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DOE BUDGET FOR FISCAL YEAR 2011

HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

TO

RECEIVE TESTIMONY ON THE U.S. DEPARTMENT OF ENERGY'S BUDGET FOR FISCAL YEAR 2011

FEBRUARY 4, 2010

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DOE BUDGET FOR FISCAL YEAR 2011

THURSDAY, FEBRUARY 4, 2010

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

The committee met, pursuant to notice, at 10:02 a.m. in room SD–366, Dirksen Senate Office Building, Hon. Jeff Bingaman, chairman, presiding.

OPENING STATEMENT OF HON. JEFF BINGAMAN, U.S. SENATOR FROM NEW MEXICO

The CHAIRMAN. All right. Good morning, everyone.

The purpose of today's hearing is to receive testimony on the fiscal year 2011 Department of Energy budget.

We want to thank Secretary Chu for testifying today on the Department's 2011 budget, and I compliment him and his staff for their timely and thorough budget. That has been a tradition in the Department of Energy and very much carried forward this year.

Given our stark fiscal climate, I appreciate the President's commitment to the continued development of clean energy programs that will help the United States be competitive in the world economy. The Department continues to support renewables and conservation, as well as electricity delivery and transmission, but as in past years, I am concerned about the proposal to zero out research for oil and gas development, especially in light of the recent natural gas discoveries here in the United States.

The nuclear energy research budget is headed in the right direction by integrating it as part of a portfolio of low carbon energy sources.

There is an increase for the Energy Information Administration that, in my view, is long overdue.

Finally, the Department has taken the lead on innovative energy research and development by proposing $300 million in funding for ARPA-E, the Advanced Research Projects Agency for Energy, as well as creating centers or hubs in energy storage, energy-efficient buildings, and nuclear reactor simulation, similar to the Joint Bioenergy Institute, which I visited with Secretary Chu a year or so ago.

Again, we thank you for appearing before the committee today and we will have questions after your statement. But first, let me call on Senator Murkowski.

STATEMENT OF HON. LISA MURKOWSKI, U.S. SENATOR FROM ALASKA

Senator MURKOWSKI. Thank you, Mr. Chairman.

Thank you, Secretary, for sitting before us this morning. I appreciate your contributions.

Last week at the President's State of the Union, he remarked on energy. My take on it was it appeared to present a more centrist, kind of an all-of-the-above approach to the energy policy. For example, he called for increasing support for additional nuclear energy, as well as for oil and gas production. This was certainly a welcome change from my perspective, expanded beyond the "renewable only" mantra that we have been hearing from the agencies.

With the budget request that we received on Monday, I already see a disconnect between last week's speech and some agencies' budget priorities.

I will start first with nuclear. I am certainly very pleased to see additional funding for the loan guarantee program that Congress established in 2005, but I am frustrated that DOE has still not issued a loan guarantee for nuclear power. I hope that we can expect the first one shortly.

Perhaps more troubling to me is the Department's plan to withdraw its Yucca Mountain application from the NRC with prejudice within the next 30 days. This leaves us without a viable repository option at this point and it exposes taxpayers to billions in liability for the Government's breach of contract.

Some agencies' budget requests are also inconsistent with the desire to increase the Nation's energy security through domestic oil and gas production. Not only does the budget request propose to cancel a $71 million project that would add needed capacity to the Strategic Petroleum Reserve, it contains substantial tax and fee increases for domestic oil and gas producers. These policies are clearly not designed to spur more domestic production.

The budget request also appears to pick winners and losers within the renewable industry. I was pleased personally to see the additional funding slated for geothermal activities. However, while the Department calls for significant funding increases for both solar and wind activities, it cuts funding for hydropower. In fact, hydropower, which provides emissions-free baseload power and has tremendous job potential is the only renewable resource to see a slash in funding this year.

I am also concerned that DOE is asking for a budget increase on top of the $37 billion in additional stimulus funds that it received. As of yesterday, the DOE Web site showed that it has spent just $2.1 billion of those funds in the past year, just slightly more than the $1.8 billion increase that has been proposed for its baseline budget. DOE had authority to spend a total of $63 billion last year, but did not come close to that level. At a time of record debt and another year with a record deficit, we should ask ourselves if the Department truly needs authority to spend more this year when we know that DOE is having difficulty spending the money that it already has.

Finally, on a more parochial note, perhaps I am disappointed that the administration is not working to improve energy technology and energy efficiency efforts in cold-climate States like Alas-

ka, particularly since last year's budget terminated funding for the Arctic Energy Office.

I know that we will have an opportunity this morning, Mr. Chairman, to get into these issues with a little more detail.

Again, I want to thank Secretary Chu for being with us.

The CHAIRMAN. Mr. Secretary, why don't you go ahead with your statement, and then we will have questions.

STATEMENT OF HON. STEVEN CHU, SECRETARY, DEPARTMENT OF ENERGY

Secretary CHU. Thank you, Chairman Bingaman, Ranking Member Murkowski, members of the committee. I am glad to have the opportunity to discuss the President's fiscal year 2011 budget request for the Department of Energy.

President Obama stated, "The nation that leads the world in creating new sources of clean energy will be the Nation that leads the 21st century global economy." I fervently share this view. The President's fiscal year 2011 budget request for $28.4 billion for the Department of Energy will help position the United States to be a global leader in the new energy economy. The budget request makes much-needed investments to harness the power of American ingenuity. This request will create clean energy jobs, expand the frontiers of science, reduce nuclear dangers, and help curb carbon pollution that threatens our planet.

The President's budget request includes an investment of $2.4 billion in energy efficiency and renewable sources of energy. It also promotes innovative energy efficiency and renewable energy projects through $500 million in credit subsidy that will support $3 billion to $5 billion in lending. It expands the Advanced Manufacturing Tax Credit by $5 billion to help build a robust domestic manufacturing capacity for clean energy technologies. Through this budget, we will increase research, demonstration, and deployment of wind, solar, and geothermal energies, make buildings and homes more efficient, develop energy-efficient vehicles, and pursue carbon capture and sequestration.

Nuclear energy must also be part of our clean energy mix. Our budget request includes an additional $36 billion in loan guarantee authority for the nuclear power sector to help construct the first nuclear plants in decades, as well as $495 million for nuclear energy research and development.

We have many technologies in hand today to begin the transition to a low-carbon economy, but we will need breakthroughs and better technology to meet our long-term goals. The budget request invests in basic and applied research. It puts us on a path of doubling the funding for science, a key Presidential priority.

The budget request supports the Department's three new complementary approaches to marshaling the Nation's brightest minds to accelerate energy breakthroughs.

The Department will continue funding the three Energy Innovation Hubs introduced in fiscal year 2010. In addition, we are proposing a new hub to dramatically improve batteries and energy storage.

The Energy Frontier Research Centers program will be expanded to capture new and emerging opportunities.

In the fiscal year 2011 budget, we also include $300 million for ARPA-E.

We are requesting $55 million to start the RE-ENERGYSE initiative to help educate the next generation of scientists and engineers.

