biomass technologies. The Tribal Energy Program aims to facilitate the installation of 100 MW of renewable energy generation by Native American tribes by 2010.

The Asia Pacific Partnership (APP) for Clean Development and Climate requests funding at the \$7.5 million level. This international partnership is an important and innovative accord to accelerate the development and deployment of clean energy technologies among the six member countries: Australia, China, India, Japan, South Korea, and the United States. Representing about half of the world's economy, popu-

lation, energy use, and emissions, the six countries have agreed to work together and with private sector partners to set and meet goals for energy security, national air pollution reduction, and global warming, employing policies and practices that promote sustainable economic growth and poverty reduction, while addressing the serious challenge of climate change.

#### INDUSTRIAL TECHNOLOGIES PROGRAM

Industry consumes more energy than the residential, commercial, and transportation end-use sectors, and it is also the Nation's second largest emitter of CO<sub>2</sub>. Advancements in industrial energy-efficient technology could improve U.S. competitiveness, and contribute to our national effort to reduce oil imports, alleviate natural gas price pressure, and pre-empt the need for new power plants and consequent emissions.

The fiscal year 2008 budget request for Industrial Technologies is \$46.0 million, a \$0.4 million increase over the fiscal year 2007 request. The program will leverage its innovative technology transfer practices and partnerships with energy-intensive industries, while shifting toward more crosscutting and higher-impact R&D activities that will bring innovative energy solutions to a much broader group of industrial companies, at a more accelerated pace.

The Industrial Technologies Program (ITP) has a track record for moving innovative technologies from R&D through commercialization and onto the floors of industrial plants. In 2006 alone, 8 technologies funded by ITP received prestigious R&D 100 awards. New technologies emerging from ITP's R&D program are being adopted to help solve some of industry's toughest energy and competitiveness challenges. In many cases, this is occurring through the industrial energy assessments that ITP is conducting at 250 of the Nation's largest energy-consuming manufacturing plants as part of Secretary Bodman's "Easy Ways to Save Energy" initiative. We estimate that ITP-sponsored technologies and deployment activities have contributed to industrial energy savings of over \$3.1 billion in one year (2004).

The \$7.2 million requested for the new activity, Energy-Intensive Process R&D, will support R&D in 4 crosscutting areas to better deliver technology solutions for the industrial processes that consume the most energy. These four areas are Energy Conversion Systems, Industrial Reaction and Separation, High-Temperature Processing, and Fabrication and Infrastructure. One example of a technology that cuts across the industrial sector to deliver savings is ITP's ultra-high efficiency, ultra-low emissions, industrial steam generation "Super Boiler." Since steam is used in every major sector, the potential benefits are tremendous. The Super Boiler is 10 to 20 percent more efficient than current technology and can reduce NO<sub>x</sub> emissions to below 5 parts per million, which represents an approximately 90 percent reduction in emissions from a conventional boiler.

The \$4.9 million request for the new Inter-Agency Manufacturing R&D activity working with the National Science and Technology Council will support the development or adaptation of next-generation technologies that can revolutionize U.S. industrial processes and deliver dramatic energy and environmental benefits. These next-generation technologies, such as entirely new processing routes and supply chains, can have broad applications across industry, yet they typically require the type of high-risk, high-return R&D that one industry cannot usually undertake. Our initial research focus will include development of techniques and processes needed for nanomanufacturing. We aim to help transform industrial processes by enabling the mass production and application of nano-scale materials, structures, devices, and systems that provide unprecedented energy, cost, and productivity benefits in manufacturing.

Deployment efforts such as "Best Practices" activities and Industrial Assessment Centers will continue to deliver the results of energy-efficiency R&D and energy-saving practices to industrial plants nationwide. A vehicle for educational outreach, the university-based Industrial Assessment Centers train engineers and scientists in the energy field, providing opportunities for students to conduct energy assessments at no cost to small and medium-sized manufacturing plants in the United States.

#### FACILITIES AND INFRASTRUCTURE

The fiscal year 2008 budget request of \$7.0 million for Facilities and Infrastructure, an increase of \$1.0 million from the fiscal year 2007 request, supports the operations and maintenance of the National Renewable Energy Laboratory (NREL) in Golden, CO. NREL is a single-purpose National Laboratory dedicated to R&D for energy efficiency, renewable energy, and related technologies that provides EERE, as well as DOE's Office of Science and the Office of Electricity Delivery and Energy Reliability, with R&D, expert advice, and programmatic counsel.

## PROGRAM DIRECTION AND PROGRAM SUPPORT

The Program Direction budget supports the management and technical direction and oversight needed to implement EERE programs at both headquarters and the Project Management Center. Areas funded by this request include: Federal salaries, information systems and technology equipment, office space, travel, and support service contractors. The fiscal year 2008 budget request for Program Direction totals \$105.0 million, a \$14.0 million increase over the fiscal year 2007 request. This increase reflects EERE's updated staffing needs, which more closely align critical skills to mission requirements and adds staff to support technical program staffing shortfalls and implementation of the AEI and EPACT 2005 priorities.

The Program Support budget request provides resources for crosscutting performance evaluation, analysis, and planning for EERE programs and for technical advancement and outreach activities. The information developed by the Program Support components provides decision makers at every level the information they need to make choices related to energy alternatives that can help the Department achieve its goals. The fiscal year 2008 budget request for Program Support activities totals \$13.3 million, representing a \$2.4 million increase from the fiscal year 2007 budget request. The increase reflects the expansion of EERE's market transformation and commercialization analysis and expanded efforts in the Technology Advancement and Outreach Office.

## CONCLUSION

Accelerating research, development, and deployment of America's abundant clean sources of energy and making more efficient use of all energy consumed is central to EERE's mission, and to a secure and competitive economic future that enhances our environmental well-being for our Nation and our world. We believe the administration's fiscal year 2008 budget request for energy efficiency and renewable energy programs strategically positions the stepping stones that will continuously catalyze and accelerate new energy sources, technologies, and practices into the marketplace, and hasten the transformation of how our homes, businesses, and vehicles use energy.

This concludes my prepared statement, and I am happy to answer any questions the Committee members may have.

Senator DORGAN. Next we will hear from the Honorable Tom Shope, the Assistant Secretary of the Office of Fossil Energy. Mr. Shope, thank you for being with us.

**STATEMENT OF HON. THOMAS D. SHOPE, ACTING ASSISTANT SECRETARY FOR FOSSIL ENERGY**

Dr. SHOPE. Thank you, Mr. Chairman, thank you, Ranking Member Domenici and members of the subcommittee. It is an honor for me to appear before you today to present the Office of Fossil Energy's proposed budget for fiscal year 2008.

Fossil Energy's \$863 million budget request for fiscal year 2008 will allow the office to support the President's top initiatives for energy security, clean air, climate change and coal research as well as DOE's strategic goal of protecting our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally sound energy.

Let me begin the presentation of our budget with coal, our most abundant and lowest cost domestic fossil fuel. Coal today accounts for nearly one-quarter of all of the energy and more than one-half of the electricity produced in the United States. Because coal is so important to our energy future, our proposed budget of \$448 million for the President's coal research initiative, related fuel cell R&D and program direction accounts for more than one-half of our total budget. Our overarching goal is to conduct research and development that will improve the competitiveness of domestic coal in future energy markets, allowing the Nation to tap the full potential

of its abundant fossil energy resources in an environmentally sound and affordable manner.

This year's request completes 3 years ahead of schedule the President's commitment to invest \$2 billion on clean coal research over 10 years. Our coal research initiative is broken down into the following components. We are requesting \$73 million for the Clean Coal Power Initiative, a cooperative, cost-shared program between the Government and industry to demonstrate emerging technologies in coal-based power generation so as to help accelerate commercialization. Work on promising technologies selected in two prior solicitations will continue in fiscal year 2008 and we plan to announce a third solicitation during the year.

The first of a kind, high priority FutureGen project will establish the capability and feasibility of co-producing electricity and hydrogen from coal with near zero atmospheric emissions, including carbon dioxide. FutureGen's proposed budget of \$108 million for fiscal year 2008 will be used to support detailed plant design and procurement and other preliminary work. Technology development supporting FutureGen is embodied in our Fuels and Power Systems Program. Included in the Program's proposed budget for fiscal year 2008 of \$245.6 million, you will find the research and development for carbon capture and sequestration, membrane technologies for oxygen and hydrogen separation, advanced combustion turbines, fuel cells, coal to hydrogen conversion and gasifier related technologies.

The high priority carbon sequestration program with a proposed budget for fiscal year 2008 of \$79 million for developing a portfolio of technologies with great potential to reduce greenhouse gas emissions. The goal is to achieve substantial market penetration after 2012. In the long term, the program is expected to contribute significantly to the President's goal of developing technologies to substantially reduce greenhouse gas emissions.

In addition, the network of seven regional carbon sequestration partnerships and the International Carbon Sequestration Leadership Forum established by DOE in 2003 will continue their important work, including conducting vital, diverse geologic CO<sub>2</sub> storage tests. Research and development carried out by the Coal to Hydrogen Fuels Program, funded at a proposed \$10 million, will make the future transition to a hydrogen-based economy possible by reducing the costs and increasing the efficiency of hydrogen production from coal.

We have requested \$62 million in fiscal year 2008 to continue the important work of a Solid State Energy Conversion Alliance, the goal of which is to develop the technology for low cost, scalable, and fuel flexible fuel cell systems.

Consistent with our fiscal year 2006 and 2007 budget requests, the Petroleum Oil Technology and Natural Gas Technologies Research and Development Programs are proposed to be terminated in fiscal year 2008. However, the Office of Fossil Energy will continue to carry out important responsibilities in the oil and natural gas sector, such as management of the ultra-deep water and unconventional resources research program mandated by the Energy Policy Act of 2005.

In addition, fossil energy will continue to authorize natural gas imports and exports, collect and import data on natural gas trade, operate the Rocky Mountain Oil Field Testing Center and oversee the Loan Guarantee Program for the Alaska Natural Gas Pipeline.

The Energy Policy Act of 2005 directs the strategic petroleum reserve to prepare to increase its oil storage to 1 billion barrels. Additionally, the President recently recommended expanding the reserve's capacity to 1.5 billion barrels. Our budget request of \$331 million, almost double last year's request, will fund the reserve's continued readiness as well as the immediate filling of the reserve to its current capacity of 727 million barrels. The budget includes \$168 million to begin expansion at existing and new sites towards the 1.5 billion barrels.

#### PREPARED STATEMENT

Mr. Chairman and members of the subcommittee, this completes my prepared statement. I'd be happy to answer any questions you may have.

Senator DORGAN. Secretary Shope, thank you very much for your testimony.

[The statement follows:]

#### PREPARED STATEMENT OF HON. THOMAS D. SHOPE

Mr. Chairman, members of the committee, it's a pleasure for me to appear before you today to present the Office of Fossil Energy's (FE) proposed Budget for fiscal year 2008.

Fossil Energy's \$863 million budget request for fiscal year 2008, one of the largest FE requests made by this administration, will allow the Office to achieve 2 fundamental objectives: first, to support the President's top priorities for energy security, clean air, climate change and coal research; and second, to support the Department of Energy's strategic goal of protecting our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally-sound energy.

More specifically, the proposed budget emphasizes early initiation of an expansion of the Strategic Petroleum Reserve; rapid development of technologies to manage and dramatically reduce atmospheric emissions of the greenhouse gas carbon dioxide from fossil fuel use in power generation and other industrial activity; and design and other preparatory work on the FutureGen project to combine in one plant the production of electric power and hydrogen fuel from coal with near-zero atmospheric emissions.

#### THE PRESIDENT'S COAL RESEARCH INITIATIVE

I will begin the detailed presentation of our proposed budget with coal, our most abundant and lowest cost domestic fossil fuel. Coal today accounts for nearly one-quarter of all the energy—and about half the electricity—consumed in the United States. Because coal is so important to our energy future, our proposed budget of \$448 million for the President's Coal Research Initiative, related fuel cell R&D and R&D by Federal employees within program direction accounts for more than half our total budget.

I should mention here that our fiscal year 2008 Budget focuses our research and development on activities that support the President's Advanced Energy Initiative and key provisions of the Energy Policy Act of 2005. These activities will be conducted largely through cost sharing and industry collaboration. As a result of the evaluations under the Research and Development Investment Criteria, and the Program Assessment Rating Tool, activities throughout the program emphasize research and development for technologies that will be used in the FutureGen project.

The goal of the overall coal program, which includes the President's Coal Research Initiative, is to conduct research and development that will improve the competitiveness of domestic coal in future energy markets. The administration strongly supports coal as an important component of our energy portfolio. This year's budget request completes the President's commitment to invest \$2 billion on clean coal re-

search over 10 years, 3 years ahead of schedule. Our coal budget request is broken down into the following components:

*Clean Coal Power Initiative*

We are requesting \$73 million in fiscal year 2008 for the Clean Coal Power Initiative (CCPI), a cooperative, cost-shared program between the Government and industry to demonstrate emerging technologies in coal-based power generation so as to help accelerate commercialization. CCPI allows the Nation's power generators, equipment manufacturers and coal producers to help identify the most critical barriers to coal use in the power sector. Technologies to eliminate the barriers are then selected with the goal of accelerating development and deployment of applications that will economically meet environmental standards while increasing plant efficiency and reliability. Work on promising technologies selected in two prior solicitations will continue in fiscal year 2008, and we plan to announce a third solicitation during the year, which will focus on advanced technology systems that capture carbon dioxide for sequestration and beneficial reuse.

Some activities of the Clean Coal Power Initiative will help drive down the costs of Integrated Gasification Combined Cycle (IGCC) systems and other technologies for near-zero atmospheric emission plants that are essential to the FutureGen concept.

*FutureGen*

FutureGen is a high-priority project that will establish the capability and feasibility of co-producing electricity and hydrogen from coal with near-zero atmospheric emissions including carbon dioxide. FutureGen is a public/private partnership designed to integrate technologies that ultimately will lead to new classes of plants that feature fuel flexibility, multi-product output, electrical efficiencies of over 60 percent, and near-zero atmospheric emissions. FutureGen's goals include electricity at costs no more than 10 percent above power from comparable plants that are incapable of carbon sequestration. The capture and permanent storage of atmospheric carbon emissions is a key feature of the FutureGen concept, as is the capability to use coal, biomass, or petroleum coke. The project should help retain the strategic value of coal—the Nation's most abundant and lowest cost domestic energy resource. FutureGen's proposed budget of \$108 million for fiscal year 2008 will be used to support detailed plant design and procurement, as well as ongoing permitting, preliminary design and site characterization work.

To help fund both the CCPI and FutureGen projects in fiscal year 2008, our proposed Budget redirects \$58 million in unexpended sums and \$257 million in deferred appropriations from the original Clean Coal Technology program. Specifically, the Budget proposes to transfer \$108 million of the \$257 million deferral to the FutureGen project, and cancel the remaining \$149 million from the deferral. Of the unobligated balances carried forward at the start of fiscal year 2008, \$58 million is transferred to the Clean Coal Power Initiative (CCPI).

FUELS AND POWER SYSTEMS

Technology development supporting FutureGen is embodied in the core research and development activity of the Fuels and Power Systems program. The Fuels and Power Systems program's proposed budget for fiscal year 2008 is \$245.6 million. Of this total amount, \$183.6 million will fund research and development for carbon capture and sequestration, membrane technologies for oxygen and hydrogen separation, advanced combustion turbines, coal-to-hydrogen conversion, and gasifier-related technologies. The remaining balance of \$62 million will support Fuel Cells.

The program breaks down as follows:

*Advanced Integrated Gasification Combined Cycle*

With proposed funding of \$50 million for fiscal year 2008, the Advanced Integrated Gasification Combined Cycle program will continue to concentrate efforts on gas stream purification to meet quality requirements for use with fuel cells and conversion processes, on impurity tolerant hydrogen separation, on elevating process efficiency, and on reducing the costs and energy requirements for oxygen production through development of advanced technologies such as air separation membranes.

*Advanced Turbines*

A funding request of \$22 million will allow the Advanced Turbines program to continue its concentration on the creation of a turbine-technology base that will permit the design of near-zero atmospheric emission IGCC plants and a class of FutureGen-descended plants with carbon capture and sequestration. This research

emphasizes technology for high-efficiency hydrogen and syngas turbines and builds on prior successes in the Natural Gas-based Advanced Turbine Systems Program.

#### *Advanced Research*

The Advanced Research program bridges basic and applied research to help reduce the costs of advanced coal and power systems while improving efficiency and environmental performance. The proposed \$22.5 million budget for Advanced Research will fund projects aimed at a greater understanding of the physical, chemical, biological and thermo-dynamic barriers that currently limit the use of coal and other fossil fuels.

#### *Carbon Sequestration*

The Carbon Sequestration program, with a proposed budget for fiscal year 2008 of \$79 million, is developing a portfolio of technologies with great potential to reduce greenhouse gas emissions. This high-priority program's primary concentration is on dramatically lowering the cost and energy requirements of pre- and post-combustion carbon dioxide capture. The goal is to have a technology portfolio by 2012 for safe, cost-effective and long-term carbon mitigation, management and storage, which will lead to substantial market penetration after 2012. In the long term, the program is expected to contribute significantly to the President's goal of developing technologies to substantially reduce greenhouse gas emissions.

The Carbon Sequestration program's activities in fiscal year 2008 will concentrate on research and development projects for carbon dioxide (CO<sub>2</sub>) capture and storage, as well as measurement, monitoring and verification technologies and processes.

In coordination with the current partnerships, the program will determine the "highest potential" opportunities for the initial expedited round of large scale sequestration tests in saline, coal, and/or oil and gas bearing formations. This work will begin with a physical characterization of the surface and subsurface, reservoir modeling, and NEPA review.

The Partnerships will also move on to the next phase of the Weyburn project, where CO<sub>2</sub> is being injected into a producing oilfield. Weyburn's success would deliver both decreased carbon emissions and increased domestic oil production.

Finally, DOE formed the international Carbon Sequestration Leadership Forum (CSLF) in 2003 to work with foreign partners on joint carbon sequestration projects, and to collect and share information. That work will continue in fiscal year 2008.

Several members of the CSLF have also signed on to the FutureGen project, and others have signaled strong interest in joining.

#### *Fuels*

Research and development carried out by the Coal-to-Hydrogen Fuels program, funded at a proposed \$10 million, will make the future transition to a hydrogen-based economy possible by reducing the costs and increasing the efficiency of hydrogen production from coal. This program is an important component of both the President's Hydrogen Fuel Initiative and the FutureGen project.

#### *Fuel Cells*

Within Fuel Cells, we have requested \$62 million for fiscal year 2008 to continue the important work of the Solid State Energy Conversion Alliance, the goal of which is to develop the technology for low-cost, scalable and fuel flexible fuel cell systems that can operate in central, coal-based power systems as well as in other electric utility (both central and distributed), industrial, and commercial/residential applications.

#### *Research by Federal Staff*

In addition to the funding levels reflected for Fuels and Power Systems, there is \$20 million provided within the Program Direction account that directly supports the President's Coal Research Initiative, plus \$1 million for fuel cells. This funding supports Federal staff directly associated with conducting the research activities of specific Fuels and Power Systems subprograms.

#### *Petroleum and Natural Gas Technologies*

Consistent with the fiscal year 2006 and fiscal year 2007 Budget Requests, the Petroleum-Oil Technology and Natural Gas Technologies research and development programs will be terminated in fiscal year 2008.

The Oil and Gas group will manage the Ultra-Deepwater and Unconventional Resources Research Program mandated by the Energy Policy Act of 2005. However, I should point out that the 2008 Budget proposes to repeal this legislation, consistent with the fiscal year 2007 Budget Request.

In addition, FE will continue to authorize natural gas imports and exports, collect and report data on natural gas trade, and operate the Rocky Mountain Oilfield Testing Center.

FE will also oversee the loan guarantee program for the Alaska Natural Gas Pipeline.

#### *Strategic Petroleum Reserve*

The Strategic Petroleum Reserve (SPR) exists to ensure America's readiness to respond to severe energy supply disruptions. The Reserve reached its highest inventory level—700 million barrels of oil—in 2005. The Energy Policy Act of 2005 directs DOE to fill the SPR to its authorized 1 billion barrel capacity, as expeditiously as practicable. Additionally, in the 2008 Budget, the President proposed expanding the Reserve's capacity to 1.5 billion barrels.

Our budget request of \$332 million for fiscal year 2008—almost double last year's request—will fund the Reserve's continued readiness through a comprehensive program of systems maintenance, exercises, and tests, as well as beginning expansion to 1 billion barrels at existing and new sites and NEPA work to expand to 1.5 billion barrels. DOE will begin immediately to fill the reserve to its current capacity of 727 million barrels through purchases of oil with available balances as well as through placement of the Department of the Interior's royalty in-kind oil into the SPR.

#### *Northeast Home Heating Oil Reserve*

The Northeast Home Heating Oil Reserve was established in July 2000 when the President directed the Department of Energy to establish a reserve capable of assuring home heating oil supplies for the Northeast states during times of very low inventories and significant threats to immediate supply. The Reserve contains 2 million barrels of heating oil stored at commercial terminals in the Northeast and is in good condition. The current 5-year storage contracts expire in September 2007. A request for bids was issued in February 2007. The proposed fiscal year 2008 budget requests \$5.3 million for continued operations.

#### *Naval Petroleum and Oil Shale Reserve*

The fiscal year 2008 budget request of \$17.3 million for the Naval Petroleum and Oil Shale Reserve (NPOSR) will allow it to continue environmental remediation activities and determine the equity finalization of Naval Petroleum Reserve 1 (NPR-1); operate NPR-3 until its economic limit is reached, and while operating NPR-3, maintain the Rocky Mountain Oilfield Test Center.

Because the NPOSR no longer served the national defense purpose envisioned in the early 1900s, the National Defense Authorization Act for Fiscal Year 1996 required the sale of the Government's interest in Naval Petroleum Reserve 1 (NPR-1). To comply with this requirement, the Elk Hills field in California was sold to Occidental Petroleum Corporation in 1998. Subsequently, the Department transferred 2 of the Naval Oil Shale Reserves (NOSR-1 and NOSR-3), both in Colorado, to the Department of the Interior's (DOI) Bureau of Land Management. In January 2000, the Department returned the NOSR-2 site to the Northern Ute Indian Tribe. The Energy Policy Act of 2005 transferred administrative jurisdiction and environmental remediation of Naval Petroleum Reserve 2 (NPR-2) in California to the Department of the Interior. DOE retains the Naval Petroleum Reserve 3 (NPR-3) in Wyoming (Teapot Dome field).

#### ELK HILLS SCHOOL LANDS FUND

The National Defense Authorization Act for fiscal year 1996 authorized the settlement of longstanding "school lands" claims to certain lands by the State of California known as the Elk Hills Reserve. The settlement agreement between DOE and California, dated October 11, 1996, provides for payment, subject to appropriation, of 9 percent of the net sales proceeds generated from the divestment of the Government's interest in the Elk Hills Reserve. Under the terms of the Act, a contingency fund containing 9 percent of the net proceeds of the sale was established in the U.S. Treasury and was reserved for payment to California.

To date, DOE has paid \$300 million to the State of California. The first installment payment of the settlement agreement was appropriated in fiscal year 1999. While no appropriation was provided in fiscal year 2000, the Act provided an advance appropriation of \$36 million that became available in fiscal year 2001 (second installment). The next 4 installments of \$36 million were paid at the beginning of fiscal year 2002, fiscal year 2003, fiscal year 2004, and fiscal year 2005 respectively. A seventh payment of \$84 million was made in fiscal year 2006.

The fiscal year 2008 budget proposes no funding for the Elk Hills School Lands Fund. The timing and levels of any future budget requests are dependent on the schedule and results of the equity finalization process.

**FOSSIL ENERGY'S BUDGET MEETS THE NATION'S CRITICAL ENERGY NEEDS**

In conclusion, I'd like to emphasize that the Office of Fossil Energy's programs are designed to promote the cost-effective development of energy systems and practices that will provide current and future generations with energy that is clean, efficient, reasonably priced, and reliable. Our focus is on supporting the President's top priorities for energy security, clean air, climate change, and coal research. By re-evaluating, refining and refocusing our programs and funding the most cost-effective and beneficial projects, the fiscal year 2008 budget submission meets the Nation's critical needs for energy, environmental and national security.

Mr. Chairman, and members of the committee, this completes my prepared statement. I would be happy to answer any questions you may have at this time.

Senator DORGAN. Finally, we will hear from the Honorable Kevin Kolevar, Director of the Office of Electricity Delivery and Energy Reliability. Director, you may proceed.

**STATEMENT OF KEVIN M. KOLEVAR, DIRECTOR, OFFICE OF ELECTRICITY DELIVERY AND ENERGY RELIABILITY**

Mr. KOLEVAR. Thank you, Mr. Chairman, members of the subcommittee for the opportunity to testify on the President's fiscal year 2008 budget request for the Office of Electricity Delivery and Energy Reliability.

The mission of the Office is to lead national efforts to modernize the electricity delivery system, enhance the security and reliability of America's energy infrastructure, and facilitate recovery from disruptions to energy supply.

The President's budget request includes \$114.9 million for OE in fiscal year 2008, which represents a 16 percent decrease from the fiscal year 2007 operating plan. This request includes \$86 million for Research and Development activities, \$11.6 million for Operations and Analysis activities and \$17.4 million for Program Direction.

I will first address the activities of OE's Research and Development program. Our request of \$86 million for fiscal year 2008 will fund the following four main activities—high temperature superconductivity, visualization and controls, energy storage and power electronics, and renewable and distributed systems integration. The development of these advanced electricity technologies will influence the future of all aspects of the electric transmission and distribution systems.

The first activity I would like to highlight is the science and development of high temperature superconductivity. Superconducting cables transmit electricity through conductors of temperatures approaching absolute zero, thus preventing resistance to electrical voltage, which allows large amounts of electricity to be transmitted over long distances with little line loss. Superconductivity, therefore, hold the promise of alleviating capacity concerns while moving power efficiently and reliably.

Another critical piece of a resilient and reliable modern grid is enhancing the security of our control systems. Our visualization and control activity focuses on improving our ability to measure and address the vulnerabilities of control systems. The research in this area will allow us to detect cyber intrusion, implement protec-

tive measures and response strategies, and sustain cyber security improvements over time.

Using our understanding from previous energy storage demonstration activities, we are researching and developing new, advanced higher energy density materials and storage devices for utility scale application. The program also focuses on research in power electronics to improve material and device properties that are needed for transmission level applications.

Finally, in 2007, the renewable and distributed systems integration activity will complete the transition away from generation technology activities and will then focus on grid integration of distributed and renewable systems in 2008. This is a logical step in advancing clean energy resources to address future challenges.

I will now discuss DOE's Permitting, Siting and Analysis Office, which is tasked with implementing mandatory EPACT requirements to modernize the electric grid and enhance the reliability of the energy infrastructure. These requirements include analyzing transmission congestion, proposing energy corridors for the Secretary's consideration and coordinating Federal agency review of applications to site transmission facilities on Federal lands. The President's budget requests \$5.7 million for this Office in fiscal year 2008.

On August 8, 2006, the Department published its National Electric Transmission Congestion Study in compliance with section 1221(a) of the Energy Policy Act. This study highlighted more than 15 geographic areas where electric congestion or capacity constraints exist. The Department has announced that, due to the significant public interest in the national corridor issues, before the Secretary designates any national corridor, he will first issue any designations in draft form to facilitate focused review and comment by affected States, regional entities, and the general public.

Another major effort involves the implementation of section 368 of the Energy Policy Act, which requires the designation of energy right-of-way corridors on Federal lands in the 11 contiguous western States. The agencies plan to publish a draft programmatic environmental impact statement for the designation of the energy corridors in the late spring of this year and will solicit public comments.

Finally, this Office is preparing to implement DOE's responsibilities under the new section, 216(h) of the Federal Power Act. Section 216(h) provides for the Department to act as the lead agency for purposes of coordinating all applicable Federal authorizations and related environmental reviews required to site an electrotransmission facility.

OE's Office of Infrastructure Security and Energy Restoration facilitates the protection of the Nation's critical energy infrastructure. This Office is responsible for coordinating and carrying out the Department's obligations for critical infrastructure identification, prioritization, protection, and national preparedness within the energy sector. The President's 2008 budget request includes \$5.9 million for this Office.

In times of declared emergencies, this Office coordinates Federal efforts under the National Response Plan to assist State and local governments and the private sector in the restoration of electrical

power and other energy-related activities. DOE personnel deployed in regions affected by large-scale electrical outages to assist in recovery efforts. The Infrastructure Security and Energy Restoration Office also works with States to foster greater awareness of the regional scope of energy interdependencies and to develop energy assurance plans that address the potential cascading effects of energy supply disruptions.

In his 2007 State of the Union Address, the President emphasized the importance of continuing to change the way America generates electric power and highlighted the significant progress we have already made in integrating clean coal technology, solar and wind energy, and clean safe nuclear energy into the electric transmission system.

Technology such as power electronics, high temperature superconductivity and energy storage hold not only the promise of lower costs and greater efficiency but also directly enhance the viability of clean energy resources by addressing issues such as intermittency, controllability and environmental impact.

We cannot simply rely on innovative policies and infrastructure investment. We must also invest Federal dollars in the research, development, and deployment of new technology in order to improve performance and ensure our national security, economic competitiveness, and environmental well-being.

Mr. Chairman, this concludes my statement. I look forward to any subcommittee questions.

Senator DORGAN. Dr. Kolevar, thank you very much for your statement.

[The statement follows:]

PREPARED STATEMENT OF KEVIN M. KOLEVAR

Mr. Chairman and members of the committee, thank you for this opportunity to testify on the President's fiscal year 2008 budget request for the Office of Electricity Delivery and Energy Reliability.

The mission of the Office of Electricity Delivery and Energy Reliability (OE) is to lead national efforts to modernize the electricity delivery system, enhance the security and reliability of America's energy infrastructure, and facilitate recovery from disruptions to energy supply. These functions are vital to the Department of Energy's (DOE) strategic goal of protecting our national and economic security by promoting a diverse supply and delivery of reliable, affordable, and environmentally responsible energy.

The President's fiscal year 2008 budget includes \$114.9 million for OE in fiscal year 2008, which is an 8 percent decrease from the fiscal year 2007 request. This includes \$86.0 million for Research and Development activities, \$11.6 million for Operations and Analysis activities, and \$17.4 million for Program Direction. As DOE is currently preparing a spending plan in accordance with the terms of the 2007 Continuing Resolution, my testimony on the fiscal year 2008 budget request reflects a comparison to the administration's fiscal year 2007 request.

When Thomas Edison opened the Pearl Street Station in lower Manhattan on September 4, 1884, he could hardly have foreseen the role electricity would play in the development of American society. Although the demand for electric lighting and power initially drove the station's construction, electricity ultimately stimulated and enabled technological innovations that reshaped America. Today, the availability and access to electricity is something that most Americans take for granted. Most people cannot describe what it is or where it comes from. Yet, it is vital to nearly every aspect of our lives from powering our electronics and heating our homes to supporting transportation, finance, food and water systems, and national security.