In addition to the health of our economy and our planet, the Department of Energy is focused on the safety and security of our people. Last April in Prague, President Obama outlined an ambitious agenda to address the greatest threat to global security, the danger of terrorists getting their hands on nuclear weapons or the material to build them. The Department is requesting a significant increase, more than $550 million in new funding, for the NNSA Defense Nuclear Nonproliferation Program to help meet the President's goal of securing all vulnerable nuclear materials around the world in 4 years.

The President has also made it clear that as long as nuclear weapons continue to exist, it is essential we ensure the safety, security, and effectiveness of our nuclear stockpile. With the $7 billion in funds we have requested, we can upgrade our infrastructure that has been allowed to decay over the past decade, support the cutting-edge work of our national labs, and recruit the skilled work force that we need.

The budget also protects public health and safety by cleaning up the environmental legacy of our Nation's nuclear weapons program. Additionally, it instructs the Department to discontinue its application to the U.S. Nuclear Regulatory Commission for a license to construct a high-level waste geologic repository at Yucca Mountain. On Monday, the Department filed a motion with the NRC to stay all proceedings for 30 days. During this time, we will file a formal motion to withdraw the application.

To deal with our nuclear waste management needs, the administration has brought together a range of experts to conduct a comprehensive review of the back end of the fuel cycle. The Blue Ribbon Commission announced last week, co-chaired by General Brent Scowcroft and Congressman Lee Hamilton, will provide recommendations for a safe, long-term solution. We also propose breaking down artificial stovepipes and merging the Office of Civilian Radioactive Waste Management with the Office of Nuclear Energy.

Finally, we are committed to being good stewards of the taxpayers' money. For example, we have eliminated more than $2.7 billion in tax subsidies for oil, coal, and gas industries. This step is estimated to generate more than $38.8 billion in revenue for the Federal Government over the next 10 years.

To further our reform agenda, the budget request also includes $2 million to establish a new management reform initiative. This initiative will report directly to me and will receive close personal attention.

Building a clean energy future will not be easy, but it is necessary for our economy and our security. As a scientist, I am optimistic and I believe we can meet this challenge and lead the world in the 21st century.

President Obama and I are looking forward to working with this committee and this Congress to build a stronger, safer, and more prosperous future.

I am pleased to answer any questions at this time.

[The prepared statement of Secretary Chu follows:]

PREPARED STATEMENT OF HON. STEVEN CHU, SECRETARY, DEPARTMENT OF ENERGY

Chairman Bingaman, Ranking Member Murkowski, and Members of the Committee, thank you for the opportunity to appear before you today to discuss the President's Fiscal Year 2011 budget request for the Department of Energy.

President Obama has stated, "The nation that leads the world in creating new sources of clean energy will be the nation that leads the 21st century global economy." I fervently share this view. The President's FY 2011 budget request of $28.4 billion will help position the United States to be the global leader in the new energy economy. The budget request makes muchneeded investments to harness the power of American ingenuity. This request will create clean energy jobs, expand the frontiers of science, reduce nuclear dangers, and help curb the carbon pollution that threatens our planet. As part of this Administration's commitment to fiscal responsibility, the Department of Energy is also proposing several program reductions and terminations.

American Recovery and Reinvestment Act

The FY11 budget request builds on the investments in the American Recovery and Reinvestment Act. Through the $36.7 billion the Department received from the Recovery Act, we are putting Americans to work, while helping to build a clean energy economy, spur energy innovation, and reduce our dependence on oil. We've begun to make our homes and offices more energy efficient, modernize our grid, and invest in key renewable energy projects. Getting this money out the door quickly, carefully, and transparently has been and will continue to be a top priority for me.

FY11 Budget Supports Strategic Priorities

To continue the progress we have made, the FY11 budget request supports the Department's strategic priorities of:

- Transitioning to a low-carbon economy by developing and deploying clean and efficient energy technologies, increasing generation capacity and improving our transmission capabilities;
- Investing in scientific discovery and innovation to find solutions to pressing energy challenges and maintain American economic competitiveness; and
- Enhancing national security by ensuring the safety, security and effectiveness of the nuclear stockpile without testing. The budget request also includes funds to work with our international partners to secure vulnerable nuclear material around the world within four years, and advance our nuclear legacy cleanup.

These strategic priorities will be enabled by a continued commitment to improving the management and fiscal performance of the Department.

Energy

To transition to a low-carbon future, we must change the way we generate and use energy. The President's budget request invests in clean energy priorities, including an investment of $2.4 billion in energy efficiency and renewable sources of energy. It also promotes innovative energy efficiency and renewable energy projects through $500 million in credit subsidy that will support $3 to $5 billion in lending. It expands the Advanced Manufacturing Tax Credit by $5 billion to help build a robust domestic manufacturing capacity for clean energy technologies. Through this budget, we will increase research, demonstration, and deployment of wind, solar and geothermal energies; make buildings and homes more efficient; develop energy efficient vehicles; and pursue carbon capture and sequestration.

Nuclear energy must also be a part of our clean energy mix. During his State of the Union address last week, President Obama said, "To create more of these clean energy jobs, we need more production, more efficiency, more incentives. And that means building a new generation of safe, clean nuclear power plants in this country." The President and I are committed to restarting our domestic nuclear industry. Our budget request includes an additional $36 billion in loan guarantee authority for the nuclear power sector to help construct the first new nuclear plants in decades, as well as $495 million for research and development to support the competi-

tiveness, safety and proliferation resistance of nuclear energy in the United States and abroad.

Innovation

We have many technologies in hand today to begin the transition to a low-carbon economy, but we will need breakthroughs and better technologies to meet our long-term goals. The budget request invests in basic and applied research and puts us on the path to doubling funding for science, a key presidential priority. We are also requesting $55 million to start the RE-ENERGYSE initiative to help educate the next generation of scientists and engineers.

The budget request also supports the Department's three new, complementary approaches to marshalling the nation's brightest minds to accelerate energy breakthroughs.

The first approach is the Energy Innovation Hubs. The Hubs are multidisciplinary, goal-oriented, and will be managed by top teams of scientists and engineers with enough resources and authority to move quickly in response to new developments. They are to be modeled after laboratories such as MIT's Radiation Laboratory, which developed radar during World War II, and Bell Laboratories when it invented and developed the transistor. Ideally, this work will be conducted under one roof. The Department will continue funding the three Energy Innovation Hubs introduced in FY 2010. In addition, we are proposing a new Hub to dramatically improve batteries and energy storage.

The second approach is the Energy Frontier Research Centers. The EFRCs are mainly university-based, problem-oriented research. We have identified key scientific barriers to energy breakthroughs, and we believe we can clear these roadblocks faster by linking together small groups of researchers across departments, schools, and institutions.

The third funding approach is the Advanced Research Projects Agency—Energy (ARPA-E). ARPA-E is technology-oriented. We are seeking the boldest and best ideas for potentially transformative energy technologies and funding them to see if they work. The FY 2011 budget request includes $300 million for ARPA-E.