The Energy Information Administration has estimated that by the year 2030, U.S. electricity sales are expected to increase by 43 percent from their 2005 level. Although this is a positive indicator of a growing economy, it is also a significant amount of new demand on an electricity infrastructure that is already stressed and

aging. With this in mind, OE's fiscal year 2008 budget request reflects a commitment to implement the directives of the Energy Policy Act of 2005 (EPACT), support research of breakthrough technologies, and coordinate Federal response to temporary disruptions in energy supply to ensure a reliable and secure electricity infrastructure for every American in the coming decades.

Meeting our future electricity needs will not be solved by focusing only on expanding our generation portfolio or on energy conservation. Perhaps the greatest challenge today, as it was in Edison's time, is building the elaborate network of wires and other facilities needed to deliver energy to consumers reliably and safely.

#### RESEARCH AND DEVELOPMENT

The fiscal year 2008 budget request of \$86.0 million for the Research and Development (R&D) program within OE funds 4 activities: High Temperature Superconductivity; Visualization and Controls; Energy Storage and Power Electronics; and Renewable and Distributed Systems Integration.

Over the past 18 years, DOE has invested more than \$500 million in the science and development of high temperature superconductivity. Superconductivity holds the promise of addressing capacity concerns by maximizing use of available "footprint" and limited space, while moving power efficiently and reliably. It also supports advanced substation and interconnection designs that allow larger amounts of power to be routed between substations, feeders, and networks using less space and improving the security and reliability of the electric system.

Today, the High Temperature Superconductivity activity continues to support second generation wire development as well as research on dielectrics, cryogenics, and cable systems. This activity is being refocused to address a near-term critical need within the electric system to not only increase current carrying capacity, but also to relieve overburdened cables elsewhere in the local grid. The superconductivity industry in the United States is now at the critical stage of moving from small business development to becoming a part of our manufacturing base.

Enhanced security for control systems is critical to the development of a reliable and resilient modern grid. The Visualization and Controls Research & Development activity focuses on improving our ability to measure and address the vulnerabilities of controls systems, detect cyber intrusion, implement protective measures and response strategies, and sustain cyber security improvements over time. The fiscal year 2008 request reflects an increase of \$7.75 million related to support this effort.

This activity is also developing the next generation system control and data acquisition (SCADA) system that features GPS-synchronized grid monitoring, secure data communications, custom visualization and operator cueing, and advanced control algorithms. Advanced visualization and control systems will allow operators to detect disturbances and take corrective action before problems cascade into widespread outages. The need to improve electric power control systems security is well-recognized by both the private and public sectors.

The Energy Storage and Power Electronics activity proposes an increase of \$3.80 million in fiscal year 2008 to: (1) leverage understanding gained from previous Energy Storage demonstration activities to research and develop new advanced higher energy density materials and storage devices for utility scale application; and (2) focus on enhanced research in Power Electronics to improve material and device properties needed for transmission-level applications.

Large scale, megawatt-level electricity storage systems, or multiple, smaller distributed storage systems, could significantly reduce transmission system congestion, manage peak loads, make renewable electricity sources more dispatchable, and increase the reliability of the overall electric grid.

The Renewable and Distributed Systems Integration Research & Development activity completed the transition away from generation technology activities in fiscal year 2007 and will focus on grid integration of distributed and renewable systems in fiscal year 2008, which is a logical step in advancing clean energy resources to address future challenges.

#### PERMITTING, SITING, AND ANALYSIS

In fiscal year 2008, the Department is requesting \$5.7 million for the Permitting, Siting, and Analysis (PSA) Office within the Operations and Analysis subprogram, which implements mandatory requirements set by EPACT to modernize the electric grid and enhance reliability of the energy infrastructure by contributing to the development and implementation of electricity policy at the Federal and State level. The Permitting Siting and Analysis Office is also tasked with analyzing transmission congestion, proposing energy corridors for the Secretary's consideration, and

coordinating Federal agency review of applications to site transmission facilities on Federal lands.

The Department published its National Electric Transmission Congestion Study on August 8, 2006, in compliance with section 1221(a) of EPACT, which requires DOE to prepare a study of electric transmission congestion every 3 years. The study named more than 15 areas of the Nation with existing or potential transmission congestion problems. The study identifies Southern California and the East Coast from New York City to Washington, DC, as "Critical Congestion Areas," because transmission congestion in these densely populated and economically vital areas is especially significant.

During the development of the study, which relied on extensive consultation with States and other stakeholders, the Department provided numerous opportunities for discussion and comment by States, regional planning organizations, industry, and the general public. OE intends to supplement the tri-annual Congestion Studies study by publishing annual progress reports on transmission improvements in the congested areas.

Section 1221(a) also requires the Secretary to issue a report based on the August 8 Congestion Study. In this report, if consumers in any geographic area are being adversely affected by electric energy transmission capacity constraints or congestion, the Secretary may, at his discretion, designate such an area as a National Interest Electric Transmission Corridor (National Corridor).

Because of the broad public interest in the implementation of section 1221(a), the Department invited and received over 400 public comments on the designation of National Corridors. The Department continues to evaluate these comments, and has not yet determined whether, and if so, where, it would be appropriate to propose designation of National Corridors. Prior to issuing a report that designates any National Corridor, the Department will first issue a draft designation to allow affected States, regional entities, and the general public additional opportunities for review and comment.

Another major effort involves the implementation of section 368 of EPACT, which requires the designation of energy right-of-way corridors on Federal lands in the 11 contiguous Western States. An interagency team, with DOE as the lead agency, conducted public scoping meetings concerning the designation of corridors in each of the 11 contiguous Western States. The agencies plan to publish a draft Programmatic Environmental Impact Statement for the designation of the energy corridors in late spring of 2007 and will solicit public comments.

In August 2006, DOE and 8 other Federal agencies signed a Memorandum of Understanding (MOU) that clarifies the respective roles and responsibilities of Federal agencies, State and tribal governments, and transmission project applicants with respect to making decisions on transmission siting authorizations. DOE is preparing to implement its responsibilities under the new section 216(h) of the Federal Power Act to coordinate with these 8 other Federal agencies to prepare initial calendars, with milestones and deadlines for the Federal authorizations and related reviews required for the siting of transmission facilities. DOE will maintain a public website that will contain a complete record of Federal authorizations and related environmental reviews and will work closely with the lead Federal NEPA agency to encourage complete and expedited Federal reviews. DOE is currently considering the procedures it will use in carrying out this program.

#### INFRASTRUCTURE SECURITY AND ENERGY RESTORATION

The President has designated the Department of Energy as the Lead Sector Specific Agency responsible for facilitating the protection of the Nation's critical energy infrastructure. The Infrastructure Security and Energy Restoration (ISER) activity of the Operations and Analysis subprogram is responsible for coordinating and carrying out the Department's obligations to support the Department of Homeland Security in this important national initiative. The fiscal year 2008 request is for \$5.9 million in funding for Infrastructure Security and Energy Restoration within the Operations and Analysis subprogram.

The Infrastructure Security and Energy Restoration activity fulfills DOE's responsibilities as defined in Homeland Security Presidential Directives 7 and 8 for critical infrastructure identification, prioritization, and protection and for national preparedness. In times of declared emergencies, this Office also coordinates Federal efforts under the National Response Plan to assist State and local governments and the private sector in the restoration of electrical power and other energy-related activities.

In the event of a large-scale electrical power outage caused by natural disasters such as hurricanes, ice storms, or earthquakes, DOE personnel will deploy to the

affected region to assist in recovery efforts. During the 2005 hurricane season, DOE was specifically deployed to respond to 5 hurricanes: Dennis, Katrina, Ophelia, Rita and Wilma. In such instances, DOE coordinates all Federal efforts to assist local authorities and utilities in dealing with both measures to restore power and to resolve other issues related to fuel supply.

The Infrastructure Security and Energy Restoration Office also fosters greater awareness of the regional scope of energy interdependencies by working with States to develop energy assurance plans that address the potential cascading effects of energy supply problems. Exercises are conducted with States and Federal partners to help sharpen this focus. Finally, staff work with States and DHS in emergency situations to help resolve issues brought on by temporary energy supply disruptions, such as the winter 2007 propane shortage in Maine.

#### CONCLUSION

In his 2007 State of the Union address, President Bush emphasized the importance of continuing to change the way America generates electric power and highlighted significant progress in integrating clean coal technology, solar and wind energy, and clean, safe nuclear energy into the electric transmission system.

Technologies such as power electronics, high temperature superconductivity, and energy storage hold the promise of lower costs and greater efficiency, and also directly enhance the viability of clean energy resources by addressing issues such as intermittency, controllability, and environmental impact.

Federal investment in the research, development, and deployment of new technology combined with innovative policies and infrastructure investment, is essential to improving grid performance and ensuring our energy security, economic competitiveness, and environmental well-being.

This concludes my statement, Mr. Chairman. I look forward to answering any questions you and your colleagues may have.

#### FOSSIL ENERGY BUDGET

Senator DORGAN. Let me begin with a couple of questions and then I'll call on my colleagues.

First, Secretary Shope, the ability to use the abundant supplies of coal that we have in this country depends a lot on the research and development capability in the fossil energy R&D programs. I was looking at your numbers and if you take out the 25 percent for FutureGen and then take out the strategic petroleum reserve money, isn't it then the case that the administration budget is proposing less money for fossil energy R&D?

Mr. SHOPE. Well Senator, we do take a portfolio approach to not only the coal aspect of the program, the entire fossil energy program, as I mentioned, focusing on energy security both in the domestic economic impacts as well as economic opportunities that it provides. So when we talk about our coal budget, we really are looking at a \$426 million coal budget going forward. That's the amount of money we will be advancing in 2008.

Senator DORGAN. But isn't that a substantial reduction?

Mr. SHOPE. Compared to our 2006 budget, we had \$366 million that was applied in 2006.

Senator DORGAN. Applied by 2007 numbers?

Mr. SHOPE. In 2007, we're going to be applying \$425 million.

#### COAL RESOURCES

Senator DORGAN. My point was not about your portfolio approach, admirable as that might be. My point was with respect to the use of our coal resources, abundant resources that can probably only be used in the future, in the way that many of us would like them to be used, if we, through research and development, unlock the mystery of this technology to be able to sequester carbon and

burn coal in a way that's clean, doesn't just spoil our atmosphere and so on. My question is, if you remove SPRO and remove FutureGen, isn't the case, with respect to the issue of being able to use our coal resources and able to devote research and development funds, that there is a substantial reduction there?

Mr. SHOPE. If you're looking at strictly the MMG research and the research and development, our fuels and power systems, that's correct. There's a decrease in there but there is an increase again—we've looked at our program and said, what is it that we need to accomplish our goals?

Senator DORGAN. I understand that but then how does one justify at this moment—it seems to me that we've come to an important intersection here in energy policy. Some regions have coal resources, others have oil, nuclear power and so we're talking about a lot of issues here. We have hundreds of years of coal resources. We can only use them, in my judgment, if we're able to make the investment to unlock the mystery of how to avoid putting effluents into the air and causing all kinds of issues. How do we use research and development to get to that point? So how does one justify coming to this intersection, saying to us, "Oh, by the way, with respect to that account, we want to cut funding."

Mr. SHOPE. Well, Senator, I agree with your statements about that. That's exactly what we need to do is to move forward and we're looking for a technology approach forward. I would say to you that the research and development—we still have a very active, vibrant portfolio in our research and development area. But we also are looking forward to moving these—the technologies out, getting them applied. So that's why we do have the FutureGen project going forward. It's part of our—that's actually a research project in and of itself so all the money that we are using in FutureGen are research dollars.

But in addition, we're trying to look at carbon capturing storage, the issue that is really preeminent in our program and saying we need to move forward and get these technologies deployed so we'll increase in our sequestration budget as well, to bring this to fruition.

Senator DORGAN. You know, the problem is, it's never much fun to inquire of someone who I think, in a less guarded moment, would probably say, I understand your point. We should be asking for more money but this is the President's budget. I'm here to support the President's budget. That's what I'm paid for. So I can't get, perhaps, as candid an answer as I would hope on whether it makes a lot of sense at this intersection, to cut that portion of the budget. It just seems nuts to me. With all due respect, if we want to use that resource, we're going to have to find ways to be able to use it and unlocking those ways, in my judgment, would require some directed funding to our priorities. We're going to do that rather than cutting funding.

#### ENERGY EFFICIENCY AND RENEWABLE ENERGY BUDGET

But I understand your answers, Mr. Secretary. I don't mean to badger you. Let me ask Secretary Karsner a similar type of question. You and I visited the Renewable Energy Laboratory at Golden, Colorado. I was enormously impressed by it. I, of course, have

a great interest in all of these accounts and a good many of them are going to be decreased, as you know and I suspect if I asked you the same question, I'll get an answer——

Mr. KARSNER. I support the President's budget.

Senator DORGAN. So is there any chance after the hearing, we could have a cup of coffee and find out where I could ask you the same questions? But more seriously, you know, we here in Congress added money to this bill, as you know \$300 million. When you take that with the 2007 level and then the plus up of \$300 million, the 2008 request, in virtually every area, with, I think, maybe two exceptions, is going to be a cut in funding 2008 versus 2007.

We're talking, on the authorizing committee, Senator Bingaman, Senator Domenici, myself and Senator Craig, and others about this notion of how to put together another follow-on energy bill and what parts are necessary, so we understand the urgency. It seems to me there is a confluence of events here with respect to what has become sort of a consensus on climate change, our vulnerability with respect to oil and foreign oil. There is a greater urgency to these issues and it seems to me out of step with that greater urgency to see proposed reductions in spending in most of the accounts dealing with renewable and energy efficiency issues. Would you agree with me, Secretary Karsner?

Mr. KARSNER. In substance, in the character of what you're saying, I do agree. I think the differential is largely accounted for by the idiosyncrasies of the budgeting process. This 2008 budget originated more than 2 years ago, just as I'm currently preparing a 2009 budget 2 years into the future for an administration I won't be a part of. Technology, of course, moves much faster, as do these priorities, and when we had the opportunity for the spend plan, which is really the first budget that I've had the opportunity to exercise influence over, it does very accurately reflect our priorities in a contemporaneous, real-time snapshot of the portfolio approach and there is a heavier emphasis on efficiency.

Senator DORGAN. I think it is important to note that the Congress, on a bipartisan basis, in putting together the fiscal year 2007 appropriation bills, combined, I believe, 10 bills into one omnibus because we were required to do that. Republicans and Democrats together said "You know what? We're under funded in the renewables area and so we added to all of these accounts." There are priorities that come from the administration and then priorities that come from the Congress and we will try to work our will in terms of what we believe the right priorities will be. I mentioned the renewable energy and fossil fuel accounts and I think it's important to understand that there is a renewed urgency here with respect to both and so your area is going to be critically important to us. We need to get out of your area some very significant opportunities and changes for the future.

#### NUCLEAR ENERGY BUDGET

Secretary Spurgeon, can you tell me how the \$114 million for shared costs of efforts to reduce barriers to deploy nuclear power, would be spent? I don't quite understand from the description how that would be dispersed.

Mr. SPURGEON. It's spent through two consortia. The NuStart Consortia, which consists of 10 electric generating companies plus two manufacturers and the Dominion Power Group, which has one utility and manufacturer and architect engineers associated with it. The whole objective of the Nuclear Power 2010 Program is to remove the barriers to entry of these first nuclear powerplants into the marketplace. So what we are doing is we're spending money on design standardization costs. We're spending money in design standardization and in preparing the combined operating licenses for two different types of reactors, one a boiling water reactor and the second, a pressurized water reactor.

So it's to get the first ones through the process so that those that follow can reference the first ones and shorten the time scale and thus, cost for introducing nuclear power in the United States.

#### ELECTRICITY DELIVERY TECHNOLOGICAL ADVANCES

Senator DORGAN. I don't know as much about that area. That's why I asked the question. I will submit further questions as well, just so that I understand more. And, finally, then I will turn to my colleagues.

Director Kolevar, it seems to me that we have not seen any substantial change in the technology of delivering electricity for perhaps three-quarters of a century. We string lines and we run electricity over the lines and we run these lines through a corridor. I know some companies are working on new technologies—composite conductors, to name one, and there are others. If we could see dramatic advances there, we might be able to use existing corridors to double or triple the capability of moving electricity to where it's needed and that's part of what your investment is about, I understand.

With what hope can we approach a future with new technologies for the transmission of electricity? Thus far, we have had very few advances in those areas.

Mr. KOLEVAR. You're correct, Mr. Chairman. It is certainly challenging space. There have been a variety of new technological advances that we have not seen penetrate the system in any significant fashion. I do believe the opportunity is there for a couple of reasons. One, the system today is increasingly stressed and in two parts of the country, we either came close to or experienced black-outs. I think that will drive greater technological penetration of transmission scale applications and distribution scale applications that can enhance reliability.

I also think it's the case that the work that is going on with the Federal Energy Regulatory Commission (FERC) and the Nuclear Regulatory Commission (NRC) in pushing new mandatory reliability standards will help some of these technologies to be pushed into the market.

#### ELECTRICITY DELIVERY AND ENERGY RELIABILITY BUDGET

Senator DORGAN. Director Kolevar, I'll give you the opportunity to learn from Secretary Shobe on this subject but you're probably not happy to see a \$132 million research and development budget drop to \$86 million. I assume that this is probably not advancing our pursuit of new technologies.

Mr. KOLEVAR. We were able to leverage a number of synergies in the program where we saw the drop that you reference from fiscal year 2006 to 2008. Mr. Chairman, I would also note that the majority of that reduction was scheduled for phase-out. It was in some reciprocating engine work and in some combined heat and power work where we had achieved or came very close to achieving some pre-established milestones. There was a general thought that when we achieve what we set out to achieve that we ought to then discontinue that project and focus on some other applications.

Senator DORGAN. Would you prefer at least the minimum level of funding for the pursuit of research and development for new technology in electric transmission?

Mr. KOLEVAR. I'm sorry, I don't understand your question. At the minimum 2008 level?

Senator DORGAN. At least in the pursuit of research and development and in the area where there has been so little progress for so long and where so much is necessary for us to be able to produce in one area and transmit to another. I was wondering whether you would prefer level funding, at a minimum level, for this function of research and development.

Mr. KOLEVAR. Yes, sir. Level funding at a minimum would be appreciated.

Senator DORGAN. Thank you. Senator Domenici.

Senator DOMENICI. Well, Mr. Chairman, you succeeded.

Senator DORGAN. I did. I didn't want to mention that but I did.

Senator DOMENICI. Three witnesses and three shots but you got there. Let me make an observation first. Obviously, he's sitting in the chair and I'm sitting next to him as ranking member. That got turned around just a few months ago but I think that it should be—it would be appropriate for me to indicate to the four of you that I can recall your coming before the subcommittee to get confirmed for your jobs and I was obviously sitting in this position with my friend and ranking member—who came before the Energy and Natural Resources Committee, which frequently gets confused with this subcommittee. This isn't the subcommittee.

And I was quite impressed when we finished getting all of you, the four of you, that this late in this administration, we were going to get such qualified people. I openly expressed myself as saying that the Secretary of Energy and his Under Secretary, Clay Sell, have done some exciting work in getting the four of you to take these jobs. And I repeat that. I hope you're as enthused now as you were when you told us why you would take this job, knowing full well that whether it is a Republican or a Democrat, there is a big chance you will not be around for 5 or 6 years to see your dreams achieved.

I do believe I was right in my assessment about you. Your work has been exciting. I think you are challenged even though you had a terrible start with the lousy work that the United States Senate did and we were in charge, not them, in not getting an appropriation bill and then throwing upon you the kind of appropriation that we did and then you having to address questions like you are here, when this appropriation process is all out of focus for the year 2005, 2006, 2007, and 2008. But I commend you.

## PREVENTING REGIONAL BLACKOUTS

Now I want to just start with you on the right hand side. When we passed the energy bill, the authorizing bill, those of us who were very thrilled with the bill had a check-off list and almost everybody had one item that said that if this works, it should not be too long before America can say, we will not have any more regional blackouts in our grid across the country. I didn't ask you, Director Kolevar, whether I could make that statement. We thought that's what we did. I'm sure Senator Craig said the same thing. He had it on his list. What we had done is created authority in you so that we should avoid the pitfalls that cause the grid failures.

Now quickly, without too much elaboration, did we give you the right authority and are you pursuing—is this being pursued with vigor so that what we told the American people may become a reality in terms of the stability of the grid system?

Mr. KOLEVAR. Yes, sir, I would say that you did. We believe that the provisions contained in the Energy Policy Act of 2005, when executed, will dramatically assist reliability of the overall transmission and distribution systems.

Senator DOMENICI. I want to say to you, I think they're right and I certainly would not want you to operate under this law if it is deficient. If it is, I think you ought to tell us because we don't want you to go 4 years or so trying to give us stability in the grid and then tell us, the law was short. You got it?

## LOAN GUARANTEE PROGRAM

Mr. KOLEVAR. Yes, sir.

Senator DOMENICI. Now let me move over to Secretary Karsner.

Secretary Karsner, I'll try to hurry up but I can't resist. If you or any of the other witnesses are talking about a budget and you're talking about the amount of money the Federal Government is putting into an account and you look to the energy bill and found that there is a section that provides for loan guarantees for new technology or technologies that implement this act, would it be fair to think that you would assume that maybe some loan guarantees would be added to your portfolio so that more money could be spent by the entrepreneurs and business people that took advantage of this law?

Mr. KARSNER. That would be fair.

Senator DOMENICI. Let me just say, that is fair and that is—the chairman knows that and he was not talking against that in his questions but the truth of the matter is and Senator Craig, would you believe that we still do not have a packaged set of regulations from the Department of Energy—

Senator CRAIG. Twenty months after the passage of the act. Yes, I'm counting, month by month, week by week, day by day.

Senator DOMENICI. No, I'm telling you that I understand that every time we turn around, we run into another stalwart and they are stalwarts—in this administration that say, I don't like loan guarantees and therefore, they get them stalled. We write them. They pass judgment based on their existence in life and say, well, I don't like them. I submit and Mr. Chairman, that on loan guaran-

tees, when we're finished, even though we're not an authorizing committee, that we ought to ask our staff how to write loan guarantee provisions in this bill that if signed by the President, we will be rid and finished with them having any judgment with reference to how to write the loan guarantee bills. And I'm going to try to do that, if you would help, we'll do it bipartisan and get it written and get that out of the way so loan guarantees will be finished in terms of having to look at authorizing language. Would that help you and would that help you, Secretary Shope, in your part of this law, too?

Mr. SHOPE. The loan guarantee provisions are beneficial to our program.

Senator DOMENICI. Not yours; Secretary Karsner?

Mr. KARSNER. They are essential to the growth of commercialization in our—

Senator DOMENICI. What about you, Secretary Spurgeon?

Mr. SPURGEON. Essential.

Senator DOMENICI. Even in the big nuclear program, you need it?

Mr. SPURGEON. Yes, sir.

Senator DOMENICI. Oh and the administration loves the nuclear program. Have they said anything to you as to why we can't get the loan guarantees going?

Mr. SPURGEON. Senator Domenici, the administration—the Department of Energy is moving very aggressively to implement the loan guarantee program. Now that we have the requisite authorization to move forward with creating the office, which was established, which was received 1 month ago. It is a matter of public record that the Department has prepared a notice of proposed rule-making and that has been received and is under review at the Office of Management and Budget as of March 16.

Senator DOMENICI. So you must be part of driving this thing?

Mr. SPURGEON. Yes, sir.

#### COAL USAGE

Senator DOMENICI. Well, that's good. I like the way you drive things. It's apt to get done. It's very important that you understand what's going on or it won't happen. We'll be through another Congress.

I have one last question to ask of the Secretary who is in charge of coal. People think that the United States is going to stop using coal because of environmental problems. Everything I read about the future says that there will be more coal used in the next decade than this previous—this decade past. Is that the assumption you're operating under?

Mr. SHOPE. Yes, it is, Senator. I would agree with that.

Senator DOMENICI. And is it not true that we must convert coal to things like liquids and other usable products and that requires a lot of technology and innovative—and money to be invested?

Mr. SHOPE. It does, Senator and it is part, again, of the President's alternative fuel strategy to include clean coal to liquids technologies, to make it part of our strategy. So yes, the entire use of coal is essential to our Nation's energy security.

## GLOBAL NUCLEAR ENERGY PARTNERSHIP

Senator DOMENICI. My last question is, who knows anything about the GNEP Program? Secretary Spurgeon, how much money did the President put in to start this program?

Mr. SPURGEON. To start it in 2008?

Senator DOMENICI. Yes.

Mr. SPURGEON. Four hundred and five million dollars, sir.

Senator DOMENICI. That's what you are here asking us for.

Mr. SPURGEON. Yes, sir.

Senator DOMENICI. That won't get you ready in terms of specifications?

Mr. SPURGEON. Yes, sir. That gets us to the point where we can define a technology pathway forward with sufficient information so that we're not guessing at what the right answer might be. We need to offer it to the Secretary for the Secretary to make a decision on a pathway forward and you need to inform that decision by good information from industry, from our national laboratories and from our universities.

Senator DOMENICI. Thank you very much.

Senator DORGAN. Senator Craig.

Senator CRAIG. Thank you, Mr. Chairman. I didn't make an opening statement so let me react not unlike the ranking member has, by agreeing certainly with the premise of your opening statement as it relates to our energy future and where we need to go and what we've done to date and what I hope we will do in the future.

Let me also say that last Wednesday, I stood on the top of a reactor core, EBR-1. For those of you who don't know what EBR-1 was, it's now an historic site. I didn't think we'd been involved in the nuclear business long enough to describe it as a historic event but it was, is an historic site so designated by President Lyndon Johnson. EBR-1 was first constructed in 1949. It started producing power in 1951. It lit the first light bulb ever powered by nuclear generated electricity in 1951 out on the high deserts of Idaho.

When I was standing on top of that reactor core, Dennis, I thought, oh, if we had only continued from that point forward at the rate we were moving at that time. We might not even be so dependent upon the Middle East today or anybody else for that matter and my guess is, we wouldn't be generating electricity at the rate of only 20 percent total nuclear. It would be substantially greater than that and we'd have the waste problem solved a decade or so ago. But we stalled out politically. We simply—we were fearful of where we were even though the technology argued there was nothing to fear. We've changed that. We've adjusted and thank goodness America is awakening to a new reality and that new reality is embodied in the Energy Policy Act of 2005 that deals primarily with power generation, in something that the chairman and I introduced just recently that deals primarily with transportation sector fuels, the SAFE Act and all I am saying to all of you in your presentation today is, too many good ideas and not enough money.

Because we can help drive industry in the right direction by creating some of the safeguards, some of the buffers and some of the incentives. But the marketplace is doing a marvelous job at this

moment. I say this publicly and loudly, even though I don't like saying it. The good news of last year is that we got \$3 gas. We may get it again this summer. The bad news is we got \$3 gas but the good news, is it's probably creating and generating in the marketplace, one of the greatest resurgent and investment in energy than the total energy portfolio ever in the history of our country. And that's good because I find it shameful of a great power to be so reliant upon those who would jerk our diplomatic chain and change our foreign policy in a way simply so that we can continue to serve our habits and I'm talking about hydrocarbon habits.

#### NEXT GENERATION NUCLEAR POWERPLANT

Now, having said that, let me switch back to EBR-1 or should I fast-forward to GNEP and NGNP because that's really where we are today. Since the time that Pete Domenici and I and Jeff Bingaman and everybody else on that committee crafted EPACT, 33, 34 nuclear reactors on the drawing board? What is it today, Dennis?

Mr. SPURGEON. The number can be either but it's either 33 or 34.

Senator CRAIG. Somewhere in that range. Now, let me say this to you as a statement because I don't disagree with any direction you're headed in. I just wish we could head there a little faster. You're going to find too many of us on this—not too many of us on this subcommittee would in any way disagree with you as it relates to nuclear power and the role it plays and the value of it in the future—our security, our competitiveness, reduction of greenhouse gases—all of that. And I would suspect that you would not hear any complaints from myself, Senator Domenici or the chairman regarding the strong emphasis you've placed on the budget for securing nuclear power through your R&D efforts in the advanced fuels cycle initiative or NGNP or GNEP.

My only advice to you would be that you remain flexible. In dealing with both chambers, both parties as it relates to a broad goal that we all seem to support. The resurgence of nuclear power in the United States, I think, is upon us. I'm not sure where a new administration will take us but I'm confident that the two committees of authority in the House and the Senate, in a bipartisan way, will advance the cause we started with the passage of EPACT.

However, you may find that the narrow goals of GNEP that must follow may not be pursued as aggressively as some of us might like. Instead, we all need to keep focused on moving the ball forward for nuclear and maintaining the momentum of what we've done. I think you understand what I'm saying. If the nuclear budget remains whole but it doesn't reflect exactly what any one of us might ask for, we can all agree that the nuclear resurgence continues and will be as a positive step forward for this country. My guess is that we'll tinker around the edges and we may add a few dollars here or there to all of your budgets. They are woefully inadequate.

I'm willing to shift the priorities in the entire budget to give you greater ability in your budget. I am just growing so very tired, as the American people are, of finding this great Nation jerked around by puppet governments around the world, largely because of a dependency we've now developed and a lack of vision decades ago in where we needed to get.

Thank you all for your presentations today. You are very skillful in doing it. If the Secretary had been here, he'd have got 10 minutes. You each got 10 minutes. So we were glad to see you and not the Secretary.

Because I think it was important that all that you said be said for the sake of the country and the policy you project. Thank you. Thank you, Mr. Chairman.

Senator DORGAN. Senator Craig, thank you very much. Senator Allard?

#### NAVAL OIL SHALE RESERVE CERTIFICATION

Senator ALLARD. Thank you, Mr. Chairman. Thank all of you for your testimony. Secretary Shope, you're familiar with the naval oil shale reserve legislation and the agreement that was worked out by the Department of Energy and the Department of the Interior when there was a transfer of management of that particular property in Colorado?

Mr. SHOPE. I am, yes sir.

Senator ALLARD. My understanding is that the Department of the Interior is ready to certify that you're not ready to certify because you're waiting for a cleanup to be completed. What is your estimate it is going to cost to finish that cleanup?

Mr. SHOPE. Again, Senator, the reserve has been transferred to the Department of the Interior, so actually—

Senator ALLARD. I'm sorry. I got that turned around.

Mr. SHOPE. Yes, sir.

Senator ALLARD. I apologize for that.

Mr. SHOPE. So we actually will wait until the Department of the Interior certifies the plant.

Senator ALLARD. They need to certify and I've been told that we're waiting for your certification but you're not willing to give that until they have cleaned up the Anvil Point facility.

Mr. SHOPE. Senator, I'll have to take that particular question for the record because that's inconsistent with what my current knowledge is of that matter, Senator.

Senator ALLARD. Okay, well that's what we've been told by the Department of Energy is that you're waiting for the cleanup of that and we've been estimated that the cleanup is around \$13 million at the high end. It's not anticipated to go over \$13 million—that's a high figure and yet, there is revenue being generated from that property now. I've been told that equals about \$70 million. The legislation directs that the revenue from the natural resources on that property be returned to the local communities and the State of Colorado and you have \$13 million of outside costs and you're holding \$70 million in there that you're not redistributing back to the State of Colorado.

It seems to me that there ought to be more of a concerted effort to get that return. Why are you sitting on that money?

Mr. SHOPE. Well again, Senator, the Department of the Interior has the lead on it. We would certify after their certification—and you're indicating—

Senator ALLARD. According to our information, they have certified it.

Mr. SHOPE. And that has not been made known to me but I will immediately look into it and address that in the record.

Senator ALLARD. They had indicated—they indicated to my staff that they are willing to certify. The legislation requires joint certification, which means the Department of Energy also has to certify. So that's our understanding and I would hope that you would get back to us because that's important. For the life of me, I don't understand why you're sitting on \$70 million when the maximum estimate on cleanup on that is around \$13 million. Heck, even if you wanted to raise your estimate to \$20 million, if you could get the other \$50 million or so to the local communities because they're being impacted right now because of the oil shale development that is happening in that particular area of the State. So they need that to meet their challenges that they are facing with that development. So, we'll continue to stay in touch with you on that and if you'll respond back. We'll get a formal question to you and then if you could respond back to us, we'd appreciate it.

Mr. SHOPE. Absolutely, Senator.

[The information follows:]

#### ANVIL POINTS MINE SITE

When the management of Anvil Points mine site was transferred to the Department of the Interior there was environmental remediation work that needed to be completed. The Department of the Interior assumed responsibility for the cleanup of Anvil Points; however, the Secretary of Energy must approve the cleanup plan.

To the best of our knowledge the Department of the Interior has completed a feasibility study and the detailed engineering plan. The final cleanup plan appears to be in draft form; however, the cleanup plan has not been submitted to the Department of Energy for approval.

It is also our understanding that part of the cleanup plan involves removal of the mine access road. However, before this can happen the U.S. Geological Survey must get into the mine and remove drilling cores that have been stored there.

The Department of Energy remains ready to review and approve the Anvil Points environmental remediation plan once it is submitted by the Department of the Interior.

#### PROGRAM ASSESSMENT RATING TOOL (PART) SCORES

Senator ALLARD. Also, you're familiar with the PART Program of the President. I suppose all of you have done that. It's where you measure—you put goals out there that are measurable and then you are evaluated. Actually, the Department of Energy has done better than most of the agencies and I want to compliment you on that.

But there are six areas in which I think there are some issues that need to be addressed and I'm just going to call them quickly to your attention. In the Department—and I'm not calling these up because I support them but what I want to make sure is that the taxpayer dollars that are going in there are creating results. There are two programs that have been measured and this is done by the Office of Management and Budget (OMB), by the way. There are two areas where you have been rated as ineffective. I don't know who has jurisdiction over the Natural Gas Technology Program.

Mr. SHOPE. I do, Senator.

Senator ALLARD. Why is that rated ineffective?

Mr. SHOPE. It's rated ineffective based upon the other priorities within the Office of Fossil Energy. So it's ineffective in the sense

of—not that the program is mismanaged, not that there has been any inappropriate activities or misspending of money—

Senator ALLARD. What’s happening to the money they’re getting?

Mr. SHOPE. It’s now being effectively utilized, all the dollars have been and our reviews demonstrate that. What the ineffectiveness refers to is the balance of putting money toward natural gas research and development in light of the high costs, the high price of hydrocarbons as they are being received today.

Senator ALLARD. Is that a correctable problem?

Mr. SHOPE. Well, we corrected it by terminating the program.

Senator ALLARD. Okay, so it’s terminated.

Mr. SHOPE. At the end of 2008.

Senator ALLARD. Okay, very good. All right, what about oil technology? That’s rated as ineffective.

Mr. SHOPE. Again, the same thing. This is not ineffective in the sense of mismanagement or any inappropriate—it’s a matter, is this—is the taxpayer dollars being best spent by investing in this research in 2008?

Senator ALLARD. It will be terminated?

Mr. SHOPE. Yes.

Senator ALLARD. It will be terminated. All right. Now there are some that don’t demonstrate any results. It’s all—there is the National Nuclear Infrastructure Program and they haven’t bothered to set any goals at all or measure them so why haven’t they bothered to do that? I guess that’s you, Secretary Spurgeon.

Mr. SPURGEON. I think that’s another program within the Department that’s being referred to there, sir.

Senator ALLARD. And that will be terminated or what?

Mr. SPURGEON. I’m not sure which program that is, so. I think it’s a Defense program.

Senator ALLARD. It’s called the national nuclear infrastructure. If you go on Expectmore.gov on the Internet, you’ll see it there.

Mr. SPURGEON. Let me take that for the record for the Department, sir.

[The information follows:]

#### PROGRAM ASSESSMENT RATING TOOL

The National Nuclear Infrastructure Program Assessment Rating Tool (PART) is focused on activities carried out by the Office of Nuclear Energy’s Idaho Facilities Management and Radiological Facilities Management programs at Idaho National Laboratory (INL).

Performance measures were established for the INL during the fiscal year 2005 merger of the Idaho National Engineering and Environmental Laboratory (INEEL) and the Argonne National Laboratory-West (ANL-W). The National Nuclear Infrastructure PART assessment was completed during the fiscal year 2006 budget formulation process, concurrent with activities associated with creation of INL.

The overall rating of “Results Not Demonstrated” is not due to the lack of performance measures, but the inability to demonstrate results against the established performance measures during the short period of time between the establishment of the new laboratory and completion of the PART assessment. The Department continues to track its performance against cost and schedule baselines. Further, the Department employs a Facility Operability Index performance measure that assesses the readiness of the infrastructure to support NE, other DOE and Work-For-Others milestones. The Department continues to evaluate and look for improvements in the operation of INL.

## PROGRAM ASSESSMENT RATING TOOL (PART) SCORES

Senator ALLARD. All right. And then on the University Nuclear Education Program—results not demonstrated. Why is that?

Mr. SPURGEON. What was that, Senator?

Senator ALLARD. It's the University Nuclear Education Programs. Results are not demonstrated. In other words, they haven't been able to establish goals that show that they're getting anything accomplished.

Mr. SPURGEON. We have a—I think our university dollars are being very well spent. It's sometimes very difficult to quantify goals for research that is happening and support of developing education programs for us. I'll give you a better answer than I'm able to give up here.

Senator ALLARD. When they make application, you can insist on them giving you—

Mr. SPURGEON. We are. We are moving the university research programs to be program based and so that we will be able to have a better measure of performance against objective.

[The information follows:]

## PART SCORE FOR UNIVERSITY NUCLEAR EDUCATION PROGRAM

The mission of the University Reactor Infrastructure and Education Assistance program has been to enhance the national nuclear educational infrastructure to meet the manpower requirements of the Nation's energy, environmental, health care, and national security sectors. More specifically, the program was designed to address declining enrollment levels among U.S. nuclear engineering programs.

A PART assessment was completed for the University Reactor Infrastructure and Education Assistance program during the fiscal year 2007 budget formulation process. The assessment, conducted under the title "University Nuclear Education Programs," determined that enrollment target levels of the program had been met and that Federal assistance was no longer needed to encourage students to enter into nuclear-related disciplines. Since the late 1990s, enrollment levels in nuclear education programs have tripled, reaching upwards of 1,500 students in 2005, the program's target level for the year 2015. In addition, the number of universities offering nuclear-related programs also has increased. These trends reflect renewed interest in nuclear power. Students continue to be drawn into this course of study and universities, along with nuclear industry societies and utilities, continue to invest in university research reactors, students, and faculty members. However, the assessment also concluded that the program performance measures that did not clearly communicate the linkage between Federal funding and growth in enrollment in nuclear-related disciplines. This led to the rating of "Results Not Demonstrated".

The Department is using part of its fiscal year 2007 funds to support all students currently on an Office of Nuclear Energy fellowship or scholarship for the period of their initial appointment. No student is in danger of losing his/her funding assuming that they stay within the original guidelines of the program with regard to course of study and grades. No additional funds are requested in fiscal year 2008 for these activities, effectively closing out the program. However, \$2.9 million was requested in fiscal year 2007 to provide fresh reactor fuel to universities and to dispose of spent fuel from university reactors. Under the fiscal year 2007 CR, these activities are also being funded. In fiscal year 2008, \$2.9 million is requested for these activities under Research Reactor Infrastructure, within the Radiological Facilities Management program.

In addition to funding research reactor activities, the Department remains committed to supporting university research through its Nuclear Energy Research Initiative (NERI). In fiscal year 2007, \$38.3 million will support NERI grants to universities within NE's R&D programs. The fiscal year 2008 budget request includes \$58.6 million to support NERI grants to universities within NE's R&D programs.

## PROGRAM ASSESSMENT RATING TOOL (PART) SCORES

Senator ALLARD. Now there's one other program, the State energy programs. What's happening there? They are—who has those?

Mr. KARSNER. That's me.

Senator ALLARD. Why aren't those—why aren't there any results being demonstrated there?

Mr. KARSNER. I can't speak to the report. I feel like there are results being demonstrated there but I'm happy to analyze that report.

Senator ALLARD. The Office of Management and Budget did an evaluation on that and said they—

Mr. KARSNER. It will not be the first time I disagree with the Office of Management and Budget.

Senator ALLARD. Well, if you could get something back to us on those. As policy makers, if we knew—

Mr. KARSNER. Absolutely, sir.

[The information follows:]

## STATE ENERGY PROGRAM PART SCORE

In 2004, the State Energy Program (SEP) received a rating of "Results Not Demonstrated" for the OMB Performance Assessment Rating Tool (PART) exercise. This rating is "given when programs do not have acceptable long-term and annual performance measures" (quoted from OMB PART Tool Guidance No. 2007-02, Jan 29, 2007). The Program had offered information for the PART based on an evaluation conducted by Oak Ridge National Laboratory (ORNL). OMB cited the need for a more comprehensive impact methodology for the study as well as an independent evaluator.

DOE has taken several actions in response to OMB's concerns. In 2005, SEP requested an independent review of the ORNL report by the Board of Directors of the International Energy Program Evaluation Conference, Inc. This independent review found the ORNL study to be a "reasonable foundation from which to estimate the national effects of the SEP program." In 2006 the program finalized the SEP Strategic Plan, which established long-term goals, objectives, and strategies to set a new direction for the program in response to the OMB assessment. In 2007 SEP initiated a comprehensive evaluation of the program by an independent evaluator to quantify program performance and identify areas for improvement.

## UNIVERSITY NUCLEAR EDUCATION PROGRAM

Senator ALLARD. Some of these programs, I think—they look good and sound good so I want to—and like all the rest, I want to see us move forward on that. So I just want to follow up that. Thank you, Mr. Chairman.

Senator DOMENICI. Mr. Chairman?

Senator DORGAN. Yes?

Senator DOMENICI. With reference to the program you asked about, it referred to—

Senator DORGAN. University, yes.

Senator DOMENICI. I want to say that in 1995, when there was nothing going on and this Senator decided we should get started on some and we started by putting back into the university system what had been there for many years and terminated and that was some assistance to encourage youngsters who had the proclivity for nuclear engineering and the like, excited them about—and it was working and we spent about \$25 million a year at the maximum and then the President, because he didn't have enough money, terminated it and I don't think I've been able to put it back. But that's the history.

Senator DORGAN. Thank you for that response and I'd agree that we need to encourage students to get into these areas. It's probably important when you have a shortage there.

Senator DOMENICI. Thank you.

Senator DORGAN. Senator Murray.

Senator MURRAY. Thanks very much, Mr. Chairman, for holding this hearing and Senator Domenici and all of our panelists. I think it's been a very interesting discussion. I think we all are looking for ways to provide alternative energy and I think there are a lot of great ideas out there. This has been a great panel and chance to hear all that. I was out in my state over the last week and had a chance to talk to my sorghum grain farmers there, very interested in the opportunities that are out there and obviously, my dairy farmers are talking about biowaste. We've got nuclear, biodiesel, hydrogen—so many opportunities and a lot of work ahead of us.

I think we have to remember, we've got to be careful what we do. Every source of energy seems to have a challenge to it and how we move forward is really important but I appreciate all the work that you're doing.

#### VEHICLE EFFICIENCY

Secretary Karsner, let me start with you. I really appreciate the President's initiative to cut our dependency on oil through the greater use of biofuels but there are other things we can do as well. We not only need to introduce alternative fuels but we have to look at how we can get efficiency in vehicles as well. Your efficiency programs—we've seen a significant increase in the 2007 spending plan and the increase in the 2008 EERE budget seems to emphasize funding for hybrid electric systems and decreases funding for research and materials and advance combustion. According to the Department's own estimates, these activities would have a lot more dramatic and near term impact on CO<sub>2</sub> emissions and reducing our dependency. Can you comment on whether you agree that improvements in combustion processes could greatly enhance our fuel economy by new lightweight materials, things like that?

Mr. KARSNER. I do agree that improvements will remain a central focus. I think some of the diminishing, programmatic budgeting there might reflect some of these successes, actually. In other words, there are natural limits to what gains can be had from the physical properties of internal combustion efficiency and it's going to ultimately be balanced against the emissions that come out of those engines. So the idea is, optimizing the efficiency to the maximum degree as a physical device and minimizing the emissions in some of those cases, for example, heavy trucks, is what that applies to. We're getting right up to that optimum barrier.

Senator MURRAY. Do you think we know everything we need to know?

Mr. KARSNER. No, absolutely not.

Senator MURRAY. Okay. Well, how much of the 2007 spending plan was directed to advanced combustion R&D?

Mr. KARSNER. I can report back with the precise numbers but we did have a substantial increase in the 2007 spend plan to vehicle technologies.

[The information follows:]

FUNDING FOR ADVANCED COMBUSTION R&D

For fiscal year 2007, \$49,706,000 is being directed to advanced combustion R&D in the Vehicle Technologies Program.

FUNDING FOR ADVANCED COMBUSTION RESEARCH

Senator MURRAY. And your 2008 is reduced funding?

Mr. KARSNER. Well, of course, the 2008 was submitted ahead of the 2007, so as Senator Dorgan pointed out, it's a bit of an anomaly this year.

Senator MURRAY. Okay. Well, it just seems to me that we need to keep focusing on all kinds of programs and reducing the research on that is not going to help us improve our—or help us get off our dependency of oil. So I'm a little bit concerned about that.

BIOFUELS

I also wanted to ask you, DOE seems to be putting a lot of their focus on cellulosic ethanol but there are other biofuels that contribute to the mix as my farmers tell me, constantly. What is the Department doing to support really a diversified approach to reducing our Nation's dependence with fuel such as biodiesel or biomethane?

Mr. KARSNER. Well, of course, we support all biofuels and of course, the President's approach is to have the broadest scope available to alternative sources to gasoline. That's the subject of a hearing tomorrow but the administration endorses all of those.

Some of them are more mature than others in terms of their efficiency process and their competitiveness so they don't need the level of breakthrough that cellulosic ethanol needs. The other sort of metric that we look at is the quantitative or volumetric capacity to make an impact of those biofuels and, although all of these are important and we want to maximize what each of them can contribute, there is no question that ethanol, through various forms of biomass, volumetrically will contribute much, much more than any of those that you named and so that's why it gets a greater emphasis.

Senator MURRAY. Are there projects out there that do cross funding that help both of them—

Mr. KARSNER. Well, codes and standards, by way of example—in fact, I would say we have more emphasis on the codes and standards for biodiesel so that we can certify them. Since we have a fairly competitive biodiesel industry that is growing very rapidly, it's very important to us that engine manufacturers be able to warrant the use of those in different ambient conditions so that's a big focus with biodiesel. We've just certified B-5 in some of the engines. I understand we're looking at B-20 levels and so codes and standards will be one of those that is cross funded.

GRID RESEARCH AT PACIFIC NORTHWEST NATIONAL LABORATORY

Senator MURRAY. Okay, thank you. I appreciate that and Director Kolevar, I just wanted to mention, I heard Senator Dorgan talking to you about the grid and modernizing our grid and moving to better technologies and what we needed to do and I just wanted to

make sure you knew about the Pacific Northwest National Lab and the work that they're doing out of my State to help efficiency on the grid. Have you ever visited there?

Mr. KOLEVAR. I have not, Senator. I intend to this year. I'm aware they're pulling real time data from Bonneville Power and visualizing, from a layman's perspective and then in more detail on some of the work that is going on there. It sounds to be very promising.

Senator MURRAY. Yes, the Grid Wise Program is really starting to look at how we can really focus on some efficiencies and better transmission. We'd really love to have you come out and take a look at it. Mr. Chairman, you might want to, too. I think you're right to mention that we need to have some efficiencies with that system and there is some work being done. I think we need to do more but we'd love to have both of you visit. So, thank you very much.

#### RETRIEVABLE ENERGY IN SPENT NUCLEAR FUEL

Senator DORGAN. Thank you very much. Just a couple other queries. Secretary Spurgeon, you talked about the closed fuel cycle. Can you tell me, just for my own information, how much energy is retrieved from spent fuel? You talked about retrieving the energy from spent fuel. What percent of the energy?

Mr. SPURGEON. Well, if we do a recycle and if we just recycle one time, in a light water reactor, you would recover 20 percent roughly of the input fuel. Now there are ways, looking to the future, where you could recover substantially more than that. But just one recycle and that's where I made the comparison base when I said as much as the Alaska Pipeline provides in energy value. It's just based on one recycle, 20 percent saving existing reactors, not including new ones that might be built in the future.

#### WEATHERIZATION

Senator DORGAN. Secretary Karsner, the issue of weatherization. I did not ask you about that. I assumed since I come from North Dakota that you would have expected me to so I don't want to disappoint you here. As you know, in the weatherization account, the proposal is to make a cut in that account. It was \$242 million in fiscal year 2006. In fiscal year 2008, it will be \$144 million, which is the budget request. Tell me what you think the consequences of that would be, to cut \$100 million from weatherization?

Mr. KARSNER. Well, there are lots of consequences. One of the primary consequences is that we have more funding to accelerate biofuels for national security and lower greenhouse gas emissions. That's on the positive side. On the negative side, it will mean, because that is an additive program for returns; that is, that there is a correlation between dollars spent and houses weatherized. It will obviously mean a diminution in the amount of houses we can achieve in a fiscal year.

Senator DORGAN. I've been out to watch what they do in the weatherization program to substantially improve some of these older homes in order to reduce the amount of heat loss. Is that program effective? Also, is it a part of our energy efficiency efforts? Be-

cause we're saving energy by insulating homes and so on, so tell me how you view that program.

Mr. KARSNER. I view any efficiency improvements as effective but with a limited pool of dollars and an enormous task, as I said, for the larger aggregate goals of lowering greenhouse gas emissions and enhancing national security, it has the unfortunate disposition of competing against other efficiency investments in our applied research and development portfolio that have enormous returns that are multiplicative across the population. Although this is a very important segment of the population and it is a worthy program to focus on, in the context of competing in our portfolio to achieve those same efficiency objectives, the returns are very, very low.

Senator DORGAN. Are these mostly lower income people that are competing?

Mr. KARSNER. For the weatherization dollars?

Senator DORGAN. Right.

Mr. KARSNER. It is all low income people.

Senator DORGAN. So the competition, we've put them in here as the lower income people that own old homes that are leaking heat and terribly inefficient, trying to struggle through the winter to pay a heat bill. They're put in competition with all the other accounts and so they get hit with a \$100 million reduction in funding. Is that something you support?

Mr. KARSNER. Well, I don't support the phrasing of it in that particular way but I do support the cut in the sense that I have to look at it as a portfolio. I have no other choice but to look at the precious taxpayer dollars that way. In fact in reality, this cut is really restoring what the Clinton administration budgetary year appropriations were in terms of apportionment of the portfolio. The President, in his first term push for poverty alleviation, substantially injected new funding into the weatherization program, I think at a time before most of the other technologies were reasonably commercial where they are today and at a time before we felt this kind of pressure from \$3 gas and other pressing priorities.

So we are sort of putting it back into balance to where it had historically been, which still makes it one of the largest programs in the Nation's applied research and development portfolio for new energy developments. And these are difficult choices but we feel like turning the housing stock itself quicker in the aggregate through working on the building envelope, insulation, better windows across the board is at least as important ultimately.

Senator DORGAN. Mr. Karsner, we added \$25 million in the Supplemental here in the Senate for weatherization. Do you support that?

Mr. KARSNER. No, I do not.

Senator DORGAN. Do you oppose it?

Mr. KARSNER. I do oppose that.

Senator DORGAN. Why?

Mr. KARSNER. The first reason is a little bit personal. We submitted a \$160 million budget for fiscal year 2007 and though we had the authority of the spend plan through Congress' generous markup of our budget, of my own volition and push, I sought to meet the Senate written mark of \$204 million and added \$40 million to the weatherization program in the spend plan. Much of that

money this late in the year will roll over into next year so it is well funded to begin with and it is at the level that the Senate itself had written into the budget, albeit I understand it was the last Senate. Every new dollar that we add for that is taking a dollar away from the other efficiency programming markups that we have and the returns on those are 20 to 1, according to the National Academy of Sciences, and I think the returns are too big to forfeit.

Senator DORGAN. Let me—well, first of all, thank you. You know, while we might agree and disagree about certain priorities and the importance of certain accounts, I agree with Senator Domenici's statement earlier. I think all four of you are significant public servants whose background and capabilities give you the opportunity to do a good job for this country and coming to serve in an administration that is not so long for this town, what 20 or 21 months left? I mean, you've not signed on for a 6- or 8-year term in most cases.

You've come from various disciplines to assume leadership in these accounts and I appreciate that. I think all four of you have a lot to offer this country, even when we might disagree about priorities. It's my intent that I and the other members of this subcommittee work with you as we want to learn from you and want to help you meet the challenges ahead. While we might disagree on the exact amounts that should be invested in certain activities, at the end of the day, I think, we all share a common interest in success in your four areas. All four of these areas are very, very important as functions in the Department of Energy and your coming here today to respond to our questions and to give us a glimpse of what you're doing is very important.

I understand Senator Domenici has made a career of this during the Clinton administration, having agency witnesses come up and defend the President's budget. That's what they're paid to do. It's what they are required to do and if they didn't do that, they'd probably go back and find out that their desk was cleaned out. So it is a little frustrating for us sometimes but having recognized that, we appreciate working with you and we appreciate you being here today.

Senator Domenici, do you have anything to add at the conclusion?

Senator DOMENICI. One last one. First, Mr. Chairman, I want to thank you for your last remarks. I have great admiration for a Senator who speaks as you have just spoken and I don't know you that well even though we've been here a long time but the more I learn, the more I like what I hear and I thank you for that.

I want to say and ask which one of you would be—would represent global warming, the problems with global warming, proposed solutions. Which one would have—

Mr. KARSNER. I think that's the Department, sir.

Senator DOMENICI. The Department. So we'll talk to the Department on that, okay? I think that's okay. I'll talk to the Department because I want to just make a statement.

You know, we're soon going to be called upon to perhaps vote on a program, an American program to help contain CO<sub>2</sub>, one way or another. There are various ways to do that, one of which is the simplest one was to put a tax on carbon.

I think that has lost favor quite a bit. In between there, there are various ways. I'd just like to make a point that I have spent a substantial amount of time and continue to spend more on analyzing the amount of CO<sub>2</sub> that China and India are producing and emitting and the lack of positive action on the part of either of those countries to diminish the carbon dioxide and to the contrary, a dramatic increase in power plants that are fed by dirty coal. That's your area, Secretary Shobe. You know about that. You're not in charge of the big picture but you know about that. They are unfortunate—they have a lot of coal but it's dirty coal. At least the Lord could have made it clean and it wouldn't have had an ambient problem. They don't even clean up the first stage in the countries I just spoke of. They burn it without anything on there to clean up the pollutants as it is burned.

But I'm going to close with this remark. As of now, we understand that they produce in China—not India, China, about one reactor that is somewhere between 500 and 750 kilowatts—megawatts, excuse me, a week, about one a week. Now, you can't hardly imagine that being an American even though we claim we are the biggest gobblers of energy and we do nothing like that, such that if we were asked to spend great amounts of money to constrain carbon dioxide, the question will be asked of those who are for it, what is China and India going to do?

And if the answer is nothing, then it would appear to me that the American people would have a very big, big issue to raise with the Congress that would do something because all we would do would be to tie our own hands and legs, do nothing significant to help the problem of CO<sub>2</sub> in the outer atmosphere because, as a matter of fact, it is global in nature not American. And I'm not going to support unilateral containment without some hope—no, without some real evidence that China and India will join us in research and development and expenditure of substantial money to contain CO<sub>2</sub> in their countries.

I think that's important that those of us who are involved get our heads together and see what all this means. It may mean that China might have to think a little sooner rather than later about what they'll do because I don't know that we'll sit by and buy their products forever either at the prices that are reduced because they spend nothing to clean it up while we spend much. That's a true impediment to us selling any products worldwide or vice versa. I thank you, Mr. Chairman. I yield.

Senator DORGAN. Senator Domenici, thank you. If in fact it is a global economy and we all live in the same fishbowl then global pollution affects all of us as well and the Senator has expressed himself with respect to a vote on the Kyoto Treaty, believing that you cannot begin to deal with these issues, leaving China and India out of the equation. Especially because it's a global economy, those industries, those manufacturing plants and others that want to belch pollutants into the air have no regulatory costs of doing so and can simply move their plant overseas, fire their American workers and accelerate the job loss in this country.

Having said all that, I think the testimony today, for example, with respect to the search for new technologies, the search for carbon sequestration, the search of this country to unlock the mys-

teries from these new technologies is very important because I assume that we will want very quickly to share those technologies with everyone around the world. I would say to you, Senator Domenici, I was persona non grata in my State for some long while with the coal industry when I served in the State capitol. I was one of those that led the fight to demand that, with respect to strip mining of coal, there would be segregation of topsoil, that companies ensure the contouring of the land for reclamation and that every new plant producing electricity had to have the latest available technology, wet scrubbers for instance.

You can well imagine the way the industry responded. I was an enemy of the industry. Well, guess what? Twenty years later, twenty-five years later, they are all glad they did it and all of us in North Dakota are glad they did it.

We produce a lot of coal. We're the first State in the country to meet the ambient air standards, even though we had substantial plants, because we spent the money to put those wet scrubbers on. We now see contoured land that looks great. It was land from which coal seams were extracted and topsoil was segregated and the contour was redone. You drive past there these days and see the vegetation, you can't tell there was coal mined from it.

It is always harder at ground zero to begin to push these issues. You're absolutely right. If we decide to proceed and China and India do nothing, we will have accomplished very little and yet, in many ways, just as with stopping the spread of nuclear weapons, it falls on our country's shoulders. We must at least, at a minimum, begin a series of no regret steps as we begin to address all of these issues.

#### ADDITIONAL COMMITTEE QUESTIONS

So, Senator Domenici, you and I will have a lot of work to do and I'll enjoy doing it with you because you have a great deal of experience and have offered a lot to this subcommittee over many, many years.

[The following questions were not asked at the hearing, but were submitted to the Department for response subsequent to the hearing:]

#### QUESTIONS SUBMITTED TO HON. DENNIS R. SPURGEON

#### QUESTIONS SUBMITTED BY SENATOR BYRON L. DORGAN

##### GLOBAL NUCLEAR ENERGY PARTNERSHIP

*Question.* I have heard Secretary Bodman talk about the Global Nuclear Energy Partnership (GNEP) as being an initiative that will take a couple of decades. Yet, your testimony refers to a Secretarial decision in June 2008. Further, your testimony refers to the development of commercial-scale reprocessing facilities in conjunction with industry. I understand many in industry feel more research and development is necessary on GNEP before moving forward on facilities.

So, I am confused by the disconnect between Secretary Bodman's own observation of GNEP being a couple decade long process and this rush to a Secretarial decision in June 2008 and development of commercial scale reprocessing facilities.

First, can you please explain to me what the Secretarial decision in June 2008 will be about? And second, can you explain why we would be turning so soon to development of commercial scale facilities?

*Answer.* The Secretarial decision in 2008 is intended to determine the GNEP path forward. The Department intends for this decision to include a decision on whether or not and how to proceed with a nuclear fuel recycling center and an advanced re-

cycling reactor. This will require compiling information regarding the requisite technologies, economics, and environmental impacts. The specific elements supporting the decision are a credible technology pathway and progress on its implementation; a business plan; definition of a government-private partnership that could be formed; completion of NEPA requirements; and a nonproliferation assessment.

In addition, a path forward on the Advanced Fuel Cycle Facility is anticipated to be part of the Secretarial decision.

The Department's work with industry at this stage will focus our research and development in support of future commercial-scale facilities. Engaging industry at this time could save the United States nearly a decade in time and a substantial amount of money, while still engaging and reinvigorating the nuclear community with new facilities and continued long-term R&D. Development of a credible U.S. program for construction of commercial fuel cycle facilities is a critical element of a strategy to convince other States considering nuclear energy programs that they can rely on the United States for their fuel cycle needs. Making the United States an influential participant in fuel cycle technology is vital to fulfilling the GNEP vision.

*Question.* Under GNEP, I understand it will take one new fast reactor to burn the reprocessed fuel from approximately every three to four light water reactors. If this is correct and today there are 103 existing light water reactors, we will need 25 to 34 new fast reactors to burn just the reprocessed fuel from existing light water reactors. I understand the nuclear power industry is not interested in building fast reactors. For GNEP to work properly, will the Federal Government have to build 30+ fast reactors or will industry be mandated to build them?

*Answer.* Deployment of advanced fast reactors is currently envisioned as a commercial activity, with revenues being generated from the production of electricity while the transuranic material is simultaneously consumed. One goal for GNEP is to establish a business case that supports the commercial deployment of advanced recycling reactors, which are fast reactors. The number of advanced recycling reactors required to use the fuel recovered from LWR spent nuclear fuel depends on a number of factors. For example, a key factor is the rate at which an advanced recycling reactor would destroy the transuranic elements, recovered from the spent nuclear fuel, while generating electricity. Other factors include the initial core loading of an advanced recycling reactor and the ability to recycle the spent fuel from the advanced recycling reactors.

*Question.* A primary goal of GNEP is to develop a reprocessing technology that is "proliferation resistant." Some claim DOE's proposed separations technologies all provide less than 1 percent of the International Atomic Energy Agency's "self-protection" standard for plutonium. Given these considerations, how can DOE's GNEP proposal meet the nonproliferation goal?