Security

In addition to the health of our economy and our planet, the Department of Energy is focused on the safety and security of our people. Last April in Prague, President Obama outlined an ambitious agenda to address the greatest threat to global security—the danger of terrorists getting their hands on nuclear weapons or the material to build them. The Department is requesting a significant increase in the budget—more than $550 million in new funding—for the NNSA Defense Nuclear Nonproliferation program to help meet the President's goal of securing all vulnerable nuclear materials around the world in four years.

The President has also made clear that, as long as nuclear weapons continue to exist, it is essential that we ensure the safety, security and effectiveness of our nuclear stockpile. With the $7 billion in funds we have requested, we can upgrade our infrastructure that has been allowed to decay in the past decade, support the cutting-edge work of our National Labs, and recruit the skilled workforce we need today and in the future. Over the next five years, we intend to boost this funding by more than $5 billion. Even in a time of tough budget decisions, we must make this investment for the sake of our security.

The budget also protects public health and safety by cleaning up the environmental legacy of the Nation's nuclear weapons program. Additionally, it instructs the Department to discontinue its application to the U.S. Nuclear Regulatory Commission for a license to construct a high-level waste geologic repository at Yucca Mountain. On Monday, the Department filed a motion with the NRC to stay all proceedings for 30 days. During this time, we will file a formal motion to withdraw the application.

Both the President and I have made clear that Yucca Mountain is not an option. To deal with our nuclear waste management needs, the Administration has brought together a range of experts to conduct a comprehensive review of the back end of the fuel cycle. The Blue Ribbon Commission announced last week, and co-chaired by General Brent Scowcroft and Congressman Lee Hamilton, will provide recommendations for developing a safe, long-term solution to managing the Nation's used nuclear fuel and its nuclear waste.

As part of our comprehensive strategy to restart the nuclear industry, we also propose breaking down artificial stovepipes and merging the Office of Civilian Radioactive Waste Management into the Office of Nuclear Energy.

Management

Finally, in order to transform the way Americans generate and use energy, we must transform the Department itself. As part of the Obama Administration's reform agenda, the budget request includes $2 million to establish a new Management Reform initiative to provide strategic direction, coordination and oversight of reform initiatives. This initiative will report directly to me and will receive close personal attention. We made important reforms when we began to implement the Recovery Act, and now we need to institutionalize those reforms and apply them across the Department.

Additionally, we are committed to being good stewards of the taxpayers' money. As we developed the budget, we looked to eliminate or reduce programs where we could. For example, we eliminated more than $2.7 billion in tax subsidies for oil, coal and gas industries. This step is estimated to generate more than $38.8 billion in revenue for the federal government over the next 10 years.

Building a clean energy future won't be easy, but it is necessary for our economy and our security. As a scientist, I am an optimist, and I believe that we can meet this challenge and lead the world in the 21st century.

HIGHLIGHTS OF THE FY2011 DEPARTMENT OF ENERGY BUDGET

The Department's Fiscal Year (FY) 2011 budget request of $28.4 billion, a 6.8 percent or $1.8 billion increase from FY 2010, supports the President's commitment to respond in a considered, yet expeditious manner to the challenges of rebuilding the economy, maintaining nuclear deterrence, securing nuclear materials, improving energy efficiency, incentivizing production of renewable energy, and curbing greenhouse gas emissions that contribute to climate change. Together with the American Recovery and Reinvestment Act of 2009 (Recovery Act) and FY 2010 budget, the FY 2011 budget request supports investment for a multi-year effort to address these interconnected challenges.

The FY 2011 budget builds on the $36.7 billion in Recovery Act funding. By the end of FY 2010, the Department expects to obligate 100 percent and outlay roughly 35-40 percent of Recovery Act funds. In developing the FY 2011 budget request, the Department has taken these investments into account. Recovery Act investments in energy conservation and renewable energy sources ($16.8 billion), environmental management ($6 billion), loan guarantees for renewable energy and electric power transmission projects ($4 billion), grid modernization ($4.5 billion), carbon capture and sequestration ($3.4 billion), basic science research ($1.6 billion), and the establishment of the Advanced Research Projects Agency—Energy ($0.4 billion) will continue to strengthen the economy by providing much-needed investment, by saving or creating tens of thousands of direct jobs, cutting carbon emissions, and reducing U.S. dependence on oil.

The President's FY 2011 Budget supports our three strategic priorities:

- Innovation.—Investing in science, discovery and innovation to provide solutions to pressing energy challenges
- Energy.—Providing clean, secure energy and promoting economic prosperity through energy efficiency and domestic forms of energy
- Security.—Safeguarding nuclear and radiological materials, advancing responsible legacy cleanup, and maintaining nuclear deterrence

These strategic priorities will be enabled by a continued commitment to management excellence:

- Management: Transforming the culture of the Department with a results-oriented approach

Innovation: Investing in Science, Discovery and Innovation to Provide Solutions to Pressing Energy Challenges

As President Obama made clear in his remarks to the National Academy of Sciences in April 2009, the public sector must invest in research and innovation not only because the private sector is sometimes reluctant to take large risks, but because the rewards will be broadly shared across the economy. Leading requires assembling a critical mass of the best scientists and engineers to engage in mission-oriented, cross-disciplinary approaches to addressing current and future energy challenges. To develop clean energy solutions and maintain nuclear security, the Department must cultivate the science, technology, engineering, and mathematics workforce of the next generation. The FY 2011 budget request of $55 million for RE-ENERGYSE (Regaining our ENERGY Science and Engineering Edge) supports K-20+ science and engineering education.

With every initiative the Department undertakes, sound science must be at the core. In FY 2011 the Department will increasingly emphasize cross-cutting initiatives to link science throughout the Department, specifically with energy and national security programs. These cross-cutting initiatives will enhance science capabilities to create knowledge and innovative technologies that can be brought to bear on national energy and security issues, leverage world-class science and engineering expertise to establish global leadership as clean energy innovators, and employ use-inspired research to reduce the cost and time to bring technologies to market at scale. The Department believes that it will deliver solutions more quickly and efficiently through our efforts to break down the traditional stovepipes and operate in a more integrated and coordinated manner. The FY 2011 Budget continues to address the President's priorities in an integrated and efficient manner, and to deliver results for the American taxpayer.

The Department continues its strong commitment to basic research and supports the President's Plan for Science and Innovation by requesting funding for the Office of Science at $5.1 billion, a 4.4 percent or $218 million increase from FY 2010. The FY 2011 budget request will support the training of students and researchers in fields critical to national competitiveness and innovation, and will support investments in areas of research essential for a clean energy future. The President's Plan commits to doubling Federal investment in basic research at select agencies. The Department supports an overarching commitment to science by investing in basic and applied research, creating new incentives for private innovation and promoting breakthroughs in energy.

To help achieve the game-changing breakthroughs needed to continue leading the global economy, the FY 2011 budget request includes $300 million for the Advanced Research Projects Agency—Energy (ARPA-E). Introduced in FY 2009, ARPA-E is responsible for enabling specific high-risk and high-payoff transformational research and development projects. Beyond simply funding transformational research that creates revolutionary technologies, ARPA-E is dedicated to the market adoption of those new technologies to meet the Nation's long-term energy challenges. This funding, along with the $400 million made available through the Recovery Act, will provide sustained investment in this pioneering program.

The Department will continue funding the three Energy Innovation Hubs introduced in FY 2010 to focus on developing fuels that can be produced directly from sunlight, improving energy efficient building systems design, and using modeling and simulation tools to create a virtual model of an operating advanced nuclear reactor. In addition, DOE is proposing a new Hub to focus on batteries and energy storage. Each of these Hubs will bring together a multidisciplinary team of researchers in an effort to speed research and shorten the path from scientific discovery to technological development and commercial deployment of highly promising energy-related technologies.

Complementing the Hubs, the Department proposes expanding the Energy Frontier Research Centers in FY 2011 to capture new, emerging opportunities by furthering its scientific reach and potential technological impact by competitively soliciting in two categories: discovery and development of new materials critical to science frontiers and technology innovations, and basic research for energy needs.

Energy: Providing Clean, Secure Energy and Promoting Economic Prosperity through Energy Efficiency and Domestic Forms of Energy

In Copenhagen, President Obama emphasized that climate change is a grave and growing danger. The imperative now is to develop the capacity to confront the challenges climate change poses and seize the opportunity to be the global leader in the clean energy economy. Meeting the Administration's goal to reduce carbon emissions by more than 80 percent by 2050 will be achieved by addressing supply and demand through increased energy efficiency, renewable generation, and grid modernization, as well as improvements in existing technologies and information analysis. An important tool that will continue to be used to address these issues will be loan guarantees. The Department's FY 2011 budget request, building on the FY 2010 budget and the Recovery Act, invests in the research, development, and deployment of technologies that will position the United States to lead international efforts to confront climate change now and in the future. The long-term economic recovery will be sustained by these continued investments in the new energy economy.

- Loan Guarantees

The Loan Guarantee Program Office (LGPO) is a vital tool for promoting innovation in the energy sector across a broad portfolio of clean and efficient energy technologies. In FY 2011, the Department is requesting funding and authority to support approximately $40 billion of innovative energy technology development. During

FY 2010, the LGPO streamlined the application review process. In FY 2011, the Department will continue to accelerate the availability of loans to leverage private sector investment in clean energy projects that will save and create jobs and stimulate the economy.

• Energy Efficiency

In August 2009, President Obama said, "If we want to reduce our dependence on oil, put Americans back to work and reassert our manufacturing sector as one of the greatest in the world, we must produce the advanced, efficient vehicles of the future." In FY 2011, the Department will promote energy efficiency in vehicles technologies, at $325 million. No less important to achieving the President's stated ambitions is decreasing energy consumption through developing and advancing building technologies ($231 million) and industrial technologies ($100 million). Federal assistance for state-level programs, such as State Energy Program grants ($75 million, a 50 percent increase from FY 2010) and Weatherization Assistance grants ($300 million, a 43 percent increase from FY 2010), will help States and individuals take advantage of efficiency measures for buildings and homes, lower energy costs and greenhouse gas emissions, and develop an ever-evolving, technically proficient workforce.

• Clean, Renewable Energy Generation

The FY 2011 budget request will modernize the Nation's energy infrastructure by investing in a variety of renewable sources such as solar ($302 million), wind ($123 million), water ($41 million), hydrogen ($137 million), biomass ($220 million) and geothermal ($55 million). These sources of energy reduce the production of greenhouse gas emissions and continue the pursuit of a clean energy economy built on the next generation of domestic production. The Department is also continuing to promote domestic clean energy through the four Power Marketing Administrations, which market and deliver electricity primarily generated by hydroelectric dams.

• Grid Modernization

In support of the modernization of the electricity grid, the President's FY 2011 Budget requests $144 million for research and development to improve reliability, efficiency, flexibility, and security of electricity transmission and distribution networks. The "Smart Grid" will integrate new and improved technologies into the energy mix, ensuring reliability, integration of renewable energy resources, and improving security.

While investing in energy efficiency, renewable energy generation, and grid modernization are fundamental steps necessary for creating a clean energy economy; investing in the improvement of existing sources of energy will provide a bridge between current and future technologies These technologies are already a major segment of the energy mix and will play a critical role in providing a solid foundation that will make possible the creation of this new economy.

• Safe and Secure Nuclear Energy

Nuclear energy currently supplies approximately 20 percent of the Nation's electricity and 70 percent of the Nation's clean, non-carbon electricity. The request for the Office of Nuclear Energy includes $495 million for research, development, and demonstration in addition to investments in supportive infrastructure. Work on advanced reactor technologies, fuel cycle technologies, waste management, and crosscutting technologies and transformative concepts will help ensure that nuclear energy remains a safe, secure, economical source of clean energy. The Department will also promote nuclear energy through the Loan Guarantee Program, which is requesting an additional $36 billion in loan authority for nuclear power in FY 2011 (for a total of $54.5 billion).

• Clean and Abundant Fossil Energy

The world will continue to rely on coal fired electrical generation to meet energy demand. It is imperative that the United States develop the technology to ensure that base-load electricity generation is as clean and reliable as possible. The Office of Fossil Energy will invest $438 million in the research and development of advanced coal-fueled power systems and carbon capture and storage technologies. This will allow the continued use of the abundant domestic coal resources in the U.S. while reducing greenhouse gas emissions.

Accurate energy information and analysis play a critical role in promoting efficient energy markets and informing policy-making and strategic planning. This budget requests a total of $129 million for the Energy Information Administration,

the statutory statistical agency within the Department, to improve energy data and analysis programs.

Security: Safeguarding Nuclear and Radiological Materials, Advancing Responsible Legacy Cleanup and Maintaining Nuclear Deterrence

- Reduces the Risk of Proliferation

In an April 2009 speech in Prague, the President called the threat of nuclear proliferation "the most immediate and extreme threat to global security" and announced his support for a new international effort to secure all vulnerable nuclear material around the world within four years. The FY 2011 budget for the NNSA Defense Nuclear Nonproliferation program supports this effort, recognizing the urgency of the threat and making the full commitment to global cooperation that is essential to addressing this threat. The budget provides $2.7 billion in FY 2011, and $13.7 billion through FY 2015 to detect, secure, and dispose of dangerous nuclear and radiological material worldwide. This request is an increase of 26 percent or $550 million from FY 2010. The budget supports cooperative nonproliferation initiatives with foreign governments and the effort and expertise to forge them into durable international partnerships, achieving the objective of a world without nuclear weapons. The budget continues the installation of radiation detection equipment at international border crossings and Megaports, significantly expands materials protection and control security upgrades at selected sites in foreign countries to address outsider and insider threats, and accelerates the pace of highly enriched uranium research reactor conversions with an urgent focus to develop the capability to produce the medical isotope molybdenum-99 in the U.S. using low enriched uranium. The FY 2011 budget request provides $4.4 billion over five years for Fissile Materials Disposition including the construction of U.S. facilities for the disposition of U.S. weapons-grade plutonium in fulfillment of our commitment with the Russian Federation under the Plutonium Management and Disposition Agreement of September 2000, and provides the first $100 million of a $400 million U.S. commitment to advance the construction of plutonium disposition facilities in the Russian Federation. The FY 2011 budget request also supports a funding increase for Nonproliferation and Verification Research and Development for new technologies in support of treaty monitoring and verification.