*Answer.* One goal of GNEP is to develop a reprocessing technology that is "more" proliferation resistant than those currently used throughout the world which separate pure plutonium. The separations technologies being considered by the Department would not separate pure plutonium and would, therefore, be more proliferation resistant than those currently in use. The Department's fiscal year 2008 budget request supports over \$88 million for further research and development on advanced reprocessing technologies.

*Question.* Another goal of GNEP is to confine reprocessing and uranium enrichment to "countries that already have substantial, well-established fuel cycles." Does DOE's fiscal year 2008 budget request include funds for cooperation with the Korea Atomic Energy Research Institute (KAERI) for pyroprocessing research and development?

*Answer.* Bilateral collaboration with South Korea on nuclear energy R&D occurs under the International Nuclear Energy Research Initiative (I-NERI). All I-NERI joint projects employ cost sharing on an approximately equal basis by the participating countries. Each country is responsible for funding its side of joint projects. In the case of the United States, current-year approved program budgets provide the funding for our contributions to the joint projects. As part of I-NERI collaborations, Korea, as represented by KAERI, is actively engaged in relevant work in fiscal year 2007 and supported in the fiscal year 2008 budget request.

It is important to note, however, that KAERI does not process spent fuel or special nuclear material as part of this cooperation. All pyroprocessing-related research and development activities involving use of spent fuel or special nuclear material under these I-NERI projects or work-for-others programs is done at DOE National Laboratories. Annual meetings between the U.S. Government, National Laboratory and KAERI officials have been instituted since 2006 to monitor cooperative activities in the area of pyroprocessing and advanced fuel cycle technologies.

*Question.* Does DOE intend to offer the Republic of Korea, a country that the United States to date has not permitted to reprocess due to proliferation concerns, a role in GNEP as a “supplier” country?

*Answer.* The Republic of Korea has the sixth largest nuclear power program in the world. The Government of the Republic of Korea has made the decision not to possess reprocessing or enrichment facilities and is limiting the scope of its research and development on pyroprocessing technologies. Nevertheless, the Republic of Korea is actively engaged in the development of advanced reactor and fuel cycle technology, nuclear safety, radioactive waste management, and other related work programs on the national, bilateral and multilateral levels. We gain a great deal by working with these experts. The Republic of Korea is engaged in research and development that supports GNEP involving small-reactors, advanced burner reactors, computer modeling, safeguards and basic science, but not separations of spent fuel.

At this point, DOE has not specifically invited countries to participate in GNEP as “supplier countries.” It is generally anticipated that the expansion of civilian nuclear power could be provided by countries already possessing the infrastructure to manufacture nuclear power plants as well as provide fuel supply services.

*Question.* Which countries has DOE invited to participate in GNEP as “supplier” countries?

*Answer.* At this point, DOE has not specifically invited countries to participate in GNEP as “supplier countries.” It is generally anticipated that the expansion of civilian nuclear power could be provided by countries already possessing the infrastructure to manufacture nuclear power plants as well as provide fuel supply services.

*Question.* Which countries has DOE invited to be “users”?

*Answer.* DOE believes it is advantageous to seek partnerships for the expansion of civilian nuclear power worldwide by providing support on infrastructure development for countries newly considering nuclear power (e.g., legal, regulatory, safety, knowledge base, experience, etc.). DOE does not plan to invite countries as “users” or “suppliers,” but rather seeks partners. The GNEP partnership is open to all countries agreeing to the statement of principles. The benefit of partnership is having access to products and services on the front and back end of the fuel cycle while relieving countries of the liability, infrastructure and expense associated with such facilities. Ultimately, there will be technology partners, materials partners (e.g., uranium) and infrastructure partners. In December 2006, the United States co-hosted, along with several other IAEA Member States (Canada, China, France, India, Japan, Russia, and South Korea), a workshop in Vienna, Austria, on “Issues for the Introduction of Nuclear Power.” Twenty-six countries currently without nuclear power—yet considering it as a potential addition to the energy portfolio—attended this workshop.

#### NUCLEAR ENERGY’S ROLE

*Question.* The Energy Information Administration’s Annual Energy Outlook 2007 reference case indicates that nuclear power provided 19 percent of the Nation’s electricity in 2005 and is expected to provide 15 percent of the Nation’s electricity in 2030.

How do you reconcile the fact that, even as the U.S. Government is providing greater Federal assistance to the nuclear power industry through various research programs and deployment incentives than ever before, that portion of electricity generated from nuclear power facilities is expected to decrease as a percentage of our overall electricity production in the next 25 years?

*Answer.* As you know, there has been no new construction of nuclear plants in the United States in 30 years. However, nuclear power still supplies a significant percentage of our electrical needs, because plant efficiencies have increased electricity production equivalent of 27 1000 megawatt plants without new construction. As such, there is little additional efficiency to be gained with the existing fleet of reactors.

According to the Energy Information Administration’s (EIA) Annual Energy Outlook 2007, America’s demand for electric power is projected to increase at an average annual rate of 1.5 percent between now and 2030. In the Annual Energy Outlook 2007, EIA assumes that the equivalent of 12 new nuclear plants (1,000 megawatts each) would be built by 2030. The capacity lost from the few currently operating plants that will be retired by 2030 is assumed to be offset by power uprates at existing plants and the restart of TVA’s Browns Ferry Unit One. Therefore EIA estimates total nuclear capacity to increase from 100 GW today to 112 GW in 2030. Based on EIA’s assumptions, all the nuclear plants operating in 2030 would produce only about 15 percent of the generation mix in the United States.

The Department is aggressively pursuing actions through our Nuclear Power 2010 program to ensure the growth of electricity produced by nuclear power. To date, 15 power companies have notified the Nuclear Regulatory Commission of their intentions to submit 19 applications for combined Construction and Operating Licenses for 33 new reactor plants. Therefore, we expect that much more than the 12 gigawatts of new nuclear capacity projected by EIA will be realized before 2030. New nuclear plants would only need to be brought on line at a rate of three or four per year, a rate lower than that already proven achievable in some years in the 1970s, in order for nuclear power to provide 20 percent of the mix in 2030.

QUESTIONS SUBMITTED TO HON. DENNIS R. SPURGEON

QUESTIONS SUBMITTED BY SENATOR PETE V. DOMENICI

GNEP ADVANCED FUEL CYCLE FACILITY—LUXURY OR NECESSITY?

*Question.* Mr. Spurgeon, the Department has requested funding for the Advanced Fuel Cycle Facility. This new research facility is intended to perform all of the critical advanced reactor fuel development. However, it seems to me that this brand new facility actually duplicates the numerous older facilities located across the DOE complex that are still in use today.

This funding would go a long way in upgrading several existing facilities and would have the added benefit of supporting a diverse scientific mission such as medical isotopes, environmental characterization, and support for the space mission.

This new facility seems to be more of a luxury, rather than a necessity.

Can you please explain your rationale for deciding to build a single brand new facility rather than make the necessary investments in our existing laboratory infrastructure?

*Answer.* The Advanced Fuel Cycle Facility (AFCF) project is in the early stages of the conceptual design; no decision has been made to construct the facility and DOE is evaluating reasonable alternatives. The Department is aware that facilities exist that, with refurbishment or upgrades, could perform some, but not all, of the functions currently planned for the AFCF. A full examination of the trade-offs between constructing a new facility and upgrading existing ones is required in accordance with the Department orders for a major system acquisition.

The AFCF would allow the Department to perform R&D, technology development, and demonstrate the integrated operations and processes involved in the recycling of spent nuclear fuel. These operations would include receiving the spent nuclear fuel, separating its various constituents, fabricating new fuel, containing transuranic elements, for an advanced recycling reactor, manufacturing lead test assemblies that are necessary for fuel qualification, and waste handling. This facility would have a continuous throughput rate from start to finish, from reprocessing both spent thermal and fast reactor fuel to fabricating new fuel types yet to be fully developed. Currently, no single facility with that capability exists.

NP 2010 PROGRAM

*Question.* Mr. Spurgeon, your budget provides \$113 million for the Nuclear Power 2010 program. This is significantly below the \$183 million needed to fulfill the 50/50 cost share agreement to prepare the detailed engineering designs needed to resolve the technical, engineering and regulatory challenges needed to license a new reactor.

What is the Department's justification for failing to meet its cost share commitment and how will this impact the cost and schedule of this project?

*Answer.* The Department of Energy (DOE) is meeting its cost-share funding commitment for these important nuclear energy projects. DOE remains committed to spend \$586.5 million as Federal cost share as agreed to with industry. DOE's cost-share primarily supports the demonstration of the "untested" regulatory process for the combined Construction and Operating Licenses for two new nuclear plants. It also supports the completion of the first-of-a-kind engineering for two reactor designs. The designs will be completed in sufficient detail to give power companies the cost and schedule information they need to make plant orders. If the fiscal year 2008 budget request of \$114 million is appropriated by Congress, DOE will have provided industry with over \$300 million of the \$586.5 million total of Federal cost share by the end of fiscal year 2008.

In November 2006, the industry proposed DOE increase its cost-share for these two projects by \$161 million to a new total DOE cost-share of \$727 million. With this increase, industry proposes activities worth \$183 million in fiscal year 2008.

DOE declined this industry request because its cost and scope went beyond DOE's original commitments.

*Question.* Based on the budget shortfall, are you able to predict which design, engineering, or regulatory activities will not be funded. Do you believe this will impact one reactor design over the other?

*Answer.* DOE does not believe one particular reactor design would have an advantage over the other based on DOE's fiscal year 2008 budget request.

The fiscal year 2008 budget request of \$114 million for the Nuclear Power 2010 program is sufficient for funding necessary activities in fiscal year 2008. The request is consistent with the agreed-to cost-share funding commitment.

#### NP 2010 PROGRAM REFORMS

*Question.* Last year, I raised a number of tough questions about the cost controls of the NP 2010 program and whether or not the NuStart team would be able to deliver on the budget commitments they had agreed to. This criticism seemed to force the reactor vendors to sharpen their pencils and improve the work product.

Do you believe the DOE's private partners have made the necessary improvements to get this program back on track?

*Answer.* Given that these are uncharted waters for industry and DOE, substantial improvements have occurred on the NuStart and Dominion projects and the Department recognizes some risks remain. These known risk areas and the contingency plans to address them are under constant NuStart and Dominion management review.

One of the more substantial improvements has been the integration of the reactor vendor engineering and power company combined Construction and Operating License (COL) application development efforts. These integration efforts are evident through formal review teams such as the Economic Simplified Boiling Water Reactor and the AP 1000 Engineering Review Teams and the Design Control Document/Construction and Operating License Integration Team. DOE believes these industry efforts significantly improve the likelihood two COL applications will be submitted to the Nuclear Regulatory Commission in the first quarter of fiscal year 2008.

*Question.* Are you confident that this program will be able to deliver two reactor designs that the NRC will be able to license?

*Answer.* The Department of Energy (DOE) is highly confident the licensing demonstration projects with Dominion and NuStart will yield approved Nuclear Regulatory Commission (NRC) design certifications and combined Construction and Operating Licenses (COL) for the two advanced light water reactor designs: the Westinghouse Advanced Passive (AP) 1000 and the GE Economic Simplified Boiling Water Reactor (ESBWR). The NRC already certified the reactor design for the AP 1000 in December 2005. NRC has projected the ESBWR design certification could occur in fiscal year 2010. DOE expects COL applications to be submitted to NRC in the first quarter of fiscal year 2008 and NRC issuance of approved licenses in fiscal year 2010.

#### FOREIGN INTEREST IN NUCLEAR ENERGY

*Question.* Mr. Spurgeon, it seems everyday that I pick up a newspaper, another country or company is announcing that they are going forward with a new nuclear plant, or expanding their existing fleet to meet their growing energy needs. Countries such as India, China, Pakistan, Russia, Romania, Finland, Argentina and the United States all have plants under construction. Worldwide there are another 200 new plants on the drawing boards.

The countries that have expressed an interest in a nuclear plant also need to make plans for uranium fuel supplies and a solution for their nuclear waste. Not all of these questions have been answered and this has forced the IAEA to think about how the world can safely expand civilian nuclear power without increasing the proliferation threat.

It occurs to me that the rest of the world is moving ahead with civilian nuclear power regardless of what the United States does.

What do you think about the worldwide nuclear effort and how will GNEP play a role in this?

*Answer.* Worldwide, nations are becoming more concerned with meeting energy demands, providing energy security and engaging in energy practices that are acceptable for sustaining the environment. DOE sees nuclear power as a safe, clean, and efficient means to meet these needs. The expansion of nuclear power can satisfy these needs and must be expanded in a safe and proliferation resistant manner. For that reason, DOE, through the Global Nuclear Energy Partnership (GNEP), plans to assist countries newly interested in nuclear power to work toward developing

sound infrastructure. In December, 2006, the U.S. co-hosted a workshop in Vienna, Austria, on "Issues for the Introduction of Nuclear Power." Twenty-six countries currently without nuclear power—yet considering it as a potential addition to the energy portfolio—attended this workshop.

While a key goal of GNEP is expansion of nuclear energy, GNEP has other roles. Another key objective of GNEP is to reduce the proliferation risks that might otherwise be associated with the global expansion of nuclear energy. GNEP supports the goals and objectives outlined in the Energy Policy Act of 2005 which calls for diversifying the U.S. energy supply with sources such as nuclear power which is an important emissions-free component of the U.S. energy portfolio. GNEP provides a vision for future energy needs worldwide in a way that reduces waste burdens and proliferation risks. GNEP aims to reinforce nonproliferation policies by offering reliable nuclear fuel services to discourage the spread of enrichment and reprocessing technologies. GNEP also aims to draw down and eventually to eliminate excess stocks of separated civil plutonium that have accumulated. In addition, GNEP facilities aim to reduce proliferation and security risks by using materials that are less easily used in nuclear weapons than separated plutonium.

#### GNEP

*Question.* Mr. Spurgeon, the budget request for the GNEP program is extremely complicated. The budget seems to fund three separate activities including fundamental R&D, technology design and then a third category known as "technology development." This third category, which consumes one-third of the GNEP budget, seems to duplicate the other activities.

Can you please clarify this and provide me with a detailed written accounting of the spending plan for the GNEP Technology Development Account.

*Answer.* The GNEP Technology Development activity includes activities within the Advanced Fuel Cycle Initiative that provide support to each of the three Global Nuclear Energy Partnership (GNEP) projects: the nuclear fuel recycling center, advanced recycling reactor, and an advanced fuel cycle research facility. Whereas the work associated with GNEP R&D activities such as Separations and Advanced Fuels Development involves basic research and bench-scale or laboratory-scale experiments of a variety of potential technologies, the Technology Development activity funding will be used to further develop technology that has been shown to be feasible at the laboratory or engineering scale, as well as to optimize design parameters and size equipment. This account also supports the small reactor and international collaboration efforts.

As the Department continues its research and development, industry engagement, and other activities, the specific allocations for fiscal year 2008 for GNEP Technology Development activity could change. However, for fiscal year 2008, the Department currently anticipates allocating approximately \$50 million for the nuclear fuel recycling center, \$34 million for an advanced recycling reactor, \$38 million for an advanced fuel cycle research facility, \$6 million for international collaborations and agreements, and \$5 million for grid-appropriate reactors in developing countries.

#### GNEP—COORDINATING RESEARCH WITH OTHER NE PROGRAMS

*Question.* The committee would like to understand the Department's view on the plans to tie together the various elements that make up its nuclear programs such as NGNP and GNEP. First, there is the potential to cooperate on fuel technologies that would benefit the high temperature gas reactor being considered for NGNP as well as Advanced Reactors being developed under the GEN IV program.

Will the Department conduct the appropriate analysis high temperature gas cooled reactor's capability to burn nuclear waste and the potential for synergy with the NGNP and GNEP?

*Answer.* One of the key objectives of the Global Nuclear Energy Partnership (GNEP) is to make nuclear power an attractive alternative to fossil fuels for developing countries around the world. Because the power demand requirements are limited for these countries, they will likely need smaller reactors. A Very High Temperature Reactor (VHTR), such as that being developed in the Next Generation Nuclear Plant (NGNP) program, is a small modular reactor design that could potentially be well suited in meeting the objectives of GNEP for global deployment of nuclear power to developing countries. While the Department (DOE) has conducted studies regarding the use of VHTRs for actinide destruction, DOE chose to utilize fast reactors initially for this component (actinide destruction) of the GNEP mission, while DOE continues research and development on VHTR and other technologies. The decision to use fast reactors is detailed in DOE's December 2006 report, The

U.S. Generation IV Fast Reactor Strategy. The Sodium-Cooled Fast Reactor (SFR) was chosen as the most promising fast reactor concept for meeting DOE's strategic goals. The United States has extensive experience with SFRs, and an SFR deployed as the Advanced Burner Reactor under GNEP could be operational in the 2020–2025 timeframe.

DOE is performing research and development on the NGNP consistent with the timeline established in the Energy Policy Act of 2005. Additional research and development on the use of high-temperature gas-cooled reactor for actinide burning could be performed after the underlying concepts supporting VHTR operation with uranium have been thoroughly validated.

#### COOPERATIVE NUCLEAR FUEL RESEARCH WITH RUSSIA

*Question.* I understand that NNSA, in conjunction with Rosatom, is developing the technology such as fuel and advanced power conversion systems for high temperature gas cooled reactors in a cost-shared program whose purpose it is to ultimately burn surplus Russian weapons plutonium.

How much has been committed to this program and under what program? What is the nature of the research and how will this benefit the GNEP effort? Is this research being coordinated with NE?

*Answer.* Between fiscal year 1999 and fiscal year 2006, the Department provided \$17.1 million to Russian Institutes to develop the Gas Turbine-Modular Helium Reactor (GT-MHR) for plutonium disposition in Russia. During that timeframe, Rosatom provided an equivalent \$17.1 million of matching Russian funds as well. This program is managed through the National Nuclear Security Administration (NNSA) and has been in place for over 8 years. The current scope of this cooperation is to conduct research and development in high risk technology areas such as the development of plutonium particle fuel and power conversion unit technologies. The advanced recycling reactor component of the GNEP program may benefit from this effort as it continues to develop advanced fuel forms and power conversion technologies. The Office of Nuclear Energy receives and considers reports summarizing the Russian GT-MHR research program.

*Question.* Based on the Russian's level of indecision on MOX; why does the Department believe this would be a prudent use of resources at this time. Is this being cost shared?

*Answer.* The Russian view of weapon grade plutonium is that it is a valuable national resource and that disposition in Russian Light Water Reactors (LWRs), such as the VVER, is not the most efficient use of this resource. Originally, both the United States and Russia had agreed to MOX disposition in LWRs. However, over time, the Russians expressed misgivings with LWR disposition, although they have never specifically excluded use of LWRs for disposition. The Russians have since proposed consideration of two additional approaches, which they consider to be a more efficient use of their plutonium. These two additional approaches are disposition in the BN-800 fast reactor, which is under construction (the plutonium disposition program has always considered the disposition of a limited quantity of plutonium in the BN-600 fast reactor); and development of a High Temperature Gas Cooled Reactor for possible use for plutonium disposition, should this reactor become available in time.

The current Russian proposal includes cost sharing in every scenario under discussion, including LWRs, although specific details have yet to be negotiated.

#### NUCLEAR FUEL CYCLE

*Question.* Mr. Spurgeon, much of the focus of the Department since the passage of the Energy Policy Act 2005 toward nuclear power has been on the development of new nuclear reactors. As you know, there are other valued components of the domestic nuclear fuel cycle. Currently, our country has only one functioning aging enrichment facility and another soon to come on-line in the next few years. These facilities will provide the fuel of the nuclear renaissance in America and build upon the President's energy security programs.

Can you tell me what the Office of Nuclear Energy is doing to encourage development in the front end of the U.S. nuclear fuel cycle, in the enrichment areas of the fuel cycle?

*Answer.* With 104 nuclear power plants currently licensed in the United States and the announcements by power companies for license applications for over 30 new plants, the Department of Energy (DOE) believes that U.S. energy security would be significantly enhanced by private sector investment in new domestic uranium enrichment capacity. Currently, the aging and energy-intensive gaseous diffusion plant at Paducah, Kentucky is the Nation's only operating enrichment plant. Three pri-

vate companies, General Electric (GE), Louisiana Energy Services (LES), and USEC Inc. (USEC) are at various stages of deploying new U.S. enrichment plants featuring advanced technology. LES is the furthest along with construction having started on its National Enrichment Facility in New Mexico that will utilize gas centrifuge technology commercially deployed by Urenco in Europe. USEC and GE are working to demonstrate commercial viability of the American Centrifuge and SILEX projects, respectively.

With respect to the Department working with private enrichers, DOE and USEC signed an agreement in June 2002, whereby USEC Inc. made a commitment to deploy an enhanced version of DOE's previously developed gas centrifuge technology at the Portsmouth Gaseous Diffusion Plant site. USEC, in order to demonstrate its American Centrifuge, is funding a Cooperative Research and Development Agreement with the DOE's Oak Ridge National Laboratory. In December 2006, DOE and USEC signed a long-term lease agreement for USEC to build its commercial plant at DOE facilities at Portsmouth, Ohio. At the same time, DOE granted USEC a patent license for DOE's gas centrifuge technology that requires USEC to pay royalties to the U.S. Government on annual sales of enriched uranium from centrifuge plant production. While LES and GE are pursuing other technical approaches, DOE encourages all three companies in their efforts to deploy reliable and competitive advanced enrichment technology.

*Question.* Does the Department need any new authorities in this regard?

*Answer.* Both LES and USEC are seeking to use DOE's uranium inventories to facilitate the startup of their new enrichment facilities. At this time, DOE does not need additional authorization to sell or transfer uranium to a private company.

#### QUESTIONS SUBMITTED TO HON. ALEXANDER KARSNER

#### QUESTIONS SUBMITTED BY SENATOR BYRON L. DORGAN

##### BALANCING RENEWABLE AND EFFICIENCY FUNDING

*Question.* DOE has strongly backed many of the programs in your office and the President highlighted initiatives to be pursued by the Office of Energy Efficiency and Renewable Energy in his State of the Union address. This includes work on hydrogen technology, biomass and biorefinery R&D, solar energy, and vehicle technologies. These are all important.

However, it seems that there is much greater emphasis on targeted renewable energy programs than other programs within your office such as energy efficiency programs, the Weatherization Assistance Program, and the State Energy Programs. In your opinion, do you have the right balance between the renewable side of your office and the energy efficiency side of your office? Why are these energy efficiency programs not seeing the same funding increases as the renewable energy programs are?

*Answer.* Yes, the Office of Energy Efficiency and Renewable Energy maintains a balanced portfolio that supports achievement of programs' goals and ensures optimal use of resources.

The fiscal year 2008 budget request includes increases for many of our energy efficiency programs. The Building Technologies Program budget request is \$9.1 million greater than the fiscal year 2007 request, the Vehicle Technologies Program budget request is \$10.1 million greater than the fiscal year 2007 request and the Industrial Technologies Program is \$435,000 greater than the fiscal year 2007 request.

Many of the Department's efficiency programs have very high returns at low cost, such as FEMP, appliance standards, energy efficiency building codes, "Save Energy Now", and Energy Star® rating system, to name a few.

##### BALANCING RESEARCH WITH DEPLOYMENT FUNDING

*Question.* I recognize that money at DOE is being devoted to R&D but, voluntary deployment and market transformation programs also are needed to move new technologies into the marketplace, and standards and codes are needed to set a minimum threshold for using cost-effective technologies. By some accounts, just over 50 percent of your \$1.24 billion in your fiscal year 2008 budget request is for research and development activities. Is this an appropriate amount? What portion of funding is being applied to renewable energy R&D and what portion to energy efficiency R&D? What is the Department doing, beyond the basic R&D, to transition new technologies into the marketplace on the efficiency side?

*Answer.* The Office of Energy Efficiency and Renewable Energy (EERE) maintains a balanced portfolio of programs to advance renewable power generation, diversify

transportation fuels, and promote energy efficiency. In our fiscal year 2008 request, almost 52 percent is R&D with the balance invested in regulation, commercialization and grant programs. This balance is appropriate because many of the Department's efficiency programs are lower cost programs, such as FEMP, appliance standards, energy efficiency building codes, "Save Energy Now", and Energy Star® rating system, to name a few.

The Office of Energy Efficiency and Renewable Energy (EERE) programs related to energy efficiency comprise approximately 46 percent of the total EERE proposed fiscal year 2008 budget (including program direction and support funds).

The Department's approach to promoting new technologies couples technology push with market demand pull, and works to address barriers to the market adoption of advanced technologies through various program initiatives. For example, the Department plans to lead by example with the Executive Order 13423 and become an early adopter of energy efficient and renewable energy technologies. By identifying markets where the life-cycle costs of advanced energy technologies currently form a compelling economic argument, the Federal Government will create demand pull which will increase the economies of scale and drive the technologies down the cost curve. The Department is also looking to stimulate the commercialization of advanced technologies by bridging the gap between R&D and the market place. To this end, the Department has designated a Director of Commercialization and Deployment, located within the Energy Efficiency and Renewable Energy Program, to oversee and guide our deployment-related efforts. However, ultimately commercialization decisions are up to industry.

#### WEATHERIZATION ASSISTANCE PROGRAM

*Question.* The Weatherization Assistance Program funding has been cut from \$242.5 million in fiscal year 2006 to \$204.5 million in the fiscal year spending plan, and the fiscal year 2008 request is for \$144 million. That is a 41 percent cut from fiscal year 2006. Why is the cut so significant? Is the Department still interested in moving the Weatherization Assistance Program to another Federal agency?

*Answer.* The 2007 operating plan optimizes resources and provides the appropriate amount of resources to support the achievement of goals and priorities. We have chosen to prioritize investments in energy efficiency and renewable energy R&D that have multiplicative returns such as improvements to appliances and the building envelope that affect the whole American population rather than additive returns not associated with technological R&D that target a single segment of the population. For example, the National Academy of Sciences studied the benefits of the energy efficiency portfolio and found that the return on the research and development (R&D) investment was roughly 20 to 1. In contrast, the Weatherization Assistance Program has a return on investment of 1.5 to 1.

The Department of Energy has no current proposal to move the Weatherization Assistance Program to another Federal agency.

#### APPLIANCE STANDARDS

*Question.* As you know, DOE has been plagued for years by long delays in issuing appliance efficiency standards. So far, you seem to be meeting the aggressive schedule you set last year for getting the required standards out, and I am pleased that you asked for additional funds. However, a recent GAO report said additional changes are needed in the program, and I am concerned that recent proposed standards have been weak and are not using the tremendous potential of this program to address our energy needs.

The GAO report said the program faces a 600 percent increase in workload with a 20 percent resource increase in the fiscal year 2007 budget. Have you analyzed the staffing and funding requirements to carry through the standards plan, and can you share that with us?

*Answer.* Yes, the Department has conducted a thorough assessment of resource needs for the efficiency standards program. On January 31, 2006, the Department submitted an aggressive plan to Congress, addressing both the history and the future plans for the Appliance Standards Program. That plan does in fact commit to a rulemaking schedule that is six times the historical rulemaking rate for this program. The actions detailed in that plan are expected to dramatically increase the efficiency of the process and the output rate. In addition in our fiscal year 2007 operating plan, we have directed resources necessary to improve the program. Early improvements in the program are evidenced by the timely issuance of final test procedures for various products and final standards for commercial products, as set out in the plan DOE provided to Congress. . Changes in our process include imple-

menting product bundling within a single rulemaking and organizing staff into seven technology teams.

Since committing to this schedule for the standards program, the Department has met 100 percent of its scheduled deadlines. We have completed eight rulemakings since EPACT 2005, including test procedure rulemakings and codification of prescribed standards, and have made significant progress on others that were underway prior to EPACT 2005. In 2006, we initiated standards rulemaking for 12 additional products and remain on schedule for all future deadlines.

*Question.* Some of the largest possible savings, for example from standards on furnace fans and refrigerators, are not included in the plan, and thus will not be considered for at least 5 years. Can you tell us how much additional resources you would need to begin work on the most important standards now?

*Answer.* You correctly note that the plan did not include provisions for new refrigerator and furnace fan efficiency standards. Current statutory requirements for refrigerator standards have been met and refrigerators of today consume approximately 70 percent less energy than they did in the early 1970s. The Energy Policy Act of 2005 gave DOE the authority to set standards for furnace fans but did not specify a statutory deadline. The plan provided to Congress is focused on implementing all statutorily required rulemakings, which are numerous. We continue to evaluate our published schedule for opportunities to accelerate and expand to additional products, such as furnace fans, while staying on schedule.

*Question.* DOE has rejected some recent suggested standards because they were not deemed consistent with current law. Do you need any additional legal authority to issue standards that make the most sense for consumers?

*Answer.* In February, Secretary Bodman sent legislation to Congress requesting authorization to streamline the standards process and bring more efficient products to market sooner. This fast-track legislative proposal would allow the Department to move directly to a Final Rule for certain products when a clear consensus for a standard exists among manufacturers, efficiency advocates, and other stakeholders. By using this process, we would be able to promulgate an energy efficiency standard directly when all relevant interests jointly have negotiated and submitted an agreed proposed standard that meets all statutory criteria. In some cases, directly issuing a final rule would shorten the time to a completed standard by nearly a third and shave months off the rulemaking process. To be clear, if the Department determines that a consensus does not exist, this proposal would not preclude rulemaking; it would simply require the Department to use the traditional three-stage process.

Other pending legislative proposals would fix various problems with the existing statute, provide DOE with needed flexibility in some areas, establish statutory efficiency standards for several products, and mandate DOE to develop standards for other products. We are hopeful that constructive legislation in this area will be enacted before the end of this year.

#### BUILDING CODES

*Question.* A small DOE program to assist States in setting and achieving compliance with their building energy codes leverages a few million dollars to improve the efficiency of every new building in much of the country. It has been rated the most cost-effective of all DOE programs assisting States. Yet the proposed fiscal year 2008 budget request would cut it.

Several studies have shown we are wasting huge amounts of energy because of poor compliance with codes. EPACT 2005 authorized a program to help States improve compliance. With so much building occurring around the country, wouldn't this be a good time to add a little funding to help make sure these buildings are up to code?

*Answer.* Yes, we are currently restarting and reinvigorating the codes program under the fiscal year 2007 Continuing Resolution which provided approximately \$2 million to the State building energy codes activities. The fiscal year 2008 request is \$3.8 million. The Department has effectively provided technical assistance and training through the Building Energy Code Program website, ([www.energycodes.gov](http://www.energycodes.gov)), technical support, web-based training, stand-up training, webcasts, and Setting the Standard newsletter. Efficient use of funds allows the Department to continue to provide assistance to improve compliance to national, regional, and State building code officials and stakeholders. For example, there are over 3 million hits a month on the Department's [www.energycodes.gov](http://www.energycodes.gov) website and some 6,000 residential code compliance tools are downloaded monthly by designers, builders and code officials. The Department trains approximately 2,000 code officials, designers, and builders to implement these codes and updates and improves

the core materials and code compliance software to reflect recent changes in the model energy codes and emerging energy efficiency technologies.

#### FEDERAL ENERGY MANAGEMENT PROGRAM

*Question.* I understand that you are big supporter of improving energy efficiency in Federal facilities. I am concerned about the ability of your office to sufficiently train, educate, and support other agencies of the Federal Government related to the Federal Energy Management Program (FEMP). In January, President Bush signed an Executive Order with new and updated energy savings targets and other requirements. Yet the proposed budget would cut the Federal Energy Management Program, which leads the Government-wide effort to save energy, by another 12 percent.

What is DOE's role in implementing the new Executive Order? What funding is provided in the budget for this purpose?

Wouldn't additional funding for FEMP save the Federal Government more money than it would cost by reducing energy waste?

*Answer.* The Department's role is to provide specific and authoritative guidance to Federal agencies on the provisions of the Executive Order and to support agency efforts to meet the goals through assistance with third party financing and design assistance. Virtually all of FEMP's fiscal year 2008 budget request of \$16.8 million will be used for the implementation of the Executive Order and associated statutory requirements in some way.

The private sector will be the most important funding source for saving energy at Federal agencies. FEMP's third party financing activities, in conjunction with the private sector, can potentially fund projects needed to meet the Executive Order goals.

#### PUBLIC EDUCATION

*Question.* Public education is the quickest way to reduce energy use and address current energy prices and supply-demand imbalance. Yet there is almost no money for public education on energy efficiency in the budget, despite a \$90 million authorization in EPACT 2005.

How much funding would be available for proactive energy-efficiency public education programs under this budget? Where is that funding in the budget?

What is your plan for using those funds, including plans for partnering or contracting with other organizations?

*Answer.* Within our fiscal year 2008 budget request, we include \$4.9 million in funding to support public information activities within our Program Support budget line and within each program's budget.

The funding supports a range of activities and programs including websites, Energy Saver fact sheets, development of publications, the EnergyStar® program, and the Energy Efficiency and Renewable Energy Information Center. In the past we have partnered with the Environmental Protection Agency (EPA), the Alliance to Save Energy, retailers and utilities to promote energy efficiency through public awareness campaigns such as "Powerful Savings," "Easy Ways to Save Energy" and the "Power Is In Your Hands." We have also collaborated with EPA and retailers to promote EnergyStar qualified products through the EnergyStar program. The 2008 budget supports our partnerships with business and non-governmental organizations to help leverage funding to promote education on energy efficient technologies and products as well as alternative sources of energy and fuel.

#### OIL SAVINGS

*Question.* In the State of the Union address, President Bush called for reducing our gasoline use by 20 percent in 10 years. This budget increases some budget areas important to that goal, such as DOE's Biomass program, but decreases others, including DOE's Vehicle Technologies program.

If we are serious about addressing our "addiction" to oil, don't you think we need to invest more in vehicle efficiency as well as in new fuels, and in improving trucks and buses as well as cars?

*Answer.* The Department's balanced portfolio of investments addressing both efficiency improvements and alternative energy sources outlined in the 2008 budget optimizes the use of resources and supports the achievement of stated goals. The 2008 Budget for the Vehicle Technologies Program is approximately \$10 million above the 2007 request. Most of the increase is to support the development of plug-in hybrid technologies, which show great promise of increasing light duty vehicle fuel economy.

*Question.* The president's goal assumes a 4 percent annual fuel economy improvement in new cars and light trucks, but the light truck fuel economy standards issued so far only increase by 2 percent a year. What will change to get a 4 percent increase in the future? Do we need more research to support this goal?

*Answer.* The President's goal to reduce gasoline consumption is ambitious and would require the use of more advanced fuel economy technologies in the new vehicle fleet. The Department believes that accelerated consumer adoption of hybrid and plug-in hybrid electric vehicles and advanced combustion engines offers the potential to significantly reduce oil consumption in the near-term. However, any requirements to improve new car and light truck fuel economy would also have to be technologically feasible, economically practicable, and ensure that vehicle safety is not compromised.

The Department of Energy's role in this effort is to accelerate advanced technology vehicles including through significant new investments in advanced batteries for hybrid and plug-in hybrid electric vehicle applications. Also, the Department is continuing research and development of advanced combustion engines to address the technical barriers to the commercialization of more efficient advanced internal combustion engines. Specific goals for combustion research are to improve, by 2012, the efficiency of internal combustion engines from 30 percent to 45 percent for light-duty applications while meeting cost, durability, and emissions constraints.

#### EPACT 2005 AND GEOTHERMAL PROGRAMS

*Question.* The Energy Policy Act of 2005 provides specific directives for DOE's renewable energy research efforts. In general, the overall approach is spelled out in section 931, which states: (a)(1) OBJECTIVES.—The Secretary shall conduct programs of renewable energy research, development, demonstration, and commercial application, including activities described in this subtitle. Such programs shall take into consideration the following objectives: (A) Increasing the conversion efficiency of all forms of renewable energy through improved technologies. (B) Decreasing the cost of renewable energy generation and delivery. (C) Promoting the diversity of the energy supply. (D) Decreasing the dependence of the United States on foreign energy supplies. (E) Improving United States energy security. (F) Decreasing the environmental impact of energy-related activities. (G) Increasing the export of renewable generation equipment from the United States.

Subsection (c) of this section of EPAct specifically provides direction for geothermal energy research. It states:

GEOTHERMAL.—The Secretary shall conduct a program of research, development, demonstration, and commercial application for geothermal energy. The program shall focus on developing improved technologies for reducing the costs of geothermal energy installations, including technologies for: (i) improving detection of geothermal resources; (ii) decreasing drilling costs; (iii) decreasing maintenance costs through improved materials; (iv) increasing the potential for other revenue sources, such as mineral production; and (v) increasing the understanding of reservoir life cycle and management.

For the fiscal year 2007 Spending Plan and the fiscal year 2008 budget request, how do the Department's decisions in each of those documents with respect to the geothermal energy research and development program comport with the statutory direction provided by Congress in section 931 of Public Law 109-58?

*Answer.* Since the 1970s, the Department of Energy has conducted a research and development program in geothermal technology valued in excess of \$1.3 billion. That investment has helped to produce the strong market for geothermal energy we see today. In fiscal year 2007 and fiscal year 2008, the Department requested zero funds for the Geothermal Program because the program has achieved key research objectives for conventional hydrothermal technology development and there are substantial incentives that support the near-term development of the technology and deployment of the geothermal resource base. Consequently, power production from high-temperature, shallow resources is now a relatively mature technology. Projects under construction, or which have both power purchase agreements and are undergoing production drilling, amount to 489 megawatts in eight Western States. The fiscal year 2007 operating plan for the Department included \$5 million to support geothermal power co-produced with oil and gas demonstration efforts, for an evaluation of enhanced geothermal systems to help industry prioritize its technology needs, and to bring to completion selected projects on exploration, drilling, and/or conversion technologies. In addition, some fiscal year 2006 unspent or uncosted funds will also be used to conclude research projects on exploration, drilling, and/or conversion technologies.

## GEOHERMAL PROGRAM AND THE NATIONAL RESEARCH COUNCIL RECOMMENDATIONS

*Question.* The administration's repeated efforts to close down and defund the geothermal research program also appears to contradict the recommendations of the last external review of the Department of Energy's renewable programs, the 2000 report of the National Research Council entitled Renewable Power Pathways. That National Research Council's examination of the geothermal program states in clear terms the importance of the program, and the recommendation that it continue to be funded: "In light of the significant advantages of geothermal energy as a resource for power generation, it may be undervalued in DOE's renewable energy portfolio."

Does the Department agree with the National Research Council that the U.S. geothermal resource base holds significant potential to contribute to national energy needs?

What actions did the Department take to implement the recommendations made by the National Research Council in 2000?

Has the Department had further communications with the National Research Council about its assessment and any follow-up by the Department?

*Answer.* Yes, the U.S. geothermal resource base is large, and can contribute to diversification of our national energy portfolio through increased private sector development. DOE's Geothermal Program has achieved its key research objectives for conventional geothermal resources. There are substantial incentives that support development of the geothermal resource base without further investment in R&D. The fiscal year 2007 operating plan for the Department included \$5 million to support geothermal power co-produced with oil and gas demonstration efforts, for an evaluation of enhanced geothermal systems to help industry prioritize its technology needs, and to bring to completion selected projects on exploration, drilling, and/or conversion technologies. In addition, some fiscal year 2006 unspent or uncosted funds will also be used to conclude research projects on exploration, drilling, and/or conversion technologies.

Since 2000, the Department has taken actions to implement all 10 recommendations made by the National Research Council. These actions include new or expanded research initiatives, technology demonstration projects, increased collaboration with other agencies, and improved international cooperation.

The Geothermal Program has not had any further communication with the National Research Council; however the Department has continued to work with the National Research Council in other areas of renewable energy.

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 QUESTIONS SUBMITTED BY SENATOR DIANNE FEINSTEIN

## GEOHERMAL TERMINATION

*Question.* The President's budget for fiscal year 2008 proposes to eliminate funding for geothermal energy research. Based on reports by the National Renewable Energy Laboratory (NREL) and the Massachusetts Institute of Technology, the Geothermal Energy Association estimates that, with a relatively small amount of research funding, geothermal energy can meet up to 20 percent of U.S. power needs by 2030. Please answer the following questions:

Given the critical need to develop low-carbon electricity generation technologies, why does the DOE propose to stop conducting research into geothermal energy?

*Answer.* The Department's geothermal program has achieved its key research objectives and there are substantial incentives that support the near-term development of the technology and deployment of the geothermal resource base. Geothermal power production from high-temperature, shallow resources is now a relatively mature energy technology. Projects under construction, or which have both Power Purchase Agreements and are undergoing production drilling, amount to 489 megawatts in eight Western States. The Western Governors Association geothermal task force recently identified over 100 sites with an estimated 13,000 megawatts of near-term power development potential.

## WIND AND SOLAR PRODUCTION COSTS

*Question.* The Massachusetts Institute of Technology (MIT) has released a report suggesting that, for less than the cost of a single clean-coal power plant, the United States could conduct the research needed to enable production of up to 100 GWe of low carbon energy from enhanced geothermal systems by 2050. How much would it cost for EERE research programs to enable production of 100 GWe of energy from wind and solar sources by 2050?

Answer. The primary factors contributing to production of 100 GWe of wind and solar energy are no longer exclusively or even substantially driven by government funded research projects. The rate at which potential capacity is converted to productive projects will depend on the amount and type of private capital investments in projects, and on the durability and scope of policy incentives. The goal of the Wind Program and Solar Program is to enable these renewable energy technologies to compete with conventional electricity throughout the Nation by helping to reduce costs. Under the President's Solar America Initiative, the goal is to improve the performance and reduce the cost of solar energy systems to make photovoltaics cost-competitive with conventional electricity sources by 2015. The President's fiscal year 2008 budget request of \$40 million for wind and \$148 million for solar contributes to these goals being met. Also, the Department's investment in technology development of next-generation systems may help enable solar companies to invest more private capital in scaling up manufacturing, as well as accelerate cost reductions to help increase demand for solar as it reaches cost-competitiveness in more markets.

If the research goals are met, DOE estimates 177 GW of wind power and 190 GW of solar power by 2050. These estimates are in accordance with the Government Performance and Results Act (GPRA) analysis that accompanies the President's budget.

#### ENHANCED GEOTHERMAL SYSTEMS

*Question.* The Massachusetts Institute of Technology (MIT) report only considers the potential to tap geothermal energy from putative "Enhanced Geothermal Systems (EGS)." What is the additional untapped capacity of more conventional geothermal technologies? How much of this capacity could be tapped by 2030 with sustained investment of \$50-\$100 million per year? By 2050?

Answer. Currently, conventional geothermal production is approximately 3,000 MWe. A recent Western Governor's Association report indicates that there is potential for up to 5,600 MWe by 2015.

The rate at which potential capacity is converted to productive projects will largely depend on the amount and type of private capital investments in projects.

*Question.* In the Energy Policy Act (EPACT), the Secretary of Energy was instructed to "promulgate regulations which describe in detail methods for calculating and verifying energy and power consumption and cost, based on the provisions of the 2005 California Non-Residential ACM manual." Please answer the following questions:

What is the DOE's progress towards this goal?

Can DOE provide a detailed comparison between proposed regulations and the California Non-Residential ACM manual, with justification for deviations? If not, how much additional funding is needed to complete this effort?

If such funding were provided, when would these new regulations be issued?

Answer. EPACT section 1331 directs the Secretary of the Treasury, in consultation with the Secretary of Energy, to promulgate methods of calculation for energy consumption and cost. On June 26, 2006, the Department of the Treasury and the Internal Revenue Service (IRS) issued Notice 2006-52, Deduction for Energy Efficient Commercial Buildings, that set interim guidance relating to the deduction for energy efficient commercial buildings under § 179D of the Internal Revenue Code. The Department of Energy provided technical guidance for the Notice. It is my understanding that Treasury elected to adopt the provisions of the California ACM manual that do not conflict with ASHRAE Standard 90.1-2001.

At this time, the IRS has only promulgated interim guidance in advance of proposed regulations. The justification for any potential deviation from the California manual and proposed Federal rules would rest with the Department of Treasury.

At this time, I am not able to provide an answer as to when the Department of Treasury might request funding for this rule nor when Treasury might promulgate a proposed rule.

*Question.* Can DOE provide similar updates for progress towards all other energy efficiency regulatory requirements of the Energy Policy Act (EPACT)?

Answer. I am pleased to report progress on a number of energy efficiency requirements of EPAct. On January 31, 2006, the Department submitted a report to Congress on its standards activities prepared in response to section 141 of EPACT 2005. The report publicly laid out our action plan and schedule for rulemakings out to the year 2011. Since committing to this schedule for the standards program, the Department has met 100 percent of its targets. We have completed eight rulemakings since EPACT 2005, including test procedure rulemakings and codification of prescribed standards, and have made significant progress on others that were underway prior to EPACT 2005. The Department has also established guidelines regarding the use

of energy metering in Federal buildings, as outlined in section 103. A standard for premium efficient electric motors was published in the Federal Register on August 18, 2006, per section 104. The section 109 requirement for a determination on whether the revised ASHRAE (American Society of Heating, Refrigeration and Air-Conditioning Engineers) code requires revisions to Federal building performance standards is on track. In addition, an acquisition plan for an energy efficiency pilot program for states has been completed and a procurement requirements document developed to fulfill section 140.

GLOBAL NUCLEAR ENERGY PARTNERSHIP

*Question.* The Department of Energy's Office of Nuclear Energy (DOE-NE) has given many different reasons for the need to invest in the nuclear fuel reprocessing aspects of the Advanced Fuel Cycle Initiative through the program known as the "Global Nuclear Energy Partnership (GNEP)." This initiative represents a significant change from long-standing U.S. nuclear policy, but no consensus has been established and program goals have not yet been fully vetted by an independent authority. The President's budget requests an increase of \$152 million over fiscal year 2007 levels for this program, and an even greater increase with respect to fiscal year 2006 levels. These increases are much greater than the combined increases for research into all renewable resources such as wind, solar, geothermal, and biological. Please answer the following questions:

What is the primary justification for this program? In order of priority, what are the secondary justifications for this program?

*Answer.* Today, 103 nuclear reactors generate roughly 20 percent of America's electricity. U.S. electricity demand is anticipated to grow 50 percent over the next 25 years—the equivalent of 45 to 50 one-thousand megawatt nuclear reactors must be built just to maintain that 20 percent share. With nuclear power as the only proven base load producer of electricity that does not emit greenhouse gases with the ability to increase output substantially, it is vital that our current fleet of reactors be expanded in order to meet our needs for carbon-free, dependable and economic electric power.

Any serious effort to stabilize greenhouse gases in the atmosphere, while providing the increasing amounts of energy needed for economic development and growth, requires the expanded use of nuclear energy. This will inevitably require us to address the spent fuel and proliferation challenges that confront the expanded, global use of nuclear energy. To meet these challenges, the Department initiated the Global Nuclear Energy Partnership (GNEP), a comprehensive approach to enable an expansion of nuclear power in the United States and around the world, promote non-proliferation goals, and help minimize the amount of nuclear waste disposal.

Additionally, many formerly non-nuclear countries are now considering the nuclear option to meet their energy needs. It is vital for the United States to be able to influence the safety, security and proliferation characteristics of nuclear reactors intended for these emerging nuclear states, as well as position U.S. industry for leadership in this growing international market. Together with the assurance of reliable fuel services, GNEP provides an attractive energy solution for many countries that could serve to eliminate the need for them to develop the more proliferation-vulnerable parts of the nuclear fuel cycle. Coupled with the spent fuel recycling and actinide burning technologies of GNEP, the United States has the potential to meet its growing energy demands and those of developing countries in a manner that minimizes potential negative impact to the United States and the world.

*Question.* The GNEP implementation plan calls for rapid construction of demonstration facilities for nuclear fuel reprocessing. Can you provide a consensus statement from our international partners describing what their contribution will be and what their requested contribution from the United States is?

If such a consensus is not available, then what level of funding is needed to establish the needed international consensus prior to building new facilities on U.S. soil? Please justify.

*Answer.* Discussions are currently in progress with several of our international partners to help define the parameters of and potential deployment strategies for the GNEP facilities. Those discussions are not yet at the point where a consensus on the amount of cost sharing, or if cost share at all, could be established. At this time, given the undefined technical, political, financial, and strategic aspects of GNEP, it is not possible to pursue quantitative discussions with our partners. Likewise, those same undefined factors render it impractical to make a reasonable estimate of the level of funding required to establish an international consensus prior to constructing the GNEP facilities in the United States. When GNEP has developed

sufficiently to develop those estimates, the Department would be able to provide them.

*Question.* In his statement, Assistant Secretary Spurgeon stated that “Any serious effort to stabilize greenhouse gases in the atmosphere, while providing the increasing amounts of energy needed for economic development and growth, requires the expanded use of nuclear energy”. No further documentation was provided to support this conclusion. Can DOE provide a comparison of the complete lifecycle costs to produce nuclear energy and safely manage nuclear waste as compared to producing a comparable amount of energy from renewable energy resources? If such a comparison cannot be provided, then please provide scientific, peer-reviewed support for this statement.

*Answer.* A recent study by the European Commission (“External Costs—Research results on socio-environmental damages due to electricity and transport,” European Commission, 2003, p. 12, [[http://ec.europa.eu/research/energy/pdf/externe\\_en.pdf](http://ec.europa.eu/research/energy/pdf/externe_en.pdf)]) states, “Nuclear power in general generates low external costs, although the very low probability of accidents with very high consequences and the fuel cycle impacts are included. It is also a technology with very [lifecycle] low greenhouse gas emissions.” On page 13 of the report, a table shows that nuclear power’s external costs are on a par with renewables. While this study considered European experiences, it is expected the situation in the United States would not differ significantly.

Other reports may contradict this. What can be said is that there is currently in operation no clean, base-load, fossil-fuel power-generation technology; solar and wind power have great potential in their limited ranges of operations; hydroelectric is essentially fully subscribed; and that leaves nuclear power. Nuclear power now provides over two-thirds of our Nation’s non-emitting electricity while renewables, primarily hydropower, account for the rest. Until such time as we can efficiently store the power produced by wind and solar power, they will continue to augment but cannot replace base-load power generation. Nuclear power is the only non-emitting technology that is ready today to be deployed in quantities sufficient to meet our growing demand for electricity.

#### FOSSIL ENERGY

*Question.* The Department of Energy’s Office of Fossil Energy (DOE–FE) has proposed extensive new investments in coal energy, yet proposes cuts in funding for oil and gas research. Acting Assistant Secretary Shope justifies this change with an argument that can be summarized as, “because coal is a critical domestic energy resource today, it will continue to be so in the future.” This may happen, but continued innovation may well replace coal with improved new technologies. Coal is a valuable energy resource over the near-term, but its long-term future is still uncertain. Please answer the following questions:

A recent study by the Climate Group indicates that the global market for biofuels, wind power, solar photovoltaic, and fuel cells will be \$167 billion by 2015; with \$523 million of venture capital invested in these technologies in California in 2005. What is the comparable global market for clean coal technologies? How will continued investment in coal research and development improve American competitiveness in a global, carbon-constrained economy? How does the return on investment for coal compare to that for other technologies?

*Answer.* Recent estimates indicate large markets for clean coal technologies through the near-term and continuing out to 2030. The International Energy Agency (IEA) World Energy Outlook (WEO) 2006 projects that coal will remain the dominant source of electricity to 2030 in both scenarios investigated (a reference scenario and an alternate scenario that significantly reduces the rate of increase in demand and emissions). Coal-based power generation in 2030 will be at least 60 percent higher than today, remaining the world’s largest source of electricity in 2030. Investment in electricity generation is expected to exceed \$5.2 trillion cumulatively by 2030, resulting in more than 5000 GW of new capacity. Over 144 GW of integrated gasification combined cycle (IGCC) capacity is expected over that timeframe. Assuming a conservative capital cost of \$1,000 per kilowatt for new coal plants, this equates to roughly a \$150 billion market for the expected new IGCC plants alone.

With the increased demand for coal, R&D investments in clean coal technology development aimed at near-zero emissions, while improving its efficient use, could help coal remain a competitive and environmentally-sound energy option for future generations of power plants, as well as for production of alternative fuels. As energy demand rises, coal will continue to compete by deploying new systems and innovative technologies that will keep it, and the existing fleet of coal-fueled generating stations, viable well into the future.

We will continue to rely on all forms of energy sources to meet the growing energy needs. Coal will continue to be relied upon for baseload power generation. Continued investment in coal R&D (including low cost carbon capture and storage) will help produce clean, economical, and efficient coal-based power plants to keep the United States at a competitive advantage and poised to take advantage of global opportunities even in a carbon-constrained scenario. Meeting future global energy needs will require the introduction of a variety of technologies to meet growing electricity demands with stringent emission regulations. Coal will remain in the near-term and beyond.

*Question.* The United States Geological Survey (USGS) has recently completed a series of studies indicating that only 10–20 percent of total U.S. coal resources may be economically recoverable. How does this compare with prior estimates by the Department of Energy? If the USGS estimates are correct, to what extent does this limit the capability of coal to power America's future?

*Answer.* The Department of Energy's coal resource estimates are all based on U.S. Geological Survey (USGS) data. It is our understanding that USGS has not completed any full basin studies that validate the findings of the several local studies referred to. We look forward to reviewing the systematic inventory of the U.S. coal reserve base currently underway by the USGS, once it is available. The coal resource in the United States is vast; estimated to be 4,000 to 9,600 billion tons. Current usage is about 1 billion tons/year. Coal will be able to power America for the foreseeable future.

*Question.* Energy experts at the Electric Power Research Institute (EPRI) have suggested that the technology to separate carbon dioxide from the emissions of coal fired utilities is ready for commercial demonstration, and that the biggest challenge is demonstrating the ability to safely sequester carbon dioxide. Is this true? If so, then why does the proposed fiscal year 2008 budget direct significantly more funding to research into coal combustion and carbon dioxide separation than to research into carbon sequestration?

Please provide a comparison between total requested funding for carbon sequestration, and that for coal combustion and carbon capture.

*Answer.* The emphasis of the funding for Carbon Sequestration (capture and storage) remains focused on the storage component of sequestration, including CO<sub>2</sub> field injection tests. However, cost and efficiency penalties of existing capture technologies remain a challenge in terms of affordability and net plant output impacts. While certain post-combustion CO<sub>2</sub> capture technologies, such as amine-based systems, could be ready for commercial demonstration in the next several years, several other advanced systems are only at the laboratory, bench-, and pilot-scale stage of development. Because of differences in plant age, size, configuration, and other site-specific factors, it is expected that a suite of CO<sub>2</sub> capture technologies will be employed by electric utilities in order to achieve significant reductions in emissions from coal-based power plants without significantly increasing the cost of electricity.

The Department of Energy (DOE) estimates that based on current amine scrubbing technology, the removal of CO<sub>2</sub> from the flue gas of an existing coal-fired power plant would constitute as much as 90 percent of the total cost of carbon capture, transport, and storage. Hence, the criticality of continued research and development of CO<sub>2</sub> capture technologies. DOE's coal program targets improved performance and cost savings based on a system-wide approach that targets the most effective avenues for advancing carbon capture and storage technology. DOE conducts R&D on technologies that will enable carbon capture and storage in the following program areas: Integrated Gasification Combined Cycle, Turbines, Sequestration, Fuels, Fuel Cells, and Advanced Research.

The DOE Carbon Sequestration Program aims to develop technologies that will lower both the cost of the carbon capture technology, but also the amount of additional power capacity required due to efficiency losses. It is the goal of the Program, by 2012, to develop technologies resulting in less than a 20 percent increase in the cost of electricity for post-combustion capture and oxycombustion technologies. Pre-combustion (integrated gasification combined cycle related) technologies are targeting less than a 10 percent increase in the cost of electricity. Of the approximately \$86 million requested for the Carbon Sequestration Program (including roughly \$7 million of R&D by Federal employees under the Program Direction line item), about \$15 million (or about 18 percent) is intended to be used for carbon capture technology research. These technologies are based on application to both coal combustion and gasification systems.

## QUESTIONS SUBMITTED BY SENATOR JACK REED

## EPACT AND EFFICIENCY PROGRAMS

*Question.* Mr. Karsner, you have recognized energy efficiency as a critical response to the Nation's energy challenges, but the budget proposed by the President does not. Funding for the President's Advanced Energy Initiative programs is coming mostly from cuts in efficiency programs. Given that efficiency is the Nation's fastest and most abundant clean energy resource, how can you justify a budget that continues to cut research, development, and deployment in this strategically critical area? Do you believe that the funding for energy-efficiency programs in the budget match the Nation's need for saving energy? What would be the impacts of the proposed budget cuts, including for industrial and vehicles R&D, and for weatherization assistance?

*Answer.* The fiscal year 2008 budget adequately funds a balanced portfolio of activities at levels that support achievement of programs' goals. It is important to note that the Office of Energy Efficiency and Renewable Energy (EERE) programs related to energy efficiency comprise approximately 46 percent of the total EERE proposed fiscal year 2008 budget (including program direction and support funds). For example, the Building Technologies Program budget request is \$9.1 million greater than the fiscal year 2007 request and the Vehicle Technologies Program budget request is \$10.1 million greater than the fiscal year 2007 request and the Industrial Technologies Program is \$435,000 greater than the fiscal year 2007 request.

EERE maintains a balanced portfolio that uses an integrated strategy of energy efficiency and renewable energy to increase our energy security and reduce our dependence on oil. The 2008 budget request optimizes resource use and appropriately funds all energy efficiency programs to support achievement of stated goals.

The fiscal year 2008 budget request includes funding increases for both the Industrial Technologies Program and the Vehicle Technologies Program. In general we have chosen to prioritize investments in energy efficiency and renewable energy R&D that have multiplicative returns such as improvements to appliances and the building envelope that affect the whole American population rather than additive returns not associated with technological R&D that target a single segment of the population. For example, the National Academy of Sciences studied the benefits of the energy efficiency portfolio and found that the return on the research and development (R&D) investment was roughly 20 to 1. In contrast, the Weatherization Assistance Program has a return on investment of 1.5 to 1.

*Question.* Mr. Karsner, the Energy Policy Act of 2005 (EPACT 2005) authorized a number of new energy-efficiency programs on public education, utility efficiency programs, building codes, appliance rebates, and other areas. Are any new energy-efficiency programs authorized in EPACT funded in the proposed budget? Does this budget allow you sufficient funding to implement the energy bill, including the added requirements on the appliance standards, Federal energy management, and Energy Star programs?

*Answer.* Yes, we are implementing numerous energy efficiency programs authorized by EPACT 2005. Here are some selected examples. The fiscal year 2008 requests funds for the establishment of new EnergyStar® qualification levels for clothes washers, as directed in EPACT section 131; the issuance of grants to establish Advanced Energy Efficiency Technology Transfer Centers as directed in EPACT section 917; reporting on the establishment of a program to inform the public on various aspects of energy efficiency as directed in section 134 and developing the next generation of low-emission, high efficiency diesel engine technologies as directed in section 754. We have also requested funds under section 140 to provide financial assistance to States to carry out energy efficiency pilot programs.

Yes, the fiscal year 2008 budget request includes adequate funding for a balanced portfolio that supports achievement of goals, including sufficient funding for appliance standards, Federal energy management and EnergyStar®.

## WEATHERIZATION FUNDING DECREASE

*Question.* Mr. Karsner, I led a bipartisan letter to Secretary Bodman supporting the fiscal year 2007 funding level of \$242.5 million for Weatherization. You chose to cut that program to \$204.5 million, and in recent House testimony I think you referred to Weatherization as a "welfare program." As you know, in the fiscal year 2007 Supplemental Appropriations bill passed by the Senate, we included an additional \$25 million for Weatherization. Weatherization provides almost 25 percent in energy savings for every house we improve, and well over 100,000 homes were done this past year. It is clearly a successful deployment program that helps lower-income homeowners and neighborhoods today. It is not a welfare program, it is an

energy program. With the administration's support and focus on reducing energy demands, why wouldn't you also strongly support Weatherization?

Answer. The 2008 budget optimizes resources and adequately supports the achievement of the program's goals and priorities. We have chosen to prioritize investments in energy efficiency and renewable energy R&D that have multiplicative returns such as improvements to appliances and the building envelope that affect the whole American population rather than additive returns not associated with technological R&D that target a single segment of the population. The National Academy of Sciences studied the benefits of the energy efficiency portfolio and found that the return on the research and development (R&D) investment was roughly 20 to 1. In contrast, the Weatherization Assistance Program has a return on investment of 1.5 to 1.

#### INDUSTRIAL EFFICIENCY PROGRAM FUNDING DECREASE

*Question.* Mr. Karsner, the industrial energy efficiency program has been slashed from well over \$100 million just a few years ago to approximately \$50 million in fiscal year 2007. The fiscal year 2008 budget request would further reduce this effort. With over one-third of our energy use in this sector, what is the justification for this cut?

Answer. The fiscal year 2008 request for the Industrial Technologies Program (ITP) is \$435,000 higher than the fiscal year 2007 request. Also, under the discretion given to the Department by Congress under the fiscal year 2007 Continuing Resolution, this program was increased by \$11 million. ITP has historically worked with the eight most energy-intensive manufacturing industries to research, develop, and implement advanced technologies that save energy, reduce costs, and improve environmental performance. These activities have contributed to significant reduction in energy use. As the program evolves, we are seeking more effective and efficient ways to develop technologies that are high impact and applicable to multiple industries. ITP has developed a new strategy with more emphasis on crosscutting R&D which will allow ITP to continue partnership with end-user industries while broadening industry participation to include other growth industries and technology developers.