- Leverages Science to Maintain Nuclear Deterrence

The FY 2011 budget request advances the Department's commitment to the national security interests of the United States through stewardship of a safe, secure and effective nuclear weapons stockpile without the use of underground nuclear testing. As the role of nuclear weapons in our Nation's defense evolves and the threats to national security continue to grow, the focus of this enterprise must also change and place its tremendous intellectual capacity and unique facilities in the service of addressing other challenges related to national defense. NNSA is taking steps to move in this direction, including functioning as a national science, technology, and engineering resource to other agencies with national security responsibilities. NNSA must ensure our evolving strategic posture places the stewardship of our nuclear stockpile, nonproliferation programs, counterterrorism, missile defenses, and the international arms control objectives into one comprehensive strategy that protects the American people and our allies. Through the NNSA, the Department requests $7.0 billion for the Weapons Activities appropriation, a 9.8 percent or $624 million increase from the FY 2010 appropriation. This increase provides a strong basis for transitioning to a smaller nuclear stockpile, strengthens the science, technology and engineering base, modernizes key nuclear facilities, and streamlines the enterprise's physical and operational footprint.

These investments will enable execution of a comprehensive nuclear defense strategy based on current and projected global threats that relies less on nuclear weapons, yet enhances national security by strengthening the NNSA's nuclear security programs. This improved NNSA capability base will mitigate the concerns regarding ratification of the follow-on Strategic Arms Reduction Treaty and the Comprehensive Test Ban Treaty. The FY 2011 request for Weapons Activities has four major components. The request for Stockpile Support increases, reflecting the President's commitment to maintain the safety, security and effectiveness of the nuclear deterrent without underground nuclear testing, consistent with the principles of the Stockpile Management Program outlined in Section 3113 (a)(2) of the National Defense Authorization Act of Fiscal Year 2010 (50 U.S.C. 2524). The request for Science, Technology and Engineering increases by over 10 percent, and provides the funding necessary to protect and advance the scientific capabilities at the U.S. nuclear security laboratories supporting the stockpile and broader national security and energy issues. The budget request for Infrastructure supports the operation and

maintenance of the government-owned, contractor-operated facilities in the nuclear security enterprise, as well as special capabilities for secure transportation and construction. The security and counterterrorism component of the budget provides for physical and cyber security in the NNSA enterprise, as well as emergency response assets and NNSA's focused research and development contribution to the Nation's counterterrorism efforts.

- Advances Responsible Environmental Cleanup

The FY 2011 budget includes $6 billion for the Office of Environmental Management to protect public health and safety by cleaning up hazardous, radioactive legacy waste from the Manhattan Project and the Cold War. This funding will allow the program to continue to accelerate cleaning up and closing sites, focusing on activities with the greatest risk reduction.

As the Department continues to make progress in completing clean-up, the FY 2011 budget request of $189 million for the Office of Legacy Management supports the Department's long-term stewardship responsibilities and payment of pensions and benefits for former contractor workers after site closure.

The Administration has determined that the Yucca Mountain repository is not a workable option and has decided to terminate the Office of Civilian Radioactive Waste Management. The core functions and staff to support efforts under the Nuclear Waste Policy Act to meet the obligation of the Government will transfer to the Office of Nuclear Energy by the end of FY 2010.

Management: Transforming the Culture of the Department with a Results-Oriented Approach

In order to transform the way Americans use and produce energy, we must transform the Department of Energy. The Department is committed to strengthening its management culture and increasing its focus on results. The implementation of the Recovery Act provided the Department with an opportunity to continue to refine best practices in management, accountability, operations, and transparency. These best practices will be applied in executing the FY 2011 budget.

To achieve our strategic priorities, the Department requests a net of $169 million for Departmental Administration. These funds, along with resources in individual program offices, will help transform key functional areas such as human, financial, project, and information technology management. The request includes $2 million for Management Reform within the Office of the Secretary, which will provide the Department with strategic direction, coordination, and oversight of reform initiatives.

DEPARTMENT OF ENERGY FY 2011 PROGRAM OFFICE HIGHLIGHTS

Office of Science: Supporting Cutting-Edge Foundational Scientific Research

The Department of Energy's Office of Science (SC) delivers discoveries and scientific tools that transform our understanding of energy and matter and advance the national, economic, and energy security of the United States. SC is a primary sponsor of basic research in the United States, leading the Nation to support the physical sciences in a broad array of research subjects in order to improve energy security and address issues ancillary to energy, such as climate change, genomics, and life sciences. In FY 2011, the Department requests $5.1 billion, an increase of 4.4 percent over the enacted FY 2010 appropriation, to invest in science research. The FY 2011 request supports the President's Plan for Science and Innovation, which encompasses the entire SC budget, as part of a strategy to double overall basic research funding at select agencies. As part of this plan, the budget request supports the training of students and researchers in fields critical to our national competitiveness and innovation economy, and supports investments in areas of research critical to our clean energy future and to making the U.S. a leader on climate change.

SC is addressing critical societal challenges and key missions of the Department of Energy through significant improvements in existing technologies and development of new energy technologies. SC will accomplish this by: (1) sustained investments in exploratory and high-risk research in traditional and emerging disciplines, including the development of new tools and facilities; (2) focused investments in high-priority research areas; and (3) investments that train new generations of scientists and engineers to be leaders in the 21st century. The FY 2011 budget request supports all three of these investment strategies.

Two of the four Energy Innovation Hubs being requested in FY 2011 are through the Office of Science; these Hubs will bring together teams of experts from multiple disciplines to focus on two grand challenges in energy: (1) Fuels from Sunlight, a

Hub established in FY 2010 and (2) Batteries and Energy Storage, a new Hub in the FY 2011 request.

The Energy Frontier Research Centers (EFRC) program will be expanded in the FY 2011 request to capture new, emerging opportunities by furthering its scientific reach and potential technological impact. New EFRCs will be competitively solicited in two categories: discovery and development of new materials that are critical to both science frontiers and technology innovations, and basic research for energy needs in a limited number of areas that are underrepresented in the 46 original EFRC awards.

The FY 2011 request for the U.S. ITER Project ($80 million, a decrease of $55 million from FY 2010) is a reflection of the pace of ITER construction as of the end of 2009. The Administration is engaged in a range of efforts to implement management reforms at the ITER Organization and accelerate ITER construction while minimizing the overall cost of the Construction Phase for the U.S. and the other ITER members.

The Office of Science supports investigators from more than 300 academic institutions and from all of the DOE laboratories. The FY 2011 budget request will support approximately 27,000 Ph.D.s, graduate students, undergraduates, engineers, and technicians. Nearly 26,000 researchers from universities, national laboratories, industry, and international partners are expected to use SC scientific user facilities in FY 2011.

Advanced Research Projects Agency—Energy: Transformational Research and Development

The FY 2011 budget request includes $300 million for the Advanced Research Projects Agency—Energy (ARPA-E), a program launched in FY 2009 that sponsors specific high-risk and high-payoff transformational research and development projects that overcome the long-term technological barriers in the development of energy technologies to meet the Nation's energy challenges, but that industry will not support at such an early stage. An essential component of ARPA-E's culture is an overarching focus on accelerating science to market. Beyond simply funding transformational research creating revolutionary technologies, ARPA-E is dedicated to the market adoption of those new technologies that will fuel the economy, create new jobs, reduce energy imports, improve energy efficiency, reduce energy-related emissions, and ensure that the U.S. maintains a technological lead in developing and deploying advanced energy technologies.

Office of Energy Efficiency and Renewable Energy: Developing and Deploying Clean, Reliable Energy

The Office of Energy Efficiency and Renewable Energy (EERE) strengthens the energy security, environmental quality, and economic vitality of the U.S. through the research, development, demonstration and deployment (RDD&D) of clean energy technologies and generation and advances in energy efficiency. EERE's activities are critical to creating a low carbon economy and sustaining strong economic growth and job creation while dramatically reducing greenhouse gas emissions and energy imports. EERE programs link advances in basic research and the creation of commercially successful products and services to ensure delivery to the marketplace for general use and implementation.

The FY 2011 budget request of $2.4 billion, an increase of 5 percent over FY 2010, is aimed at accelerating revolutionary change in the Nation's energy economy. The request includes programs associated with meeting the President's goals of investing in the next generation of clean energy technologies, vehicles and fuels, and energy efficiency measures that reduce energy use in Federal agencies and the industrial and building sectors.

Clean, Renewable Energy Generation

The FY 2011 budget request continues to work to transform the Nation's energy infrastructure by investing over $650 million in a variety of renewable sources of electrical generation such as solar ($302 million, a 22 percent increase over FY 2010), and wind ($123 million, a 53 percent increase over FY 2010), as well as deploy clean technologies to reduce our dependence on oil. The request includes expansions on Concentrating Solar Power, biopower and off-shore wind, which will provide new, additional avenues for clean energy development and deployment. These technologies will reduce the production of greenhouse gas emissions and revitalize an economy built on the next generation of domestic production.

Energy Efficiency

The Department implements a number of efforts to increase energy efficiency and conservation in homes, transportation, and industry. The FY 2011 budget requests

$758 million to accelerate deployment of clean, cost-effective, and rapidly deployable energy conservation measures in order to reduce energy consumption in residential and commercial buildings, and the industrial and Federal sectors. The Department will invest $231 million in the Building Technologies program, a 16 percent increase over FY 2010 for built environment R&D. Federal assistance for state-level programs such as State Energy Program grants ($75 million) and Weatherization Assistance Program ($300 million), will continue to help citizens implement energy conservation measures, lower energy costs and greenhouse gas emissions, and build a technical workforce. The FY 2011 request also includes $545 million to accelerate research, development and deployment of advanced fuels and vehicles to reduce the use of petroleum and greenhouse gas emissions. The FY 2011 budget complements the Recovery Act funding for these programs ($3.1 billion for State Energy Programs, $5 billion for Weatherization Assistance, $2 billion for Advanced Battery Manufacturing and $400 million for Transportation Electrification).

Office of Electricity Delivery and Energy Reliability: Moving Toward a More Intelligent Grid to Power the Digital Economy

The FY 2011 budget request for the Office of Electricity Delivery and Energy Reliability (OE) budget is $186 million, an increase of 8 percent over FY 2010. These funds will build on the "Smart Grid" investments and other activities.

The ability of the United States to meet the growing demand for reliable electricity is challenged by an aging power grid under mounting stress. Despite the increasing demand for reliable power brought on by the modern digital economy, the power grid in the U.S. has suffered from a long period of underinvestment. Much of the power delivery system was built on technology developed over 50 years ago and thus responds to disturbances with speed limited by the technology of that period. This limitation increases the vulnerability of the power system to outages that can spread quickly and impact whole regions. Breakthroughs in digital network controls, transmission, distribution, and energy storage will make the power grid more efficient, alleviating the stress on the system, as well as enable greater use of clean and distributed energy sources. The return on these investments will come from a reduction in economic losses caused by power outages and the delay or avoidance of costly investment in new generation and transmission infrastructure.

The budget request provides $144 million for research and development, which supports development of technologies that will improve the reliability, efficiency, flexibility, functionality, and security of the Nation's electricity delivery system. It accelerates investment in energy storage capabilities and funds two new research initiatives: Advanced Modeling Grid Research, to develop grid-modeling capabilities using the large volumes of data generated by advanced sensors deployed on the grid; and Power Electronics, to develop new power control devices in collaboration with universities. The proposal also continues to support the development of "Smart Grid" technologies and cyber security systems for the power grid.

The budget request continues support for Permitting, Siting, and Analysis ($6.4 million) to assist States, regional entities, and other federal agencies in developing policies and programs aimed at modernizing the power grid; and for Infrastructure Security and Energy Restoration ($6.2 million) to enhance the reliability and resiliency of U.S. critical infrastructure and facilitate its recovery from energy supply disruptions.

Office of Environmental Management: Reducing Risks and Making Progress

The mission of the Office of Environmental Management (EM) is to complete the safe cleanup of the environmental legacy brought about from over six decades of nuclear weapons development, production, and Government-sponsored nuclear energy research. This cleanup effort is the largest in the world, originally involving two million acres at 107 sites in 35 states, dealing with some of the most dangerous materials known to man.

EM continues to pursue its cleanup objectives within the overall framework of achieving the greatest comparative risk reduction benefit and overlaying regulatory compliance commitments 14 and best business practices to maximize cleanup progress. To support this approach, EM has prioritized its cleanup activities:

- Activities to maintain a safe and secure posture in the EM complex
- Radioactive tank waste stabilization, treatment, and disposal
- Used nuclear fuel storage, receipt, and disposition
- Special nuclear material consolidation, processing, and disposition
- High priority groundwater remediation
- Transuranic and mixed/low-level waste disposition
- Soil and groundwater remediation
- Excess facilities deactivation and decommissioning

The FY 2011 budget request for $6.0 billion will fund activities to maintain a safe and secure posture in the EM complex and make progress against program goals and compliance commitments, including reduction of highest risks to the environment and public health, use of science and technology to reduce life cycle costs, and reduction of EM's geographic footprint by 40 percent by 2011. EM continues to move forward with the development of the capability for dispositioning tank waste, nuclear materials, and used nuclear fuel. The budget request includes the construction and operation of three unique and complex tank waste processing plants to treat approximately 88 million gallons of radioactive tank waste for ultimate disposal. It will also fund the solid waste disposal infrastructure needed to support disposal of transuranic and low-level wastes generated by high-risk activities and the footprint reduction activities. In addition to the FY 2011 budget request, EM will continue to expend the $6 billion in Recovery Act funding provided by Congress to complete lower-risk footprint reduction and near-term completion cleanup activities.