#### MATERIALS MANUFACTURING AND INDUSTRIAL MATERIALS

*Question.* Mr. Karsner, in fiscal year 2006, research and development for the materials manufacturing industry was \$21 million. There is only \$9 million in your budget for fiscal year 2008, a 55 percent cut, and research and development for industrial materials is slashed by 57 percent to \$5 million. These low numbers reflect a decision to back away from development of key new technologies that could significantly strengthen our manufacturing global competitiveness while reducing carbon emissions in a sector that consumes more energy than any other sector of the economy. Materials manufacturers co-fund this research and development effort and outlined a program in the range of \$250 million to support the development of the next generation of production process technologies needed by their industries to be able to dramatically reduce their energy use per unit of output, cut carbon emissions, and compete globally. What is the rationale for cutting back investment in research and technology in materials manufacturing and industrial materials?

Answer. The Industrial Technologies Program (ITP) has invested approximately \$21 million in fiscal year 2006 through the Industries of the Future on technology development, focusing on industry-specific research needs. However, ITP is seeking more effective and efficient ways to develop technologies that have higher impacts and are applicable to multiple industries. ITP has developed a new strategy with more emphasis on crosscutting R&D which will minimize duplicative efforts and allow ITP to develop technologies meeting the needs of multiple industries. This approach will also accelerate technology development with broader industry participation to include other growth industries and technology developers. Materials manufacturing R&D will continue to play an important part of this program.

#### "SAVE ENERGY NOW" CAMPAIGN

*Question.* Mr. Karsner, EERE has implemented the "Save Energy Now" campaign to audit the 200 largest industrial customers/facilities in the United States. Could you specifically detail what facilities have been audited and most importantly, what energy measures have been implemented in those facilities? If changes have not been implemented, could you please explain why? Do you think funding support through the industrial program would help on the implementation side?

Answer. As of December 31, 2006, the first 200 Energy Savings Assessments, with the firms listed in the following pages, were conducted. Several companies had more

than one plant audited. Approximately half a billion dollars per year in energy savings was identified from those audits. Typical energy savings identified consisted of 5 to 15 percent of a plant's total energy use, consistent with a potential reduction of 3.3 million tons per year in CO<sub>2</sub> emissions. The audited firms are being contacted 6 months, 1 year, and 2 years after the audit to determine implementation of these recommendations. To date, the energy measures most commonly implemented in the plants as a result of these audits are in the areas of process heat and steam.

It is entirely the choice of the audited company as to whether savings recommendations are implemented and the cost-effectiveness of the recommendations is dependent on interest rates, and equipment, labor, materials prices, and other considerations in addition to the energy prices. Often the purchases must wait for the next capital acquisition cycle or the next time that the plant shuts down for routine maintenance. Nevertheless, as of April 24, 2007, \$116 million of the potential \$494 million per year of energy savings has already been implemented or is in the process of being implemented.

The fiscal year 2008 budget funding level is appropriate and sufficient to support achievement of the program's mission and goals. The program is not designed to be an implementation mechanism—it is the choice of the audited company as to whether it is worthwhile and cost-effective to implement the audit findings. The Save Energy Now initiative has demonstrated it can provide useful information to inform these industry decisions.

#### APPLIANCE EFFICIENCY STANDARDS

*Question.* Mr. Karsner, DOE has been plagued for years by long delays in issuing appliance efficiency standards. So far you seem to be meeting the aggressive schedule you set last year for getting the required standards out, and I am pleased that you asked for additional funds. However, a recent GAO report said additional changes are needed in the program, and I am concerned that recent proposed standards have been weak and are not using the tremendous potential of this program to address our energy needs.

The GAO report said the program faces a 600 percent increase in workload with a 20 percent resource increase in the fiscal year 2007 budget. Have you analyzed the staffing and funding requirements to carry through the standards plan, and can you share that with us?

Some of the largest possible savings, for example from standards on furnace fans and refrigerators, are not included in the plan, and thus will not be considered for at least 5 years. Can you tell us how much additional resources you would need to begin work on the most important standards now? DOE has rejected some recent suggested standards because they were not deemed consistent with current law. Do you need any additional legal authority to issue standards that make the most sense for the American people?

*Answer.* Yes, the Department has conducted a thorough assessment of resource needs for the efficiency standards program. On January 31, 2006, the Department submitted an aggressive plan to Congress, addressing both the history and future plans for the Appliance Standards Program. That plan does in fact commit to a rule-making schedule that is six times the historical rulemaking rate for this program. The actions detailed in that plan will dramatically increase the efficiency of the process and the output rate. In addition, in the 2007 operating plan and 2008 budget, the Department directed resources to support these efforts. Changes in our process include implementing product bundling within a single rulemaking and organizing staff into seven technology teams.

Since committing to this schedule for the standards program, the Department has met 100 percent of its scheduled deadlines. We have completed eight rulemakings since EPACT 2005, including test procedure rulemakings and codification of prescribed standards, and have made significant progress on others that were underway prior to EPACT 2005. In 2006, we initiated standards rulemaking for 12 additional products and remain on schedule for all future deadlines.

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#### QUESTIONS SUBMITTED BY SENATOR PETE V. DOMENICI

##### LOAN GUARANTEE REGULATIONS

*Question.* I understand that the Department sent its proposed draft regulations at the end of March to OMB for approval. It has been nearly 3 weeks without any action.

Based on the delays in approving the regulations, will you be able to meet the August deadline for the implementation of regulations as established in the Joint Funding Resolution?

Answer. The Department is working to meet the August 2007 deadline contained in the Revised Continuing Appropriations Resolution, 2007, Public Law 110-5. A Notice of Proposed Rulemaking was published in the Federal Register on May 16, 2007 and is open for public comment until July 2, 2007. It is not possible to guarantee that the rule will be completed by the August deadline but an aggressive effort is underway to make that happen.

#### LOAN GUARANTEE PROGRAMS (TITLE 17 OF EPACT)

*Question.* The Export-Import Bank of the United States is planning to provide over \$18 billion in new loan guarantees in fiscal year 2008, more than double the level proposed for the Department of Energy. A portion of these loan guarantees will be for new advanced technology power generation facilities being built overseas.

Can you explain why the administration has such a difficult time in providing adequate loan authority to implement a no-cost loan guarantee program at the similar level as we support foreign economic development under the Export-Import Bank program?

Answer. The nature of the Energy Policy Act of 2005 Title XVII loan guarantee program is unique among other Federal loan guarantee programs in that it encourages the employment of new or significantly improved and innovative technologies to reduce or sequester pollutants or greenhouse gas emissions, while at the same time requiring a "reasonable prospect of repayment." Other programs are primarily concerned with commercial market risk. To manage the inherent risks of this loan guarantee program, DOE is planning for an initial small portfolio of projects in order to gain experience and expertise and to ensure that the program is implemented correctly.

#### LOAN GUARANTEE—TECHNICAL EVALUATION AND FINANCIAL EVALUATION

*Question.* It is my understanding that the Department is attempting to recruit staff that has strong project development experience to evaluate these applications from a financial standpoint.

At the same time, the evaluations are currently undergoing a technical evaluation by DOE staff to determine whether or not the technology is commercially viable.

How are the evaluations proceeding and when do you expect these evaluations to be completed?

Answer. The Department is completing a preliminary review of the 143 pre-applications submitted in response to the August 2006 solicitation and guidance has been issued to program offices to begin the technical reviews of the pre-applications. Until the program offices have had the opportunity to complete the technical reviews on a sufficient number of pre-applications, the Department cannot say precisely how long it will take to complete the evaluations.

Separately, the Loan Guarantee Office will be reviewing each pre-application for compliance with the financial, commercial, and other criteria set forth in the August 2006 solicitation and accompanying guidelines. Ultimately, the goal is to complete the pre-application evaluations this summer.

#### DEPLOYING NEW TECHNOLOGY

*Question.* Mr. Karsner, our energy sector has developed around low cost energy technologies such as coal. We have spent decades and billions of dollars supporting alternative energy sources such as wind and solar, yet these technologies still only make up a small portion of our generation mix. Tax credits have helped, but the intermittent nature of these incentives has undermined their effectiveness.

It appears that we need to come up with a new model that will encourage the commercial deployment of alternative energy sources utilizing private capital. Obviously, this is something we have attempted through the loan guarantee program, but I wonder if we need a larger more aggressive solution in order to transform our energy sector—similar to the Export Import Bank or Overseas Private Investment Corporation.

I assume you have met with investors and venture capital groups interested in deploying new technology. What is the major concern of these groups and what can we do to encourage investment in new alternative energy technology to get it out of the lab and into the market?

Answer. In general, investment decisions center on maximizing the expected return for a given level of risk. With respect to alternative energy technology investments in particular, private sector investors repeatedly voice at least three primary

concerns: an unstable and irregular policy environment and the negative economic incentive to build first-of-a-kind plants.

By creating a stable and standardized policy environment with reasonable investment incentives, the Federal Government can help to lower risk and to increase private sector support of alternative energy technologies.

*Question.* What about the deployment of high cost investments such as nuclear power?

*Answer.* The principal causes of the financial risk surrounding nuclear power are political and regulatory uncertainties. By demonstrating the new Nuclear Regulatory Commission licensing process, codified at 10 CFR part 52, via our partnership program, Nuclear Power 2010, the political and regulatory uncertainties of nuclear power would be significantly reduced. Further, the Department has just released a Notice of Public Rulemaking and has not yet solicited expressions of interest for loan guarantees by the nuclear power utilities, so it is not clear how the industry will respond to such an offering. Consequently, it is too early for the Department to assess whether a more aggressive solution would be needed to encourage more nuclear power plant construction.

#### BATTERY R&D

*Question.* Mr. Karsner, your budget for Vehicles Technology is presented in a new format that provides fewer details about specific research projects.

I am interested to learn what the budget provides for battery R&D. As you are well aware the gasoline/electric hybrid car technology has become very popular. However, batteries continue to be the greatest technology challenge facing auto manufacturers.

How much funding has the President requested for battery research in fiscal year 2008 and how has that changed over the past 2 years?

*Answer.* The fiscal year 2008 budget includes \$42 million to support advanced battery R&D, such as batteries for plug-in hybrid vehicles. This includes work on long-life, abuse-tolerant lithium batteries and more advanced high-power batteries along with power-control systems and components that are optimized for plug-in hybrids. The fiscal year 2008 request for energy storage R&D is a 70 percent increase over the fiscal year 2006 appropriations, and is level with the fiscal year 2007 operating plan.

*Question.* Please explain to the subcommittee what your goals are for battery research? What can we expect in terms of performance improvements over the next 5 years?

*Answer.* Energy storage research aims to reduce costs and help overcome specific technical barriers related to performance, life, and abuse tolerance. The current cost of high energy, plug-in hybrid vehicle battery is \$1,000/kWh; our cost goal in support of the AEI is to reduce the cost of these batteries to \$300/kWh by 2014. These barriers are being addressed collaboratively by the DOE's technical research teams and battery manufacturers.

#### SOLAR ENERGY

*Question.* Mr. Karsner, during the past 6 years there has been explosive growth (+45 percent) in solar cell manufacturing worldwide. However, the United States currently produces only about 10 percent of the solar cells produced worldwide and has only grown by 7 percent since 2001. The current manufacturing leaders are Japan and Europe.

Clearly there are many factors that contribute to this outcome, but I am interested to know if the United States is behind because we lack the technical capability or if policies being pursued in Europe and Japan are driving this demand growth.

*Answer.* The capabilities in U.S. industry and at national laboratories and universities are strong. Indeed, U.S. companies are producing the highest-performance products in a variety of PV technologies, including crystalline silicon, amorphous silicon, and concentrating PV. Additionally, the leading global producer of polysilicon feedstock is a Michigan-based subsidiary of Dow-Corning (Hemlock Corporation).

The United States has lost market share in solar photovoltaic (PV) manufacturing because in recent years solar companies have sited manufacturing facilities near locations with the highest demand for the technology. Installations have increased significantly in Japan and Germany due to their long-term policies and incentives. Similarly, the solar manufacturing capacity in these countries has increased steadily as well, a fact that can be linked to the policies. For example, the German feed-in tariff program guarantees the owner of the panel a steady price for generated energy (that is even higher than the price of electricity) for 20 years following the installation; this tariff established a long-term, stable investment environment that

has been attractive to companies looking to site facilities for adding manufacturing capacity. In addition, Germany and the European Union have also bundled cash grants, cost savings and other incentives for companies building new manufacturing facilities—offsetting up to 40 percent of the capital expenditure required to build a new plant—which has resulted in U.S. companies announcing plans to site facilities in Germany.

*Question.* What is the Department of Energy doing to improve the efficiency and deployment of solar technology in the United States?

*Answer.* The Solar America Initiative (SAI) in February 2006 will make solar photovoltaics (PV) cost-competitive by 2015. Achieving the goal of the SAI will require a significant investment in reducing the cost of PV systems. Funding in fiscal year 2007 for the Solar America Initiative totals \$159 million.

There are critical areas where the Department is focusing its efforts to help increase efficiency, cost-effectiveness and deployment of solar technologies. First, solar thermal concentrating solar power plants (CSP) have the potential to contribute significantly to electricity supply in the Southwest, home to 15 of the 20 fastest-growing metro areas in the country. Second, by focusing on the development of building efficiency design and technologies coupled with distributed PV, the Department could help enable Americans nationwide to buy new “zero energy” homes and to work in “zero energy” office buildings—which will produce as much energy as they use.

*Question.* What can we expect in terms of technology or manufacturing improvements over the next 5 years?

*Answer.* On March 8, 2007, under the SAI, the Department announced the selection of 13 industry-led solar technology development projects expected to receive up to \$168 million in Federal funding over the next 3 years (subject to appropriations). These projects may ultimately help to expand the annual U.S. manufacturing capacity of PV systems. These projects are specifically focused on developing new photovoltaic components or manufacturing equipment, or even complete photovoltaic systems.

#### CELLULOSIC BIOMASS—REVERSE AUCTION

*Question.* The fiscal year 2008 budget request includes \$5 million to develop options to establish a reverse auction for biofuels as proscribed in section 942 of EPACT. This incentive program is intended to help make cellulosic biofuels cost competitive by 2015. It is my understanding that the reverse auction would require DOE to solicit bids from eligible producers. The lowest bid on a per gallon basis would receive the incentive funding.

This is a first of a kind proposal for biofuels. Do you believe that we are ready technologically or economically, to support this auction?

*Answer.* The Department is evaluating section 942 of EPACT 2005, which directs the establishment of a reverse auction incentive program for the production of cellulosic biofuels. The fiscal year 2008 budget request includes \$5 million to develop background knowledge and evaluate options for this incentive program.

#### IMPROVED BUILDING EFFICIENCY

*Question.* Mr. Karsner, the fiscal year 2008 budget requests an increase in funding for building efficiency R&D including improvements to window, lighting, and insulation designs. At the same time, funding for weatherization has been reduced.

Are you able to quantify the benefits of investing in innovative building technologies over the weatherization program? In other words, can we save more energy by investing in building technologies R&D and deployment as opposed to the weatherization assistance?

*Answer.* EERE is evaluating the potential benefits of the Building Technologies Program and the Weatherization Assistance Program. In addition, the National Academies of Science has indicated that the Weatherization Program’s return on investment is 1.5 to 1, compared to an approximately 20 to 1 return on investment for the Building Technologies Program.

#### CONCENTRATING SOLAR

*Question.* I have been very interested in the commercialization of the concentrating solar power (CSP) technology. What is DOE’s plan for supporting this dish technology deployment in the fiscal year 2007 and fiscal year 2008 budgets?

In the fiscal year 2006 budget, DOE provided about \$3.3 million to Sandia to support the development of a 1 MW dish engine pilot project. Is the plan to increase that funding in fiscal year 2007 budget to continue these efforts? If so, for how much money and when will it become available?

Answer. The Department is working with industry on the development of two CSP technologies: parabolic trough and dish-engine systems. The Department is providing technical assistance to the first commercial U.S. CSP project, a 64 MW trough system near Las Vegas, by Solargenix/Acciona Solar Power, which is expected to become operational in May 2007. Stirling Energy Systems (SES), a dish system developer, plans to commercialize dish technology through two projects (300 MW and 500 MW) in California. The Department is supporting the SES effort by providing technical assistance in improving the reliability of their Stirling engine, and helping in the design-for-manufacture of the system. The effort will continue through fiscal year 2008.

In fiscal year 2007, the Department is funding Sandia at the \$1.5 million level to support technical assistance to SES for system deployment. At this time, Sandia has access to the entire \$1.5 million.

As I understand it, there are two solar projects targeted to start actual construction ("hardware in the ground") in late 2008 or early 2009. A major program to commercialize the dish engine systems for high-volume, low-cost manufacture is underway. When the transformation from low-volume to high-volume production of this hardware is completed, it will pave the way for U.S.-based companies to take a very big step into the large-scale solar market.

*Question.* How can the Department most effectively support the commercial deployment of this technology in the near term in order to realize large scale commercial deployment?

Answer. We believe our support for technical assistance to companies pursuing trough and dish technologies as designed and funded in the fiscal year 2008 budget is very effective. Large scale, near-term CSP commercialization is ultimately the decision of industry and depends on competitive Net Present Value (NPV) assessments by capital markets, which can only be realized through life cycle cash flows.

#### EXISTING BIOMASS AWARDS

*Question.* Recipients of the alternative hydrogen production and utilization competitive grants (No. DE-PS26-06NT42801) are telling Congress that DOE's fiscal year 2008 budget does not include funds for their awards and that they need to cease work.

Can you clarify the funding commitment for this competitively awarded program to the subcommittee and provide details on how DOE will fund the competitively awarded grant in the future?

Answer. The fiscal year 2008 budget request for the Fuels program is \$10 million, which is a reduction of \$12 million from the fiscal year 2007 operating level. Fiscal year 2008 funding will only support areas of research and development (R&D) that are central to the production of hydrogen from coal. We will continue Hydrogen from Coal Research to develop improved, novel technology for the production of hydrogen including research in scale-up technologies which will simultaneously produce and separate coal-derived hydrogen from the other gas constituents in one membrane reactor. All research in high-hydrogen content liquid fuels will be terminated because these are mature but evolving technologies where the private sector has the resources and incentives to conduct R&D. All research in hydrogen utilization for mobile applications (e.g., car engines) will be terminated because this research is conducted by the Office of Energy Efficiency and Renewable Energy (EERE). This research terminated within the Office of Fossil Energy would include projects selected as a result of Funding Opportunity Notice No. DE-PS26-06NT42801 since they are aimed at ethanol production and mobile applications of hydrogen utilization. Termination of this work is proceeding in an orderly manner and contractors have been properly notified.

#### DEPLOYMENT OF RENEWABLE ENERGY TECHNOLOGIES

*Question.* In a GAO report to Congress dated December 2006, it is repeatedly stated that DOE has made steady incremental progress in making each of the renewable energy technologies more cost competitive.

As I have mentioned in my opening statement, I am more concerned at this point about deployment of these technologies.

What is the Department doing to take these technologies that are more cost competitive and fully deploy them into the marketplace?

Answer. The Department's approach to promoting new technologies couples technology push with market demand pull, and works to address barriers to the market adoption of advanced technologies through various program initiatives. For example, the Department plans to lead by example with the Executive Order 13423 and become an early adopter of energy efficient and renewable energy technologies. By

identifying markets where the life-cycle costs of advanced energy technologies currently form a compelling economic argument, the Federal Government will create demand pull which will increase the economies of scale and drive the technologies down the cost curve. The Department is also looking to stimulate the commercialization of advanced technologies by helping to bridge the gap between R&D and the market place. To this end, the Department has designated a Director of Commercialization and Deployment, located within the Energy Efficiency and Renewable Energy Program, to oversee and guide our deployment-related efforts. However, commercialization decisions are ultimately up to industry.

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QUESTION SUBMITTED BY SENATOR THAD COCHRAN

*Question.* Secretary Karsner, it is my understanding that your office is willing to consider funding for renewable energy programs through an "unsolicited proposal" process. Mississippi State University has submitted an unsolicited proposal to your office for its Sustainable Energy Research Center (SERC), a program which was funded in fiscal year 2006 and included in the fiscal year 2007 Senate Energy and Water Appropriations report. What is the status of this proposal? Will the SERC receive fiscal year 2007 funding?

*Answer.* On February 27, 2007 the Office of the Biomass Program received the SERC unsolicited proposal via email. The Program responded on March 6, 2007 by directing Mississippi State University to the formal channels for submitting an unsolicited proposal and by inviting them to meet with the Program. For any proposal to be considered unsolicited, it must be unique and not covered by any current or proposed solicitation. The Biomass Program hosted Dr. Glenn Steele and Dr. William Batchelor at DOE on April 12, 2007 and informed them of upcoming competitive solicitations that would be applicable to their area of focus. We will provide a formal response to the unsolicited proposal. Currently, the Program is in the process of preparing that response.

The Office of Biomass Program is in the process of evaluating the SERC proposal. The Program needs to make a determination that the proposal is meritorious and compliant with criteria for unsolicited proposals, and meets and supports the Program's Research, Development and Deployment plans to be recommended for funding.

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QUESTION SUBMITTED BY SENATOR WAYNE ALLARD

ELECTRICITY DELIVERY AND ENERGY RELIABILITY

*Question.* What is being done to increase available transmission from the often remote sites where renewable energy is produced to the more populated areas where the electricity is needed and how are your offices working together on that?

*Answer.* The transmission grid needs to be sufficiently large and robust to accommodate the increased level of renewable energy resources that are becoming available, as well as to meet the many other challenges of the 21st century.

The Department is implementing the provisions of the Energy Policy Act of 2005 (EPACT) to help ensure that consumers receive electricity over a dependable, modern infrastructure. These provisions include EPACT section 368 that requires designation of energy corridors on Federal lands; section 1221(a) that requires a study of electricity transmission congestion once every 3 years, coupled with the authority given to the Secretary of Energy to designate national interest electric transmission corridors; and the new Federal Power Act section 216(h) that requires the Department to act as the lead agency for purposes of coordinating all applicable Federal authorizations and related environmental reviews to site an electric transmission facility.

The Department also provides technical assistance to States, regional bodies, and others on issues such as methods and tools to increase regional planning and coordination of transmission, improving transmission siting, better understanding the location of suitable renewable resources ("resource characterization"), and improving the ability of the grid to plan for and operate with renewables that are intermittent ("grid integration issues"). Technical assistance is provided to the Department's Power Marketing Administrations as they explore what role they can play in providing access to additional renewable generation through transmission. With some types of assistance, such as renewable grid integration, the technical assistance is informed by research and development that is sponsored by the Department.

At the distribution level of the grid, the Department continues to provide technical assistance to States that wish to adopt more favorable interconnection stand-

ards, metering, demand response, and related methods that enable greater use of distributed renewables generation. For example, the Department funded the national voluntary “IEEE 1547” interconnection standard that is referenced in EPACT section 1254 regarding “Interconnection Standards” for States to consider.

In addition, using funding under the Renewable & Distributed Systems Integration activity line of the fiscal year 2007 Operating Plan, the Office of Electricity Delivery and Energy Reliability (OE) is soliciting for projects that would integrate renewable and distributed energy systems into the grid. By successfully demonstrating this integration, the use of renewable and distributed energy technologies to support electric distribution operations should substantially increase for supplying power and other ancillary services during peak load periods. The project would also demonstrate the ability of these technologies to reduce power required by the distribution feeder. This will be accomplished through modeling, design, integration, and R&D of renewables and distributed energy integration into the distribution system; low-cost sensors; advanced monitoring; and consumer information.

The Office of Energy Efficiency and Renewable Energy (EERE) typically focuses research and development activities on improving the efficiency, cost, and emissions profiles of generation technologies, including renewables.

OE and EERE understand that for this policy to succeed, it is crucial to collaborate not only on grid-scale innovations, but also on bringing the applications to the consumer. In coordinating near-term and long-term goals, OE and EERE remain alert to changes in need and demand. Both offices also support State and regional efforts to integrate renewable and distributed energy resources in their electric system planning efforts. In this spirit, OE and EERE have formed a focus group to concentrate on integration issues with renewables. OE and EERE are closely coordinating fiscal year 2007 activities under the operating plan in this area.

*Question.* I am also curious what research is being done to develop electricity storage, especially electricity manufactured from renewable sources?

*Answer.* The energy storage program of the Office of Electricity Distribution and Energy Reliability has conducted a research program on basic storage mechanisms, devices, and systems for over a decade. The program is considered worldwide to be one of the leaders in this field. Research is conducted on advanced batteries, flow batteries, supercapacitors, and flywheels, as well as the necessary megawatt level power electronics. Major demonstrations are fielded in partnership with utilities, the California Energy Commission (CEC), and the New York State Energy Development Authority. In particular, we are involved with the CEC in the development of a microgrid which incorporates 500kW of supercapacitors to harmonize wind and hydro power. We also work with the Bonneville Power Administration on a power electronics device which will smooth short term wind and wave power fluctuations when combined with storage. A project with the Iowa municipalities explores the possibility of using 200MW of compressed air storage in conjunction with a 75MW wind farm and inexpensive off-peak power.

Energy storage can significantly increase the integration of renewable sources of energy into the electric system. Storage increases the reliability of intermittent resources like wind and photovoltaics, allowing these sources to become relatively constant sources of power. Renewable power produced in off-peak periods can be stored and used during periods of greater demand, thus making renewables dispatchable. Likewise, energy storage can bridge the gap during decreased periods of renewable production and, when combined with appropriate electronics, it can also eliminate short term flutters that decrease power quality and impact digital equipment on the grid.

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QUESTIONS SUBMITTED TO HON. THOMAS D. SHOPE

QUESTIONS SUBMITTED BY SENATOR BYRON L. DORGAN

FOSSIL ENERGY BUDGET REQUEST

*Question.* Your testimony suggests that your fiscal year 2008 budget request of \$863 million is one of the largest fossil energy requests by this administration. Yet, there are only two large program requests in your budget—a doubling of funds for the FutureGen project and a doubling of funds for the Strategic Petroleum Reserve (SPR) expansion. The FutureGen request now makes up 25 percent of the coal R&D request.

With the extraction of the requests for FutureGen and the SPR expansion from your budget request, are you not actually cutting many other fossil energy R&D programs?

Answer. The FutureGen project is a key Presidential priority in the Office of Fossil Energy's portfolio and is an important component of the Coal Research Initiative. It remains a significant step towards realizing the goal of creating a near-zero atmospheric emission energy option for coal. The Strategic Petroleum Reserve provides an emergency oil stock to bolster U.S. energy security and a possible mitigation when disruptions in commercial oil supplies threaten the U.S. economy. We believe the current budget represents a balanced Fossil Energy Program portfolio that addresses all of the highest priority requirements to meet the program goal.

#### COAL R&D RESEARCH FUNDING

*Question.* The President's fiscal year 2008 Budget Request recommends \$245.6 million for the coal R&D program, is approximately \$55.7 million less than the fiscal year 2006 enacted budget level. This is largely due to some programs being zeroed out or severely cut back. This includes the Innovations for Existing Plants (IEP) program and the Advanced Research program. For example, defunding the IEP program will eliminate work for testing mercury control technologies and research on the energy-water nexus. This program is extremely important in validating mercury control technologies to insure different coals will be competitive under the mercury control (mercury MACT) rules, which require utilities to begin making reductions of mercury from their emissions by 2012. Without this program, there is a very real possibility that technologies will not be available by 2012 that can capture the mercury emitted from the combustion of coals.

Why has the Department requested elimination or reduction of important coal research and development programs?

Answer. The fiscal year 2008 Coal Research and Development budget request proposes a balanced research and development (R&D) program portfolio in support of the overall goal of near-zero atmospheric emissions coal.

Within the Advanced Research Program, bioprocessing was determined too long term to have an appreciable impact and certain other topics are not focused on technology being developed in the Coal R&D Program aimed at achieving the overall goal of near-zero emissions coal.

The IEP Program was developing low-cost technologies for reducing emissions from existing coal power plants and has been very successful. However, the industry now has regulatory drivers to incentivize them to continue development and deployment on their own of such technologies. EPA promulgated the Clean Air Interstate Rule (CAIR) to reduce emissions of sulfur dioxide and nitrogen oxides and the Clean Air Mercury Rule (CAMR) to reduce mercury emissions. These regulations provide industry with incentives to fund R&D for technologies for low-cost compliance to meet the emissions standards. Therefore, further Federal investment in mercury removal and other emission control technology is not needed.

#### CARBON SEQUESTRATION FUNDING

*Question.* The carbon sequestration program request is proposed at \$79 million for fiscal year 2008, and the Department funded \$100 million in the fiscal year 2007 Spending Plan. I have noted that the DOE budget justification states that DOE will conduct demonstrations in 3 or 4 sites across the country with the \$79 million sequestration budget, as opposed to conducting large-scale demonstrations in each of the 7 regional sequestration partnerships—which is necessary to insure this technology can be used in every region of this country.

Are the funds requested for fiscal year 2008 sufficient enough to conduct the several large-scale carbon sequestration demonstrations in every region of this country that are necessary to insure carbon sequestration is a valid option to insure carbon capture and storage from coal fired power plants? What is the Department's longer-term strategy related to the carbon sequestration program?

Answer. The Department's long-term strategy is to conduct large-scale field tests to determine that carbon capture and storage is a safe, effective approach to reduce greenhouse gas emissions. In 2007, the program is beginning work on the "highest potential" opportunities for an initial expedited round of four large scale sequestration tests (approximately 1 million tons CO<sub>2</sub> per year for each site). DOE has provided additional funding in the fiscal year 2007 budget for the Carbon Sequestration Program to award these initial large volume sequestration tests. The fiscal year 2008 budget request is sufficient to continue the four large-volume sequestration injection projects that were accelerated with additional funding received in fiscal year 2007.

## CLEAN COAL POWER INITIATIVE FUNDING

*Question.* The DOE request for the Clean Coal Power Initiative (CCPI) is \$73 million for fiscal year 2008. Although this has increased by \$68 million over the President's request of \$5 million in fiscal year 2007, it still seems inadequate. The CCPI program is the only mechanism through which those clean coal technologies can be demonstrated in order to determine their commercial acceptability. It is through the demonstration program at DOE that this country has achieved significant reductions in NO<sub>x</sub>, SO<sub>x</sub> and particulate matter because of technologies that were developed and demonstrated with DOE support. As a result, our Nation has significantly reduced criteria pollutants from coal-fired power generation, while both maintaining low cost electricity for the consumer and increasing the amount of coal-fired electric power generation over the last 3 decades. Given the success of this program, it would be a prudent decision to increase the budget for this program so that DOE can work with industry to conduct several large scale projects to demonstrate carbon capture and sequestration technologies that can be applied to both the existing fleet and new coal plants if we are going to achieve meaningful reductions of carbon dioxide emissions.

Is it not the case that, of the \$73 million requested in fiscal year 2008, \$58 million was returned from a previous project that did not go forward? Does this mean that the Department is only asking for \$15 million in new funding for the CCPI program in fiscal year 2008? The Department has made much larger requests for the CCPI program in previous years so why is the Department not committed to funding this program to the same extent in fiscal year 2008?

*Answer.* The Department's strategy has been to accumulate sufficient funds over several years and issue a solicitation to support the Clean Coal Power Initiative (CCPI). The \$68 million increase for CCPI in fiscal year 2008 over the fiscal year 2007 request is derived in part from the transfer of \$58 million in balances from the Clean Coal Technology Program that are no longer needed to complete active projects. This increase allows for the solicitation of a third round of demonstration projects in fiscal year 2008. In addition the fiscal year 2007 funding level which was increased by \$55 million over the request will be used for the third round solicitation.

## RESCISSION OF \$149 MILLION FROM THE CLEAN COAL TECHNOLOGY ACCOUNT

*Question.* The President's fiscal year 2008 budget request recommends rescinding \$149 million of previously appropriated clean coal technology funds. Rescinding these dollars would effectively cancel that money for future clean coal demonstration projects and send these funds back into the Federal Treasury. The clean coal program is under funded in a time when accelerated investments in coal technology development have never been more important. We should not be rescinding clean coal funds, but adding new funds to the program to insure we develop, in a timely manner, cost effective coal technologies.

Why does the administration insist on rescinding this funding, which was previously appropriated and can be directed for clean coal demonstration projects in future years?

*Answer.* All project funding commitments in the CCT Program have been fulfilled and only project closeout activities remain. The administration proposes to transfer \$108 million of the \$257 million deferral to the FutureGen project, and cancel the remaining \$149 million. Of the \$66 million in unobligated balances carried forward at the start of fiscal year 2008, \$58 million is transferred to the Clean Coal Power Initiative (CCPI). CCPI will complete the Round 3 solicitation using unobligated funds from projects that were selected but not awarded, plus appropriations that have not yet been committed to projects. We believe that the cumulative available funding will be sufficient for a Round 3 CCPI solicitation.

## UNIVERSITY OIL AND GAS RESEARCH FUNDING

*Question.* I am very concerned about the impacts of the cuts in oil and gas research funding for a number of reasons but am particularly worried about the impacts of these cuts on the education of our next generation of energy technologists who are graduate students today.

Can you tell me how many universities will be affected by the scheduled elimination of almost all oil and gas R&D by DOE in its fiscal year 2007 Spending Plan?

Can you please list those universities that currently receive funding? Can you tell me if and when you intend to issue a stop work order to these institutions?

Will these universities be forced to shut down their oil and natural gas research programs?

Answer. There are 25 projects at universities that will be affected by the funding reduction in the operations plan. Federal funding for oil and gas research and development activities is not needed because industry has the incentives and resources to accomplish such activities on its own. Given the private sector's incentives and capabilities, we believe that private industry is best positioned to fund R&D at universities and elsewhere, which will provide educational opportunities for our next generation of energy technologists.

The universities that currently receive funding are: University of Alaska, Fairbanks; University of Alabama; University of Arkansas; University of Arizona; Baylor University; California Institute of Technology; Carnegie Mellon University; Clemson University; Colorado School of Mines; Stanford University; University of Illinois; University of Kansas; Florida International University; Georgia Tech University; Kansas State University; Louisiana State University; Massachusetts Institute of Technology; Michigan Tech University; Western Michigan University; University of Mississippi; Mississippi State University; University of Southern Mississippi; Montana State University; Montana Tech—Bureau of Mines; New Mexico Institute of Mining and Technology; State University of New York; University of Columbia; University of Oklahoma; Oklahoma State University; Prairie View A&M University; University of North Carolina; University of Tulsa; University of Pittsburgh; Penn State University; University of Texas—Austin; University of Texas—Bureau of Economic Geology; Texas A & M University; University of Houston; Rice University; University of Utah; West Virginia University; Woods Hole Oceanographic Institute; and the University of Wyoming.

The Oil and Natural Gas program has previously sent letters to all program participants notifying them of the potential shortfalls in the fiscal year 2007 budget. These researchers are currently working using existing (prior year) funds. Subsequently, all universities with existing cooperative agreements impacted by the decrease in funds were contacted and informed of the lack of funding for fiscal year 2007. The majority of DOE projects are grants or cooperative agreements, for which a stop work order is not issued.

Each university program will have to examine its particular situation. In many cases, other Government and/or industry funding may be available to the university.

#### NATURAL GAS CARTEL

*Question.* In his 2006 State of the Union speech, President Bush indicated he wanted to reduce our reliance on "imported energy sources." At the same time, DOE and FERC have launched an aggressive campaign to import more liquefied natural gas (LNG) into the United States.

The two largest suppliers of imported liquefied natural gas to the United States are Trinidad Tobago and Algeria. Trinidad Tobago has only around 23 trillion cubic feet of gas reserves and will ultimately have to get gas supplies from Venezuela if it wants to continue its liquefaction enterprise. Algeria is a member of OPEC. Further, I note that Russia, Iran, Qatar, Algeria, and Venezuela announced recently they are meeting in Doha this week to discuss forming a natural gas cartel. This is very troubling.

Finally, I would point out that according to DOE's 2003 National Petroleum Council Gas Supply Study, the United States has almost 60 years of technically recoverable natural gas, but we need new technologies to produce them.

How does the administration's policy of reducing our reliance on imported energy sources square with its policies to encourage the imports of very large volumes of LNG, especially in light of this very disturbing news about a possible gas cartel?

Answer. Historically, U.S. imports of natural gas have come primarily from Canada by pipeline with small amounts of LNG imported from various countries. In the Energy Information Administration's most recent Annual Energy Outlook natural gas imports from Canada are forecast to decline and LNG imports are expected to rise to fill this gap.

The administration's role in addressing LNG imports is to ensure that importing facilities are permitted in a timely manner. The market will decide what facilities are economic, which ones will be built, and how much LNG to import. Furthermore, we don't believe intense discussions of a gas cartel are likely to result in the development of a cartel at this point, considering the relative infancy of the global LNG spot market.

The administration's policy of reducing our reliance on imported energy also includes research and development that will strengthen the Nation's energy security. For example, the administration has proposed to make the R&D investment tax credit permanent. Under the Advanced Energy Initiative, the 2008 Budget includes initiatives for hydrogen fuel, biofuels, plug-in hybrid vehicles, clean coal, nuclear,

and solar photovoltaics to help displace future demand for oil and natural gas. The administration also supports removing unnecessary barriers to developing existing reserves of oil and gas including, for instance, the environmentally responsible exploration and development of reserves in Alaska.

*Question.* Is the administration aware of the fact that if all LNG import facilities approved by the administration were built and operating at capacity we would be importing almost 60 percent of our natural gas most of it from many of the same countries that hold us hostage to imported oil?

*Answer.* The administration is responsible for permitting proposed LNG import facilities. However, the market will decide which ones will ultimately be built and become operational. It is unlikely that it would be economical to construct every LNG import facility that has been proposed, and historically LNG importing facilities have typically operated below their peak capacity levels. Also, Australia and Norway, countries that are viewed as reliable energy suppliers, are developing LNG exporting facilities that could supply U.S. markets.

*Question.* Who are the 10 largest U.S. investors and partners in building and operating regasification facilities in the United States?

*Answer.* There are currently only five built and operating LNG import terminals in the United States. These include the Distrigas terminal in Everett, Massachusetts owned by Suez; the Cove Point, Maryland terminal owned by Dominion; the Elba Island, Georgia terminal owned by El Paso; the Trunkline terminal in Lake Charles, Louisiana owned by Southern Union; and the Energy Bridge terminal in the Gulf of Mexico offshore Louisiana owned by Exceletrate Energy.

*Question.* Why would the administration propose eliminating all funding at DOE for natural gas supply research when we have 60 years of technically recoverable gas reserves in the United States but need new technologies to produce them?

*Answer.* Natural gas production is a mature industry that has every incentive, particularly at today's prices, to enhance production and continue research and development of technologies on their own. There is no need for taxpayers to subsidize natural gas companies in these efforts.

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QUESTIONS SUBMITTED BY SENATOR ROBERT C. BYRD

FUTUREGEN

*Question.* Mr. Secretary, in 2004, the President announced the initiation of the FutureGen project, a \$950 million, 10-year demonstration project to construct the world's first coal-fueled, near-zero emissions electricity and hydrogen power plant.

I have been supportive of the concept behind FutureGen. FutureGen, if successful in meeting the intended goals, could be a major breakthrough for a clean and efficient use of coal and good for the economic and environmental well being of our country and the world. However, ever since the inception of this project, I have been very vocal about my major concerns about the project—namely how the administration intends to pay for its \$700-plus million share of this project without robbing the basic Fossil Energy research and development programs and the total cost growth potential of this project, given increasing costs of construction and the types of unanticipated costs that usually accompany first-of-its-kind projects.

The Department of Energy's press release, dated April 10, announcing that the price of construction materials and equipment, labor, and other heavy construction expenses have significantly driven the estimated total costs of the FutureGen project to \$1.7 billion through fiscal year 2016 came as no surprise to this Senator. Even with the Department assuming \$300 million in anticipated power sales to offset the costs of the project, the Federal Government is still left with a hefty cost share of \$1.1 billion—at least \$300 million more than anticipated.

Despite the many inquiries I have submitted to the Department of Energy in the past, the Department has never been able to adequately explain to me how it is planning to fund its \$700 million-plus share for the FutureGen project. Can you explain to me how the Department plans to pay for this major escalation of an additional \$300 million?

*Answer.* The initial cost estimate for FutureGen was developed by the National Energy Technology Laboratory (NETL), which estimated the total cost of the FutureGen Project at approximately \$950 million in constant 2004 dollars. This cost estimate was included in the 2004 Report to Congress. While the Department has acknowledged that costs for some of the currently planned components of the FutureGen plant have generally increased, the Department has made no commitment beyond the \$39 million Government cost-share in Budget Periods Numbers 0 and 1. Budget Period No. 1 will begin the detailed design for the plant and re-

scoping of the project may be necessary to remain within budget. The cost for the FutureGen Project is shared between the Department of Energy, the FutureGen Industrial Alliance, and contributions from foreign governments. The Department anticipates requesting sufficient appropriations for the Government's cost-share for FutureGen to meet the objectives and schedule for this initiative.

*Question.* I have helped to provide funding for many major Government construction projects in the past and know that unanticipated costs are commonplace. Beyond inflation increases that DOE has just projected, how does the Department plan to cope with unforeseen costs that might arise with the construction of this first-of-its-kind project? How much funding has been set aside for future contingencies?

*Answer.* The project is structured in phases such that progression to the next phase depends on the successful accomplishment of objectives and milestones from each preceding phase.

To date, the cost basis estimate has remained the same as the original cost estimate identified in the March 2004 Program Summary to Congress. Contingencies are inherent in the base cost estimate as a function of design definition and technology development. The inherent contingency in the FutureGen cost estimate is consistent with industry recommended practices for a conceptual design with substantial advanced technologies. The costs associated with these contingencies are included in anticipated funding profile.

Cost and schedule risks are very real for large, first-of-a-kind projects and cannot be eliminated completely until construction is completed. We are making our best efforts to maintain budget for this important validation of the coal-based near-zero atmospheric emissions concept.

*Question.* In fiscal year 2008, the FutureGen program is funded at \$108 million, a 500 percent increase from the fiscal year 2006 level, while the Natural Gas R&D program, the Oil R&D program, and the Innovations for Existing Plants program under the Coal R&D program were zeroed out. This is a very disturbing trend, and one that I suspect will only worsen as the project goes to construction in future years. Will you be cutting into the Coal R&D program even deeper to fund cost growths in FutureGen?

*Answer.* During the 2000 campaign, the President committed to spend \$2 billion over 10 years on clean coal technology. The budget completes that commitment 3 years ahead of schedule, with \$385 million in funding for the Coal Research Initiative in 2008. The funding levels in the budget for clean coal activities are among the highest in this administration and also from any President in the last 2 decades.

The fiscal year 2008 budget request for FutureGen, when adjusted for inflation, is consistent with the funding profile as disclosed in the FutureGen Program summary as reported to Congress in fiscal year 2004. The fiscal year 2008 funding request is to cover NEPA compliance, significant design activities, and procurement of long-lead items. FutureGen is integral to the Coal R&D program, and continual investments in the coal R&D program are necessary in order to support the development of technologies to drive towards the goal of near-zero atmospheric emissions coal, which includes the integrated, scale-up testing of the necessary R&D.

The Natural Gas research and development (R&D), the Oil R&D, and the Innovations for Existing Plants programs are proposed for termination because the Federal R&D role in these areas have been completed and industry should take on that responsibility. The oil and gas industry has the incentives and resources to accomplish oil and gas R&D without additional Federal subsidies, which are unwarranted in today's price environment. Promulgation of CAIR and CAMR provided a market incentive for developing many advanced, cost-effective emissions controls and has ended the need for Federally funded R&D in areas under the Innovations for Existing Plants program. The current fiscal year 2008 budget request has been formulated based on the needs of the Fossil Energy Program and is consistent with meeting the goals and objectives of the Department's Strategic Plan.

*Question.* What role will the National Energy Technology Laboratory play in FutureGen? Enough to support the approximately 1,200 Federal and contractor staff who currently support Fossil Energy Research and Development program?

*Answer.* The National Energy Technology Laboratory (NETL) has the lead responsibility for managing the FutureGen project as well as the many other projects that it has under its purview to advance the Department's goals and carry out its mission.

*Question.* If FutureGen is successful, will the Department be able to deploy FutureGen-type technologies in other locations across the country in coming decades or will additional resources, studies, tests, and demonstrations to expand deployment of these technologies be necessary?

*Answer.* The goals of the FutureGen project are to prove the technical feasibility and economic viability of a near-zero atmospheric emission coal energy option, thus

leading to the broad acceptance of the concept. The FutureGen project has been designed to operate under real-world conditions and at large enough scale to adequately prove the viability of the concept. The key is to prove that near-zero atmospheric emissions coal is technically viable and that its costs are not prohibitive. The coal research and development program of which FutureGen is a part, is designed to advance the development of technologies that reach the goal of near-zero atmospheric emissions while increasing efficiencies, increasing clean energy production, and decreasing costs. Ultimately, the market will determine when and how many of these plants are deployed, yet a successful operation of the first FutureGen plant is an important prerequisite to the widespread deployment of near-zero atmospheric emission coal plants.

#### CLEAN COAL POWER INITIATIVE

*Question.* The administration has included \$73 million for the Clean Coal Power Initiative (CCPI) in the fiscal year 2008 budget, which is a considerable improvement over the \$5 million that the President sought in his fiscal year 2007 budget request.

I understand that two CCPI Round II projects are experiencing cost growths. Will the fiscal year 2008 CCPI funds be used to make up these cost growths and how much would be made available to each project? How much fiscal year 2008 funding and how much prior-year funding will be applied to a third CCPI solicitation?

*Answer.* Additional funding provided by DOE to an awarded project to help cover project cost growth due to the increase in material, equipment, and skilled labor cost comes from unobligated funds appropriated to the coal demonstration program before fiscal year 2006. These are funds previously committed to projects which have withdrawn from the demonstration program since selection and would be used for the Round III solicitation absent cost growth in projects from previous rounds. Funds provided to a project to cover cost growth will not be available to fund projects selected in CCPI Round 3. No fiscal year 2008 funds will be used to cover any cost growth for existing projects but cost growth will reduce the funding available for the next round of solicitations. The CCPI program operates under the fiscal constraints of the Clean Coal Technology program, so the maximum allowable increase in the Government share to these projects is 25 percent over the Government's original estimate of costs. In the case of the Southern Company, Orlando IGCC project, this means a maximum increase in the Government share of \$59 million, and \$59 million in cost growth has been approved. In the case of the Western Greenbrier Cogen. WV a FBC project, this means a maximum potential increase in the Government share of \$28 million, but no cost growth has been approved. Combined, the maximum potential net reduction in the planned fiscal year 2008 CCPI solicitation is \$87 million, of which \$59 million has been approved.

CCPI will complete the Round 3 solicitation using unobligated funds from projects that were selected but not awarded, plus appropriations that have not yet been committed to projects. We believe this cumulative amount is sufficient for proceeding with a Round 3 CCPI solicitation.

#### COAL-TO-LIQUIDS INITIATIVE

*Question.* It is my understanding that the coal-to-liquids process is only commercially feasible when the price for crude oil is at \$40 per barrel or higher. What is the Department of Energy doing to provide price guarantees or other financial incentives for investors? Does the administration support legislation that promotes coal-to-liquids projects?

*Answer.* The Department is closely following the response to the incentives established by the Energy Policy Act (EPACT) of 2005 which include coal-to-liquids deployment projects being eligible for incentives such as tax credits and/or loan guarantees as authorized in EPACT.

The President has set a goal of increasing the supply of renewable and alternative fuels, including coal-derived liquid fuels, by setting a mandatory fuels standard to require 35 billion gallons of renewable and alternative fuels in 2017—nearly five times the 2012 target now in law. In 2017, this will displace 15 percent of projected annual gasoline use.

The administration wants to work with Congress to allow coal-derived liquids to be eligible under the proposed alternative fuels standard. The standard should be structured to allow the market to determine the most efficient way to meet the standard, including to what extent coal-derived fuels will be used.

*Question.* I understand that there are environmental concerns associated with the coal-to-liquids process. What support can the Office of Fossil Energy provide to industry in identifying ways to incorporate the capture and storage of carbon dioxide

emissions from the coal-to-liquids process and from using the fuel produced by the process?

Answer. The Office of Fossil Energy is supporting industry in this area through its carbon sequestration technology development effort. This Carbon Sequestration Program includes laboratory and pilot-scale research aimed at developing new technologies and systems for greenhouse gas mitigation, which could be applied to coal-to-liquids processes as well as other industrial processes, though the primary objective is to apply them to power generation systems. In 2007, the program is beginning work on the "highest potential" opportunities for an initial expedited round of large scale sequestration tests (approximately 1 million tons CO<sub>2</sub> per year for each site). DOE has provided additional funding in the fiscal year 2007 budget for the Carbon Sequestration Program to award several large volume sequestration tests.

IMPACT OF THE FISCAL YEAR 2008 BUDGET ON THE NATIONAL ENERGY TECHNOLOGY LABORATORY

*Question.* If this fiscal year 2008 budget is enacted, how many Federal, contractor, and construction jobs will be eliminated at the National Energy Technology Laboratory, which is based in Morgantown, West Virginia; Pittsburgh, Pennsylvania; and Tulsa, Oklahoma; with smaller offices in Tulsa, Oklahoma; and Fairbanks, Alaska?

Answer. We are managing our human resources effectively to achieve our program goals and do not anticipate significant changes in staffing levels.

*Question.* In the past, NETL has received approximately \$2 million per year in General Plant Projects, which covers critical maintenance needs. Can you tell me why the past several Fossil Energy budgets have zeroed out funds for critical maintenance at the major NETL sites, all of which are more than 40 years old? Will this impact the health and safety of the workers?

Answer. NETL received almost \$2 million in fiscal year 2006 for General Plant Projects and \$4 million in fiscal year 2007. It is anticipated that NETL has sufficient funds to continue these activities in fiscal year 2008.

CLEAN ENERGY TECHNOLOGY EXPORTS INITIATIVE

*Question.* I initiated the Clean Energy Technology Exports (CETE) Initiative in the fiscal year 2001 Energy and Water Appropriations bill. The administration then completed a 5 Year Strategic Plan in 2002. From fiscal year 2004–2006, I helped provide \$1.6 million in funding to help further this initiative.

Please provide me with a detailed account on how these appropriated funds were utilized.

Answer. The Department remains committed to the goals of the Clean Energy Technology Export (CETE) Initiative. I have attached a matrix of our spending allocations in 2005 and 2006. In summary, we have funded programs that support direct partnership with industry, as well as programs that coordinate interagency efforts and improve the efficacy of Federal activities to support deployment.

**CETE PROJECTS**

Activity/Short Title	Project Partners/ Leverage	Summary Comments	Funding Amount (in thousands)
Fiscal Year 2005			
CETE Website .....	GETF .....	Provides central site for CETE info dissemination, and to summarize opportunities from other donor organizations like EBRO, ADB and GEF. Allows both novice and sophisticated market players to find appropriate points of contact for questions. Could eventually be used to track performance metrics.	\$25
DOE-USAD Hydropower Partnership .....	U.S. Hydropower Council for International Development. \$200k from USAID and private sector.	Fiscal year 2005 focus on project development and closure in India, Mexico and Guatemala. Track record of success. Multiple private sector partners.	100
Sustainable Finance .....	Resource Mobilization Advisors (RMA). \$200k from U.K. Govt, MADBank and World Bank.	Continue work in Poland and Mexico. Initiate work in Philippines to build portfolio of viable EE projects for investment. Initiated study on Financing Mechanisms to support clean energy with input from private partners and U.S. agencies. Supported Resource Guide as outreach tool for U.S. exporters.	175
Management Plan .....	ORNL .....	.....	75
Tsunami Study .....	Argonne .....	.....	75
Sustainable Communities .....	GTI .....	.....	35
Green Olympics/Beijing .....	ORNL .....	.....	45
REEEP .....	.....	.....	50
Africa Geothermal .....	.....	.....	15
Fiscal Year 2006			
CETE Website .....	Global Environment Technology Foundation (GETF) .....	Provides central site for CETE info dissemination, and to summarize opportunities from other donor organizations like EBRO, ADB and GEF. Allows both novice and sophisticated market players to find appropriate points of contact for questions. Could eventually be used to track performance metrics.	40
DOE-USAD Hydropower Partnership .....	U.S. Hydropower Council for International Development. \$400k from USAID and private sector.	Fiscal year 2006 focus on project development and closure in India and Guatemala. Track record of success with more than \$50 million in projects finalized in the past 2 years. Multiple private sector partners.	150
Sustainable Financing for EE .....	Resource Mobilization Advisors (RMA). \$500k from Philippine Govt, MADBank, USDA and World Bank.	Expect to close on \$10 million in EE project with U.S. partners in Mexico in next 6 months. New deals in Poland and Philippines in next 18 months.	100

Africa Geothermal Mission .....	EERE, Govt of Kenya .....	Reverse trade mission bringing officials from Kenya to U.S. Geothermal Conference to meet multiple vendors.	30
Energy Efficiency Initiative in Ukraine .....	IRG, Govt of Ukraine. \$600K from USAID .....	Create audit fund and project development support with U.S. ESCO's and local partners in Ukraine. CETE money will piggy-back USAID to help engage U.S. technology vendors.	50
Clean Tech in Thailand with Southern States Energy Board (SSEB) .....	FE, SSEB, Govt of Thailand .....	Good exposure to technology vendors in 16 States through SSEB. Track record of success. Multiple SME private partners. Potential projects include biomass/coal hybrid and upgrades to existing thermal plants.	40
India Coal Beneficiation .....	FE, Govt. of India .....	Builds on previous studies. Necessary to mitigate negative environmental impacts of near-term coal expansion in huge market. Multiple potential private partners. Could expand under Asia Pacific Partnership. Possible USAID/India buy-in.	45
China Ombudsman for Renewable .....	U.S. companies attending Renewable Conference .....	Goal is to set up side meetings with interested parties in China around conferences where U.S. companies are participating and/or exhibiting. First event is in September 2006.	29
China Combined Heat and Power (CHP) .....	LBNL, U.S. CHP Association .....	Seed funding to develop a market plan, consider tech options and get U.S. vendors involved. Huge market potential.	45
Caribbean—New Energy sources .....	IDB, CARICOM, USAID .....	Support for new initiative to explore alternatives to fossil fuel in the broad Caribbean market. Launch Conference in September. CETE funding used to engage U.S. vendors for wind, hydropower and biofuels technology.	20
Pl-Kazakhstan Nuclear power tour .....	ORNL, Nuclear Energy Institute (NEI), Govt of Kazakhstan .....	Responds to S-1 trip. Reverse trade mission to visit U.S. sites with potential vendors and investors. Large market and potential for U.S. sales.	45
Pl-Kazakhstan Petrochemical Industry Tour .....	GOK .....	Responds to S-1 trip. Reverse trade mission. U.S. industry interest unclear.	89
Total .....	.....	.....	594

In fiscal year 2006, we instituted performance metrics to measure the specific and tangible impact of the CETE program and we also solicited input on jointly funded projects. As a result, we are now co-funding projects with USAID, TDA and the DOE Offices of Fossil Energy and Energy Efficiency and Renewable Energy.

We have supported programs in 13 different countries in partnership with more than 20 private companies and 10 international organizations. Our funding is being leveraged at least 2:1 with other resources from private partners and other donor organizations.

The programs we are supporting are intended to benefit multiple projects with multiple U.S. vendors and developers, and yet could not be accomplished by any one U.S. company acting alone.

Regarding interagency coordination, we host CETE Working Group meetings on a quarterly basis. Representatives from all nine participating agencies regularly attend. We have also developed the "Clean Energy Exports Assistance Network" ([www.cleean.net](http://www.cleean.net)) as a tool to better inform U.S. clean technology partners of specific energy market conditions and opportunities, and to better coordinate interagency resources.

We also supported the preparation of a report titled "Financing Mechanisms for Clean Energy Technology Exports" with input from industry and CETE participating agencies. The report may be found at the website.

*Question.* Because the Department of Energy has discretion to fund programs through the fiscal year 2007 Joint Funding Resolution, what is the Department doing to further develop and integrate the CETE Initiative into its overall international energy technology deployment strategies?

What does the Department plan to do to continue to pursue the goals of the CETE Initiative in fiscal year 2008?

*Answer.* The Office of Policy and International Affairs and the Office of Energy Efficiency and Renewable Energy are working together to define useful projects for fiscal year 2007 and an overall strategy for programs in fiscal year 2008. The goal is to focus on projects that may create lasting institutional abilities, and that have the potential to transform markets.

Programs we are considering in fiscal year 2007 include further input to the website ([www.cleean.net](http://www.cleean.net)), and a training program on clean energy technologies for foreign service and foreign commercial service officials. We also plan to support industry events focused on new market opportunities in China, Central American, and the Caribbean.

In fiscal year 2008, we want to pursue a strategy of integrating the CETE goals into our international programs by ensuring better industry participation and more effective coordination with other agencies and with large donor organizations such as the World Bank and the Global Environment Facility. We expect to narrow our focus to fewer strategic markets, and to support activities in those markets that offer the greatest potential for commercial implementation.

*Question.* How is the Department and the administration integrating CETE with other administration activities such as the Asia-Pacific Partnership?

*Answer.* As you know, the CETE program encompasses all clean technologies and is global in focus whereas the Asia-Pacific Partnership (APP) has seven technology-based working groups and is a partnership of six countries: Japan, Australia, S. Korea, India, China and the United States. Further, the goals of the CETE program are to support the efforts of U.S. industry, while the APP more broadly supports green-house gas emission reductions with participation by industries from all member countries.

*Question.* How is the Department working with other Federal agencies as well as the private sector on all of these initiatives?

*Answer.* Despite the differences in focus, we are coordinating efforts through the CETE interagency working group and on the website ([www.cleean.net](http://www.cleean.net)). Many of our industry partners under the CETE umbrella also participate in the APP. We anticipate that some projects supported under the CETE program in India and China may be good candidates for funding under the APP and vice-versa.

#### GAO REPORT

*Question.* In December 2006, the GAO issued a report entitled "Key Challenges Remain for Developing and Deploying Advanced Energy Technologies to Meet Future Needs."

The report summarized that despite the United States being more and more reliant on imported energy resources, the DOE's total budget authority for fossil energy R&D dropped from \$1.9 billion (in real terms) in fiscal year 1979 to \$434 million in fiscal year 2006. With the Energy Information Administration projecting that

total U.S. energy demand will increase by about 28 to 35 percent between 2005 and 2030, GAO recommended that the Congress consider further stimulating the development and deployment of a diversified energy portfolio by focusing R&D funding on advanced energy technologies.

I note with disappointment that DOE had no comment on this recommendation. Would you please provide me with your comments on GAO's recommendations?

Answer. The GAO report provides valuable information that will be useful to the Department and the Government (in general terms) in connection with our research and development activities. Success in R&D is measured by its transition to commercial application. Examples in the oil and gas sector include down-hole telemetry, horizontal drilling, 3-D seismic analyses, and polycrystalline diamond drill bits, all of which have been adopted by the industry. Examples in the area of renewable energy are geothermal energy and hydropower, both now considered as fully developed technologies. The GAO report also notes that there is over \$5 billion in tax expenditures (financial incentives) targeted at energy suppliers and users of advanced technology. The Energy Policy Act of 2005 augments these incentives with an estimated \$11 billion worth of additional financial incentives over 10 years. The primary role for Government in this area is to fund high-risk, basic energy research, as was explicitly outlined by this administration in the Research and Development Investment Criteria issued in 2003. The GAO study fails to take stock of the increases over the last 2 decades in funding in this area, offsetting some of the declines in applied R&D. Taking into account all of these factors, we believe that DOE R&D is sufficient to meet our Nation's energy needs.

#### OIL AND GAS PRICE RELATIONSHIP

*Question.* Would you please provide comments on EIA forecasts of natural gas and oil prices in its Annual Energy Outlook (2005 to 2007). It appears that each year, EIA significantly underestimates future prices of these fuels, specifically:

In EIA's Annual Energy Outlook 2006 and 2007, natural gas price forecasts depart from a traditional price relationship to oil based on Btu parity, as demonstrated in the 2005 version. This departure is evident in both the reference case and the high oil price scenario. What is the basis for this significant departure? Why do industry analysts continue to stick with the traditional gas-oil price relationship while EIA sees the price ratio as almost doubling as in the high oil price case? (EIA)

Answer. The historical record shows substantial variability in oil and natural gas prices and in the relationship between them. The ratio between the annual average prices of a barrel of West Texas Intermediate (WTI) oil and one million British Thermal Units (BTU) of natural gas at the Henry Hub has varied since 1990 from a high of 14.5 to a low of 5.7.

Historically, fuel switching between oil and gas was thought to have been a major contributor to the price relationship, but there has recently been some decline in the capacity to switch between these fuels in many end-use applications. While oil and natural gas continue to compete in some applications, oil and natural gas prices are also linked to the availability of alternative sources of supply; competition between coal, nuclear power, renewables, and natural gas as fuels for electricity generation; the availability and cost of inter-fuel conversion technologies, such as gas-to-liquids; environmental restrictions; and the relative importance of transportation costs in the total delivered price of energy from each source, which affects the regional scale of inter-fuel competition. EIA expects there to be a relationship between oil and natural gas prices that varies somewhat depending on many factors, not necessarily a constant ratio of price between oil and gas that is closely linked to the ratio of their energy content that some industry analysts expect.