EM carries out its cleanup activities with the interests of stakeholders in mind. Most importantly, EM will continue to fulfill its responsibilities by conducting cleanup within a "Safety First" culture that integrates environment, safety, and health requirements and controls into all work activities to ensure protection to the workers, public, and the environment, and adheres to sound project and contract management principles. EM is also strengthening its project and planning analyses to better assess existing priorities and identify opportunities to accelerate cleanup work. Working collaboratively with the sites, EM continues to seek aggressive but achievable strategies for accelerating cleanup of discrete sites or segments of work. In addition, functional and cross-site activities such as elimination of specific groundwater contaminants, waste or material processing campaigns, or achievement of interim or final end-states are being evaluated.

After the EM program completes cleanup and closure of sites that no longer have an ongoing DOE mission, post closure stewardship activities are transferred to the Office of Legacy Management (LM). LM also receives sites remediated by the U.S. Army Corps of Engineers (Formerly Utilized Sites Remedial Action Program) and private licensees (Uranium Mill Tailings Radiation Control Act, Title II sites). Post closure stewardship includes long-term surveillance and maintenance activities such as groundwater monitoring, disposal cell maintenance, records management, and management of natural resources at sites where active 15 remediation has been completed. At some sites the program includes management and administration of pension and post-retirement benefits for contractor retirees.

The Administration has determined that developing a repository at Yucca Mountain, Nevada, is not a workable option and has decided to terminate the Office of Civilian Radioactive Waste Management (RW). The Nation needs a different solution for nuclear waste disposal. As a result, in 2010, the Department will discontinue its application to the U.S. Nuclear Regulatory Commission for a license to construct a high-level waste geologic repository at Yucca Mountain and establish a Blue Ribbon Commission to inform the Administration as it develops a new strategy for nuclear waste management and disposal. All funding for development of the Yucca Mountain facility and RW will be eliminated by the end of FY 2010. The Administration remains committed to fulfilling its obligations under the Nuclear Waste Policy Act. The Office of Nuclear Energy will develop an integrated approach to improve the waste management options for the Nation and support the Blue Ribbon Commission. Ongoing responsibilities under the Nuclear Waste Policy Act, including administration of the Nuclear Waste Fund and the Standard Contract, will continue under the Office of Nuclear Energy, which will lead future waste management activities.

Innovative Technology Loan Guarantee Program and Advanced Technology Vehicle Manufacturing Program: Supporting Investment in Innovation and Manufacturing

To encourage the early commercial production and use of new or significantly improved technologies in energy projects, the Department is requesting an additional $36 billion in authority to guarantee loans for nuclear power facilities and $500 million in appropriated credit subsidy for the cost of loan guarantees for renewable energy systems and efficient end-use energy technology projects under section 1703 of the Energy Policy Act of 2005. The additional loan authority for nuclear power projects will promote near-term deployment of new plants and support an increasing role for private sector financing. The additional credit subsidy will allow for investment in the innovative renewable and efficiency technologies that are critical to meeting the Administration's goals for affordable, clean energy, technical leadership, and global competitiveness.

The FY 2011 budget also requests $58 million to evaluate applications received under the eight solicitations released to date and to ensure efficient and effective management of the Loan Guarantee Program. This request will be offset by collections authorized under Title XVII of the Energy Policy Act of 2005 (P.L. 109-8).

The Advanced Technology Vehicle Manufacturing program requests $10 million to support ongoing loan and loan monitoring activities associated with the program mission of making loans to automobile and automobile part manufacturers for the cost of re-equipping, expanding, or establishing manufacturing facilities in the United States to produce advanced technology vehicles or qualified components, and for associated engineering integration costs.

Office of Nuclear Energy: Investing in Energy Security and Technical Leadership

The Department is requesting $912 million for the Office of Nuclear Energy (NE) in FY 2011—an increase of 5 percent over the FY 2010 enacted level. NE's funding supports the advancement of nuclear power as a resource capable of meeting the Nation's energy, environmental, and national security needs by resolving technical, cost, safety, proliferation resistance, and security barriers through research, development, and demonstration as appropriate.

Currently, nuclear energy supplies approximately 20 percent of the Nation's electricity and over 70 percent of clean, non-carbon producing electricity. Over 100 nuclear power plants are offering reliable and affordable baseload electricity in the United States, and they are doing so without air pollution and greenhouse gas emissions. NE is working to develop innovative and transformative technologies to improve the competitiveness, safety and proliferation resistance of nuclear energy to support its continued use.

The FY 2011 budget supports a reorganized and refocused set of research, development, and demonstration (RD&D) activities. This program is built around exploring, through RD&D: technology and other solutions that can improve the reliability, sustain the safety, and extend the life of current reactors; improvements in the affordability of new reactors to enable nuclear energy to help meet the Administration's energy security and climate change goals; understanding of options for nuclear energy to contribute to reduced carbon emissions outside the electricity sector; development of sustainable nuclear fuel cycles; and minimization of risks of nuclear proliferation and terrorism.

NE is requesting $195 million for Reactor Concepts Research, Development and Deployment. This program seeks to develop new and advanced reactor designs and technologies. Work will continue on design, licensing and R&D for the Next Generation Nuclear Plant to demonstrate gas-cooled reactor technology in the United States. The program also supports research on Generation IV and other advanced designs and efforts to extend the life of existing light water reactors. In FY 2011, NE will initiate a new effort focused on small modular reactors, a technology the Department believes has promise to help meet energy security goals.

The FY 2011 request includes $201 million for Fuel Cycle Research and Development to perform long-term, results-oriented science-based R&D to improve fuel cycle and waste management technologies to enable a safe, secure, and economic fuel cycle. The budget also requests $99 million to support a new R&D program, Nuclear Energy Enabling Technologies, focused on the development of cross-cutting and transformative technologies relevant to multiple reactor and fuel cycle concepts. The Crosscutting Technology Development activity provides crosscutting R&D support for nuclear energy concepts in areas such as advanced fuels and reactor materials and creative approaches to further reduce proliferation risks. The Transformative Nuclear Concepts R&D activity will support, via an open, competitive solicitation process, investigator-initiated projects that relate to any aspect of nuclear energy generation including, but not limited to, reactor and power conversion technologies, enrichment, fuels and fuel management, waste disposal, and nonproliferation, to ensure that good ideas have sufficient outlet for exploration. The Energy Innovation Hub for Modeling and Simulation will apply existing modeling and simulation capabilities to create a "virtual" reactor user environment to simulate an operating reactor. NE will also continue its commitments to investing in university research, international cooperation, and the Nation's nuclear infrastructure—important foundations to support continued technical advancement.