Tighter markets, as we have experienced in recent years, result in greater price impacts from similar shifts in demand or supply than would be seen in looser markets. On the supply side, higher oil prices result in increased drilling for oil and thus higher costs for oil and gas drilling, placing upward pressure on gas prices. Higher oil prices also generally result in increased cash flow and the potential for greater investment in oil and gas prospects, placing downward pressure on gas prices. Over the longer-term, world markets will play a larger role in determining the relationship between oil and natural gas prices in the United States due to increasing trade in liquefied natural gas. This relationship will be influenced by worldwide fuel switching capability, exploration and production costs (E&P) costs, and the potential for a growing gas-to-liquids market.

Numerous changes occur from one Annual Energy Outlook (AEO) to another. Nothing was specifically implemented in the model to change the oil-to-natural gas price relationship. For example, natural gas prices in the AEO2006 and AEO2007 are higher compared to the AEO2005, partially as a result of much higher costs.

Higher prices resulted in slower projected growth in residential, commercial, and industrial gas consumption through conservation and inter-fuel substitution. In the power generation market, higher natural gas prices dramatically lower the future natural gas generation share and raise the coal share from what it might have been with lower natural gas prices. However, notwithstanding the possibility of significant policy changes affecting energy use over the next 25 years, AEO reference case projections generally assume that current laws and policies remain in place indefinitely, in order to provide a baseline for policy analyses requested by Congress and the administration. Should future policy actions to mitigate greenhouse gas emissions preclude significant growth in coal-fired generation, and if new nuclear power plants that would be economically attractive under such circumstances are blocked by other concerns, continued growth in gas-fired generation would likely reduce the future ratio of oil-to-natural gas prices from that projected in AEO2007.

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QUESTIONS SUBMITTED BY SENATOR DIANNE FEINSTEIN

ELK HILLS

*Question.* As compensation for the Federal Government's sale of the Elk Hills Reserve, Congress mandated in the fiscal year 1996 National Defense Authorization Act (Public Law 104-106) that 9 percent of the net sales proceeds be provided to California for its claims to State school lands located in the Reserve. Of the \$317.7 million owed to the State under the terms of this settlement, approximately \$300 million has been paid to date.

The Department of Energy's fiscal year 2008 budget does not provide for the remaining compensation. It is my understanding that California has already agreed to allow the Department to hold \$6 million of the remaining compensation as a "worst case scenario" to complete the equity finalization process. The State is willing to come to a compromise with the Department over the remaining payment, and has offered to complete the claim with a final appropriation of \$9.7 million. Would this be an acceptable solution to the Department, and if not, why?

*Answer.* If the State of California wishes to submit a proposal to the Department, we are open to considering it.

*Question.* What is the Department's timeline to complete this settlement with the State of California?

*Answer.* The equity finalization process is a complicated matter, and thus the timeline is uncertain.

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QUESTIONS SUBMITTED BY SENATOR PETE V. DOMENICI

CARBON SEQUESTRATION

*Question.* Mr. Shope, as you are well aware, coal is the most CO<sub>2</sub> intensive source of energy. Today, 75 percent of coal reserves are held by the United States, Russia, China, India and Australia, and it is clear that coal will be a major energy provider for each of these nations for the foreseeable future.

The recently released MIT report, *The Future of Coal*, stresses the importance of large-scale demonstration projects for carbon capture and storage technologies. The authors conclude that projects inject less than 1 million tons of carbon dioxide per year and will not be large enough to replicate the geological stresses that a full commercial scale operation would produce. I understand that the current carbon injection projects are on a much smaller scale.

Do you agree that such large-scale demonstrations are needed, and in what time-frame? What is the Department doing to expand its R&D efforts in this area?

*Answer.* The Department of Energy (DOE) agrees that large-scale projects are necessary to demonstrate that carbon sequestration technologies are necessary to replicate commercial-scale operations. DOE has been planning for large-scale sequestration tests since 2004. The Regional Carbon Sequestration Partnerships are currently conducting some smaller tests that are helping to build the infrastructure and demonstrate the technology on a small scale. In 2007, the program is beginning work on the "highest potential" opportunities for an initial expedited round of large scale sequestration tests (approximately 1 million tons CO<sub>2</sub> per year for each site). DOE has provided additional funding in the fiscal year 2007 budget for the Carbon Sequestration Program to award several large volume sequestration tests. The DOE is in the process of negotiating these large volume tests with the Regional Partnerships and plans to make some of the awards by the end of fiscal year 2007. The

Regional Partnerships have come forward with a portfolio of project opportunities, a variety of geologic conditions, and future commercialization opportunities.

*Question.* Has the Department developed a R&D roadmap to address the challenges facing adoption of carbon capture and sequestration?

*Answer.* The DOE Carbon Sequestration Program issues a revised roadmap annually in May. It contains a discussion of the program's structure, challenges, and goals for technology development. This roadmap can be downloaded from the following website: [http://www.netl.doe.gov/publications/carbon\\_seq/refshelf.html](http://www.netl.doe.gov/publications/carbon_seq/refshelf.html).

#### CHINA—CARBON SEQUESTRATION COLLABORATION

*Question.* The MIT study also calls for up to 10 other large-scale demonstration projects in other countries. China in particular is building coal-fired power plants at a spectacular rate.

Would you support a major initiative to partner with China to develop carbon capture and storage technologies?

*Answer.* The Department is actively engaged with China on the development of carbon capture and storage technologies. China is involved in the FutureGen Alliance. China is also a member of the Carbon Sequestration Leadership Forum, whose purpose is to make information on viable carbon capture and storage projects broadly available internationally and identify and address wider issues relating to carbon capture and storage. Finally, carbon sequestration is within the purview of the Asia Pacific Partnership's Cleaner Fossil Energy Task, in which both China and the United States participate. We look forward to continued collaborations with China in the area of carbon capture and storage.

*Question.* In your view, how can we best encourage China to collaborate with the United States in developing these technologies?

*Answer.* The Department of Energy (DOE) will continue to encourage China through involvement in the Carbon Sequestration Leadership Forum, the FutureGen Alliance, and the Asia Pacific Partnership on Clean Development and Climate. China is a member of the Carbon Sequestration Leadership Forum, whose purpose is to make information on viable carbon capture and storage projects broadly available internationally and identify and address wider issues relating to carbon capture and storage. China is also involved in the FutureGen Alliance. Finally, the DOE and China are members of the Asia Pacific Partnership on Clean Development and Climate, which has a mission to promote the technical transfer and demonstration of clean coal technologies. We would look forward to this continued collaboration with China.

#### CARBON CAPTURE R&D

*Question.* Developing carbon capture and storage technologies will require progress on several research fronts. First, the costs of carbon capture must be brought down to affordable levels. Second, the feasibility of injection technologies must be demonstrated at commercial scales. Third, monitoring and verification technologies must be developed.

Which of these research areas do you believe to be the most challenging given today's technologies?

*Answer.* The Department of Energy (DOE) believes that the demonstration of carbon storage at the appropriate scale and the development of low-cost carbon capture technologies are equally important. The need to demonstrate carbon storage at scale is needed to stress the injection operations and determine the effects on the storage formations. Different geological conditions and settings need to be assessed to show that the capacity and injectivity exists for full scale deployment. Protocols for the site selection, characterization, well construction, permitting, monitoring, and closure need to be developed from these projects so that full scale deployment can occur. Carbon capture technologies exist today in industrial applications, but have not been demonstrated at full scale in conjunction with electricity generation. In addition, the commercial systems that exist today would increase the cost of electricity by approximately 30 percent to 80 percent, for pre and post combustion technologies, respectively. Novel capture technologies are being researched in the laboratory and have the potential to reduce the increase in cost of electricity to DOE's goal of not more than 10 percent. Continued research and demonstration of these technologies is needed at a pilot-scale and in full-scale integrated demonstration. Monitoring, mitigation, and verification technologies are necessary but new technologies are not critical to deployment of carbon capture and storage as a greenhouse gas mitigation technology. Existing technologies can be adapted for monitoring CO<sub>2</sub> in geologic formations. Advancement in this area could improve our knowledge of the fate of CO<sub>2</sub> and drive down the associated cost of monitoring.

*Question.* In your view, how should the Office of Fossil Energy allocate its resources between these areas?

*Answer.* The Department of Energy (DOE) has issued a roadmap for technology development, which is working to stage the funding requirements for the capture and storage demonstration projects. Early emphasis is on the demonstration of storage projects and bringing down the cost of CO<sub>2</sub> capture. As the capture program has success in developing novel technologies for low cost capture, DOE is supporting pilot and demonstration tests to demonstrate that these capture technologies are ready for commercial deployment.

*Question.* How should the Federal Government and the private sector share the cost burden of developing these technologies?

*Answer.* The Department's Carbon Sequestration Program administers research and development awards through cooperative agreements, which require that participating organizations provide a minimum of 20 percent cost share. For demonstration projects selected under a Clean Coal Power Initiative solicitation, the recipient would need to provide a minimum of 50 percent cost-share and agree to a schedule to reimburse the Government based on future revenues from sales of the commercialized technology.

#### TAXATION OF COAL R&D DOLLARS

*Question.* Under the Clean Coal Power Initiative, Round 2, the Department of Energy has authorized funding of various private sector projects to demonstrate advanced clean coal technology, including advanced gasifier technology.

It is my understanding that the IRS has changed its long standing policy toward Federal research funding to make these funds taxable as corporate income. The practical effect of this policy change is that one branch of government is providing funding to encourage a public purpose activity, while another branch of government is reducing that funding by taxing it.

I have worked too hard on this subcommittee and as Chairman of the Energy Committee to make Federal energy R&D research a priority. Now to have the IRS change it's policy to levy a huge tax on the Federal R&D funds would be devastating in our effort to increase our energy independence.

Can you please explain the logic behind this decision and what impact it will have on Federal R&D efforts to have upwards of one-third of the funding going toward tax payments instead of research?

*Answer.* I would refer you to the Department of Treasury for an explanation and rationale of their decisions.

*Question.* Has Secretary Bodman contacted Treasury Secretary Paulson to discuss this matter?

*Answer.* The Department of Energy has been in contact with the Treasury Department to understand the rationale behind this ruling and what options may be available under current law to utilize allocated research and development funding.

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#### QUESTION SUBMITTED BY SENATOR WAYNE ALLARD

##### NAVAL OIL SHALE RESERVES ROYALTY DISTRIBUTION

*Question.* As you may be aware, when Congress transferred Naval Oil Shale Reserves (NOSR) Numbers 1 and 3 from the Department of Energy to the Department of the Interior in 1998 the legislation stated that DOI could not begin the "normal" process of royalty distribution until DOE was compensated for their "original investment" and for the costs of cleanup of the Anvil Points facility. To ensure this happened section 7439 (f)(2) of the Transfer Act stated that the Secretaries of Interior and Energy must jointly certify to Congress that the monies have been recouped prior to making revenue available for distribution to the State of Colorado.

Oil and gas receipts collected from production within NOSR Number 3 have now far surpassed the estimate of what was needed to fully reimburse DOE for their original investment as well as covering the cost of environmental remediation at the Anvil Points site. It is my understanding that the agencies will not agree to certification until the necessary clean-up is complete. As you and I both know, that will likely take several more years.

I was serving in the Senate at the time and played an active role in the passage of this provision. It is my view that DOE and DOI have misread the intent of Congress in determining that the clean-up must be complete. Can you please tell me what this position was based on?

*Answer.* Although the Department of the Interior assumed responsibility for the environmental remediation of Anvil Points, the Secretary of Energy must certify

that there are adequate funds in the account to offset all costs incurred by the Government, including the Department of the Interior's proposed cleanup plan. It is our understanding that Department of the Interior has not finalized its cleanup plan; consequently the cost of that plan remains to be estimated.

At such time as the Department of the Interior completes the plan along with the estimate of costs, the Department of Energy stands ready to quickly review and certify whether the funds generated exceed the total costs. We will continue to work closely with the Department of the Interior to facilitate the completion of the necessary measures to initiate the appropriate distribution of the royalty payments from the former Reserves.

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QUESTIONS SUBMITTED TO KEVIN M. KOLEVAR

QUESTIONS SUBMITTED BY SENATOR BYRON L. DORGAN

CONSOLIDATION OF RESEARCH PROGRAMS

*Question.* I have noticed that the Distributed Energy Systems has been renamed to Renewable and Distributed Systems Integration. The funding has been reduced and the focus changed to distributed generation technologies on the utility side of the meter. What has happened to development of technologies on the customer side of the meter? Has it been reduced, eliminated, or moved to another research area? Why was this done?

*Answer.* The Office of Electricity Delivery and Energy Reliability's (OE) Distributed Energy Systems budget line has been renamed to reflect the fact that distributed generation technologies have been completed. The Distributed Energy Program has met its performance targets of: (1) achieving three integrated energy systems (combined heat and power systems) of greater than 70 percent efficiency; (2) demonstrating a 38 percent efficient microturbine; and (3) demonstrating a 44 percent efficient reciprocating engine. The research efforts will now address Renewable and Distributed Systems Integration (RDSI), as reflected in the budget request. This research will concentrate on the integration of renewable and distributed energy technologies into the grid at the distribution system level.

The successful demonstration of this integration could substantially increase the use of renewable and distributed energy for supplying power and other ancillary services during peak load periods in support of electric distribution operations. These projects will also demonstrate the ability of these technologies to reduce power required to the distribution feeder. This will be accomplished through: modeling, design, integration, and RD&D of renewables and distributed energy integration into the distribution system; low-cost sensors; advanced monitoring; and consumer information. The goal of RDSI is to demonstrate a peak load reduction of 20 percent by 2015 and improve asset management on distribution feeders. This will be accomplished through the implementation of distributed energy (including renewables) and energy management systems that are cost competitive with system capacity upgrades.

The development of technologies on the customer side of the meter is the responsibility of the Office of Energy Efficiency and Renewable Energy. Currently, only renewable technologies that can be placed on the utility side of the meter are being supported in this office. The Distributed Energy activities were moved by Congress in the fiscal year 2006 appropriations.

*Question.* DOE has developed programs such as GridWise and GridWorks to facilitate grid systems integration while fostering development of the "smart grid" concept. Your office has restructured and streamlined your R&D programs in fiscal year 2007 and into fiscal year 2008.

Thus, what is the status of these efforts? What has your office done since the 2003 Blackout to address the role of advanced technologies to avoid similar situations and to coordinate with the private sector to shepherd these technologies into the marketplace?

*Answer.* In fiscal year 2005, the Department issued a solicitation and awarded cooperative agreements in support of the Gridwise and Gridworks research plans. Some of these awards are completed and others are still in progress. The Department remains committed to completing the activities initiated under this solicitation for Gridwise and Gridworks. As a result of these activities, the Department has recognized the need to promote advanced grid control technologies (Gridwise) and improved hardware (Gridworks) in a systematic manner.

We have identified the causes of the 2003 blackout and have made progress in implementing the recommendations made by the U.S.-Canada Power System Out-

age Task Force (Task Force). The most important recommendation of the Task Force was for the U.S. Congress to enact legislation to make compliance with reliability standards mandatory and legally enforceable, which the Congress did in the Energy Policy Act of 2005. The Federal Energy Regulatory Commission implements this policy through oversight of the North American Electric Reliability Council as the Nation's "Electric Reliability Organization."

The electricity delivery system is extremely complex and remains subject to combinations of mechanical and human failures. Although improvements have been made to the grid since 2003 in areas such as operator training, we can never entirely prevent blackouts from occurring. What we can do is improve our ability to identify and isolate problems on the grid when they arise. That is why my office works with transmission system operators on the next level of technologies that will increase the ability of operators to receive real-time information regarding transmission problems.

It is also important that we are not just prepared for a blackout similar to that of August 14, 2003; we must be well-prepared for a wider range of possible events. The Office of Electricity's (OE) Infrastructure Security and Energy Reliability program provides hands-on expertise to assist in the recovery of the transmission network, no matter what the cause of the failure. Finally, under authority from the Energy Policy Act of 2005, OE assists State and regional planners by identifying areas of electric congestion, coordinating Federal authorizations required to site new transmission, and where appropriate, designating national interest electric transmission corridors to enable the FERC, under certain circumstances, to site transmission facilities.

#### HIGH TEMPERATURE SUPERCONDUCTIVITY RESEARCH

*Question.* I note that the funding level for high temperature superconductivity research and development has been cut by 42 percent from the funding level in fiscal year 2006. Why such a significant cut? What technology applications are being reduced because of these cuts?

*Answer.* The cut was to focus the high temperature superconductivity program on higher priority wire development and cable demonstrations (including fault current limiters). The cut in high temperature superconductivity reflects phasing out of motor research and completing flywheel cooperative agreements.

#### ELECTRICITY TRANSMISSION AND ENERGY DELIVERY

*Question.* I have noted your office's work on determining areas of congestion and defining national corridors as well as your work in siting and permitting. North Dakota has a variety of energy resources that are stranded and that are not able to move to markets. What is your office doing to help promote and expand transmission delivery and efficiency in North Dakota and around the country?

*Answer.* My office is involved in four major activities to help transmission delivery and improve efficiency in North Dakota and around the country.

First, in August 2006, in accordance with section 1221(a) of the Energy Policy Act of 2005 (EPACT), the Department of Energy (DOE) released the National Electric Transmission Congestion Study (Congestion Study), which examined transmission congestion and constraints and identified constrained transmission paths in many areas (except Texas) that are facing growing demand. The congestion study identified three categories of congestion areas that merit further attention throughout the continental United States. The third type of congestion areas in the study, "Conditional Congestion Areas," identified areas where congestion is not presently acute, but could become so if considerable new electric generation were to be built without associated transmission capacity. The region from the Dakotas-Minnesota falls into this category because it contains potential locations for new large-scale wind and coal generation that could serve distant load centers.

Second, in addition to fulfilling the EPACT requirement that the Department update the Congestion Study every 3 years, DOE will also issue annual reports in the interim that detail the progress made in addressing the congestion challenges as identified in the 2006 Congestion Study. My office is preparing a draft for the Department's Congestion Alleviation Update that will be published in fall 2007. This update will detail the transmission, generation, and demand reduction activities that have occurred in the areas of transmission congestion that the Department identified in its August 2006 study.

Third, my office is implementing two other areas of EPACT that relate to transmission delivery. One of these is in accordance with EPACT section 368 and is a joint effort with the Departments of Agriculture, Commerce, Defense, and Interior to designate energy corridors on Federal lands for oil, gas, and hydrogen pipelines

in addition to electricity transmission and distribution facilities. A record of decision for the 11 contiguous Western States, is expected to be completed in fiscal year 2008. Corridor designation for the Eastern United States, Alaska, and Hawaii will begin in early fiscal year 2008. The second area of EPACT is in accordance with the new Federal Power Act section 216(h) created under EPACT section 1221(a). The Department is now beginning this process of coordinating all applicable Federal authorizations and related environmental reviews that are required to site an electric transmission facility.

Fourth, my office has been and continues to support the efforts of States and transmission planners to work on a regional basis to better coordinate electric infrastructure improvements. For example, for a number of years we have given direct funding support, as well as in-kind support from various technical analyses and studies, to the Western Governor's Association for its "Committee on Regional Electric Power Coordination," which is an ad-hoc group of Western State officials who meet regularly to better coordinate and encourage needed electric infrastructure improvements in the Western Interconnection. A number of regional and sub-regional transmission planning and study groups in the West have emerged as a result of the encouragement of these State officials and their Governors. In fact, the Department reviewed many of the documents these groups have produced in conducting analysis for the Congestion Study. As a result of the Congestion Study, the western region, with oversight by a body of State officials, has now developed regional transmission planning through the Western Electricity Coordinating Council.

Similarly, in the Eastern Interconnection, grid planners are undertaking efforts to conduct interconnection-wide analyses. The new Eastern Reliability Working Group has brought together all of the regional transmission operators, independent system operators, and reliability councils in the Eastern Interconnection.

The Office of Electricity also coordinates with the Office of Energy Efficiency and Renewable Energy to provide technical assistance to transmission planners and grid operators seeking to integrate wind generation into the transmission grid. This includes working with the Midwest Independent System Operator to identify possible transmission upgrades that will enable wind generation in North Dakota to be developed.

#### LOAN GUARANTEE QUESTIONS

*Question.* Since the passage of the fiscal year 2007 Joint Funding Resolution, the Department has moved forward on several fronts related to the loan guarantee program. Please tell the committee where the Department stands in terms of setting up the new loan guarantee office, issuing final regulations for this program, and reviewing the pre-applications submitted last year.

*Answer.* The Department has advertised the position for the Director of the Loan Guarantee Program Office. A number of resumes have been received to date, and the Department will review the resumes for qualified candidates. In addition, two senior Department of the Treasury employees with experience in Federal loan guarantee programs have joined the Loan Guarantee Program Office on 6 month details to help establish the office. Once the Director has been hired, the Director will make a determination on required staffing expertise and those positions will be recruited.

With respect to the issuance of final regulations, the Department is working to meet the August 2007 deadline contained in the Revised Continuing Appropriations Resolution, 2007, Public Law 110-5. A Notice of Proposed Rulemaking was published in the Federal Register on May 16, 2007 and is open for public comment until July 2, 2007.

Finally, the Department is completing a preliminary review of the applications to determine which applications are responsive to the solicitation. Guidance has been issued to program offices to begin the technical reviews of the pre-applications. Separately, the Loan Guarantee Office will be reviewing each pre-application for compliance with the financial, commercial, and other criteria set forth in the August 2006 solicitation and accompanying guidelines. Ultimately, the goal is to complete the pre-application evaluations this summer.

*Question.* With all of these activities underway, when do you think that the Department can reasonably expect to make the public announcements regarding awards to industry?

*Answer.* The Department anticipates that it will take until at least the first quarter of calendar year 2008 to issue the first loan guarantees.

*Question.* In the fiscal year 2007 Long-term Funding Resolution, Congress provided funding to support establishment of a loan guarantee office. Congress authorized up to \$4 billion in loan guarantees to be available immediately and directed that no loan guarantee awards can be made until final loan guarantee regulations

are in place, 6 months from the date of enactment of the fiscal year 2007 Long-term Funding Resolution. Furthermore, in fiscal year 2008, the Department is seeking additional funding to support the loan guarantee office, and you are requesting \$9 billion in additional authority with a caveat that this amount would be reduced from amounts previously provided.

If the request is for \$9 billion to be reduced by the amount previously provided, is that amount previously provided, the \$2 billion the Department previously announced would be available late last year or the \$4 billion that the Long-term Funding Resolution provided?

Answer. As the Department anticipates that it will take until at least the first quarter of calendar year 2008 to issue the first loan guarantees, DOE anticipates issuing \$9 billion in loan guarantees in fiscal year 2008.

*Question.* Does the Department believe that new coal and nuclear power plants are very capital intensive and thus requiring additional assistance to construct first-of-a-kind technologies? The committee is aware of information that the costs of these plants are very large relative to the market capitalization of some of the utility companies that are interested in constructing such facilities.

What is the Department's current assessment of the economic viability of new commercial coal and nuclear power plants?

How would Federal loan guarantees affect the relative economics of these new coal and nuclear power plant projects?

In view of the uncertainties and regulatory risks associated with the initial deployment of a new fleet of IGCC carbon capture-ready and nuclear power plants, in your judgment would the loan guarantee program play an important role bringing these planned projects to fruition?

Answer. Advanced, environmentally friendly, clean coal technologies are poised to enter the market, but some require a price premium relative to more conventional technology. In spite of the higher cost, the private sector has shown great interest in these technologies. The 2008 budget continues robust funding for the President's Advanced Energy Initiative to develop and accelerate the deployment of advanced energy technologies, including new coal and nuclear technologies. Long-term regulatory drivers, such as the Clean Air Interstate Rule (CAIR) and the Clean Air Mercury Rule (CAMR), also provide an incentive for the private sector to invest in these technologies.

The Department received 143 pre-applications requesting more than \$27 billion in loan guarantee protection for this initial round of guarantees. Twenty-three projects, representing \$16 billion in loan guarantees were for advanced fossil technology.

Loan guarantees, along with other provisions in the Energy Policy Act of 2005, can play a role in accelerating the deployment of advance coal and carbon capture technologies.

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#### QUESTION SUBMITTED BY SENATOR JACK REED

##### DISTRIBUTED GENERATION

*Question.* Mr. Kolevar, the 2008 request essentially zeroes out the Distributed Energy Resource program, which used to be a \$60 million program aimed at helping Combined Heat and Power and other clean and efficient technology get onto the grid. This program was shifted to the Office of Energy Distribution and Energy Reliability last year and now is slated for elimination. Has EDER abandoned its commitment to develop clean distributed generation, and focus only on transmission and power delivery issues?

Answer. The focus on the development of distributed generation technologies has been completed. The Distributed Energy Program has met its performance targets of: (1) achieving three integrated energy systems (combined heat and power systems) of greater than 70 percent efficiency; (2) demonstrating a 38 percent efficient microturbine; and (3) demonstrating a 44 percent efficient reciprocating engine. The research has now shifted to Renewable and Distributed Systems Integration (RDSI) work. This research will concentrate on the integration of renewable and distributed energy technologies into the grid at the distribution system level. By successfully demonstrating this integration, the use of renewable and distributed energy in support of electric distribution operations should substantially increase for supplying power and other ancillary services during peak load periods.

These projects will also demonstrate the ability of these technologies to reduce power required to the distribution feeder. This will be accomplished through modeling, design, integration, and RD&D of renewables and distributed energy integra-

tion into the distribution system; low-cost sensors; advanced monitoring; and consumer information. The goal of the RDSI is to demonstrate peak load reduction of 20 percent by 2015, and improve asset management on distribution feeders with the implementation of distributed energy (including renewables), and energy management systems that are cost competitive with system capacity upgrades.

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QUESTIONS SUBMITTED BY SENATOR PETE V. DOMENICI

OFFICE OF ENERGY ELECTRICITY DELIVERY AND ENERGY RELIABILITY

*Question.* Mr. Kolevar, I understand that your office has had the responsibility for complying with section 1221 of the Energy Policy Act that requires the Secretary to designate "National Interest Electric Transmission Corridors"

We all know how difficult it is to site electric transmission lines, but with a projected 19 percent increase in electricity demand over the next decade; we must work through the NIMBY issues.

What is the status of this report and what are the next steps in designating these critical infrastructure corridors.

*Answer.* Section 216(a) of the Energy Policy Act of 2005 authorizes the Secretary, in his discretion, to designate geographic areas where transmission congestion or constraints adversely affect consumers as national interest electric transmission corridors (National Corridors). On April 26, 2007, DOE issued two draft National Corridor designations, in relation to the two Critical Congestion Areas identified in the Department's August 2006 Congestion Study. The first is the draft Mid-Atlantic Area National Corridor and the second is the draft Southwest Area National Corridor. If, after consideration of all comments on these drafts and consultation with the affected States, the Secretary of Energy decides that designation of either or both areas is appropriate, he will issue one or more orders doing so.

DOE welcomes comments on the draft National Corridor designations and has opened a 60-day public comment period, which will end on July 6, 2007. Please refer to the Federal Register Notice for information on the comment process. The full text of the notice is available at <http://nieetc.anl.gov>. During the public comment period, the Department intends to hold seven public meetings to discuss these drafts.

In 2006, the Department announced that, in addition to the statutory requirement under section 216(a) of FPA that the Department release a congestion study every 3 years, DOE would issue annual progress reports in addition to the triennial studies. Accordingly, the Department is beginning a review of mitigation activities underway in each of the congestion areas identified in last year's Congestion Study. The activities that will be examined include the status of transmission projects that are proposed, permitted and completed since last August. We will also be identifying new or proposed local generation, demand response programs, and energy conservation and efficiency programs affecting congestion in the identified congestion areas. The Department intends to issue this congestion alleviation progress report in fall 2007.

ENERGY STORAGE R&D

*Question.* Mr. Kolevar, your fiscal year 2007 spending plan provides only \$5 million to support R&D storage. This level of funding is woefully inadequate considering the biggest challenge to the deployment of renewable generation is the intermittent nature of these technologies. It is vitally important that your office work with Asst. Secretary Karsner's team to ensure that energy storage R&D complements the renewable research.

Can you explain why this important R&D effort has received so little in spending? If Congress provided an additional \$5 million or \$10 million how would you spend this funding?

*Answer.* Funding requests for energy storage research during the last 5 years have fluctuated between approximately \$5 million and \$3 million. However, this amount has been augmented by up to \$11 million in congressionally directed funding and by some \$7 million in annual cost share from our State and utility partners. The program is considered worldwide as one of the leaders in this field.

An extra \$5 million or \$10 million would expand the scope of OE's research program.

ENERGY INFRASTRUCTURE SECURITY

*Question.* Mr. Kolevar, your fiscal year 2007 spend plan recommends a significant increase in funding for infrastructure security, which was not included in your fiscal

year 2007 request and it is unclear from the spend plan how this funding is being used and for what purpose.

Is this funding being used to improve foreign energy infrastructure security—are these Middle East countries?

Answer. In fiscal year 2007 the Office of Electricity (OE) has been tasked as the technical lead assisting the State Department in executing the Critical Energy Infrastructure Protection (CEIP) initiative, which is overseen by the National Security Council (NSC). The Department of Energy's (DOE) role is to assess and advise foreign countries who have requested U.S. assistance on needed improvements to their energy infrastructure security. Our teams of expert teams travel to the host country and assess current security measures and recommend improvements. The host country funds and implements the actual improvements that are identified in the development of a CEIP security program.

The specific countries targeted by this program were selected by the intelligence community, were coordinated through the interagency process, and were provided in a report to the NSC. To date, CEIP Initiative activities have been limited to the Middle East, although DOE and the Department of Homeland Security have provided similar support to Canada and Mexico because of the interconnected nature of our energy systems.

*Question.* Is this funding being cost shared by the nation that is benefiting from this security evaluation? Is there any reason why the country can't or should not pay for this activity?

Answer. Each host country has shared the cost of the consultation with the U.S. Government, although specific cost-sharing mechanisms vary depending on the country. The Office of Electricity funds travel and lodging of U.S. Government employees and required security training for U.S. Government employees traveling to dangerous areas. It also provides for the participation of contractors with specific expertise relevant to energy security in a high-threat environment and Federally-funded national lab experts and scientists. Finally, OE reimburses U.S. Embassies for their support efforts. All participating host foreign nations have agreed to pay for the technical experts' internal travel while in country. They have also provided aircraft and watercraft that the teams have needed and have supported the teams' security needs. While DOE helps to evaluate security requirements, the host country has the sole responsibility for funding all such security enhancements to the critical energy infrastructure.

*Question.* Is this a free service we intend to provide to other countries in the future or, do we have a special obligation to these nations?

Answer. The United States is not responsible for the entire cost of the consultation—the costs are shared with the host nation. The fiscal year 2007 initiative is limited to those nations the intelligence community has identified in a classified document to the NSC.

#### SUBCOMMITTEE RECESS

Senator DORGAN. We thank the witnesses for appearing. This hearing is recessed.

[Whereupon, at 4:15 p.m., Wednesday, April 11, the subcommittee was recessed, to reconvene subject to the call of the Chair.]