Office of Fossil Energy: Abundant and Affordable Energy for the 21st Century

The FY 2011 budget request of $760 million for the Office of Fossil Energy (FE) will help ensure that the United States can continue to rely on clean, affordable energy from traditional domestic fuel resources. The United States has 25 percent of the world's coal reserves, and fossil fuels currently supply 86 percent of the Nation's energy.

The Department is committed to advancing Carbon Capture and Storage (CCS) technologies in order to promote a cleaner and more efficient use of fossil fuels. In addition to significant Recovery Act funds, Advanced CCS with $438 million requested in FY 2011 is the foundation of the Department's clean coal research program which seeks to establish the capability of producing electricity from coal with near-zero atmospheric emissions.

In addition, $150 million of FE's $760 million request will be used to promote national energy security through the continued operations of both the Strategic Petroleum Reserve and Northeast Home Heating Oil Reserve programs. These programs protect the Nation and the public against economic damages from potential disruptions in foreign and domestic petroleum supplies.

The National Nuclear Security Administration: Ensuring America's Nuclear Security and Reducing the Global Threat of Nuclear Proliferation

The National Nuclear Security Administration (NNSA) continues significant efforts to meet Administration priorities, leveraging science to promote U.S. national security objectives. The FY 2011 President's budget request is $11.2 billion, an increase of 13 percent from the enacted FY 2010 appropriation. The FY 2011-2015 President's Request for the NNSA is a significant funding increase over FY 2010 levels, reflecting the President's priorities on global nuclear nonproliferation and for strengthening the nuclear security posture of the United States to meet defense and homeland security-related objectives:

- Broaden and strengthen the NNSA's science, technology and engineering mission to meet national security needs
- Work with global partners to secure all vulnerable nuclear materials around the world within four years
- Work towards a world with no nuclear weapons. Until that goal is achieved, ensure the U.S. nuclear deterrent remains safe, secure and effective
- Transform the Nation's Cold-War era weapons complex into a 21st century national security enterprise
- Provide safe and effective nuclear propulsion for U.S. navy warships

The FY 2011 budget request of $7.01 billion for the Weapons Activities appropriation provides funding for a wide range of programs. Some activities provide direct support for maintaining the nuclear weapon stockpile, including stockpile surveillance, annual assessments, life extension programs, and warhead dismantlement. Science, Technology and Engineering programs are focused on long-term vitality in science and engineering, and on performing R&D to sustain current and future stockpile stewardship capabilities without the need for underground nuclear testing. These programs also provide a base capability to support scientific research needed by other elements of the Department, to the federal government national security community, and the academic and industrial communities. Infrastructure programs support facilities and operations at the government-owned, contractor-operated sites, including activities to maintain and steward the health of these sites for the long term. Security and counterterrorism activities leverage the unique nuclear security expertise and resources maintained by NNSA to other Departmental offices and to the Nation.

The Weapons Activities request is an increase of 9.8 percent over the FY 2010 enacted level. This level is sustained and increased in the later outyears. The multiyear increase is necessary to reflect the President's commitment to maintain the safety, security and effectiveness of the nuclear deterrent without underground nuclear testing, consistent with the principles of the Stockpile Management Program outlined in Section 3113 (a)(2) of the National Defense Authorization Act of Fiscal Year 2010 (50 U.S.C. 2524). Increases are provided which directly support of the nuclear weapon stockpile, for scientific, technical and engineering activities related to maintenance assessment and certification capabilities, and for recapitalization of key nuclear facilities. The President's Request provides funding necessary to protect the human capital base at the national laboratories -including the ability to design and certify nuclear weapons—through a stockpile stewardship program that fully exercises these capabilities. Security and nuclear counterterrorism activities decrease about 3 percent from the FY 2010 appropriated levels, leveraging the continuing efficiencies in the Defense Nuclear Security budget.

The FY 2011 request for Defense Nuclear Nonproliferation is $2.7 billion, an increase of 25.8 percent over the FY 2010 appropriation. The increase is driven by the imperative for U.S. leadership in nonproliferation initiatives both here and abroad. In addition to the programs funded solely by the NNSA, our programs support the Department of Energy mission to protect our national security by preventing the spread of nuclear weapons and nuclear materials to terrorist organizations and

rogue states. These efforts are implemented in part through the Global Partnership against the Spread of Weapons and Materials of Mass Destruction, formed at the G8 Kananaskis Summit in June 2002, and the Global Initiative to Combat Nuclear Terrorism, launched in Rabat, Morocco, in October 2006.

The FY 2011 President's request for International Nuclear Materials Protection and Cooperation reflects selective new security upgrades to buildings and areas that were added to the cooperation after the Bratislava Summit, additional Second Line of Defense sites, and sustainability support for MPC&A upgrades. The Global Threat Reduction Initiative increases by 68 percent in support of the international effort to secure vulnerable nuclear materials around the world within four years. The Fissile Materials Disposition program increases by 47 percent reflecting continuing domestic construction of the MOX Fuel Fabrication Facility and the Waste Solidification Building, as well as design documentation for a related pit disassembly and conversion capability. A portion of the funding increase results from the transfer of funding associated with the latter activity from the Weapons Activities appropriation starting in 2011.

The President's request of $1.1 billion for Naval Reactors is an increase of 13.3 percent over the FY 2010 appropriated level. The program supports the U.S. Navy's nuclear fleet, comprised of all of the Navy's submarines and aircraft carriers, including 52 attack submarines, 14 ballistic missile submarines, 4 guided missile submarines, and 11 aircraft carriers. These ships are relied on every day, all over the world, to protect our national interests. Starting in FY 2010, there are major new missions for the NNSA Naval Reactors program. A significant funding increase is requested for the OHIO Class submarine replacement and for the related activity which will demonstrate new submarine reactor plant technologies as part of the refueling of the land-based prototype reactor. R&D is underway now, and funding during this Future Years Nuclear Security Program is critical to support the long manufacturing spans for procurement of reactor plant components in 2017, and ship procurement in 2019. Resources are also included in FY 2011 to support commencement of design work for the recapitalization of used nuclear fuel infrastructure.

The Office of the Administrator appropriation provides for federal program direction and support for NNSA's Headquarters and field installations. The FY 2011 request is $448.3 million, a 6.5 percent increase over the FY 2010 appropriation. This provides for well-managed, inclusive, responsive, and accountable organization through the strategic management of human capital, enhanced cost-effective utilization of information technology, and integration of budget and performance through transparent financial management practices.

Management: Transforming the Culture of the Department with a Results-Oriented Approach

To transform the way Americans use and produce energy, we need to transform the Department of Energy. Because the mission of the Department is vital and urgent, it must be pursued using a results-oriented approach that is safe, fiscally responsible, and legally and ethically sound. The Department has developed strong management and oversight capabilities during implementation of the Recovery Act, and these lessons will be applied to the FY 2011 budget. The budget request of $337 million for corporate management includes $75 million for the Office of Management, $102 million for the Office of the Chief Information Officer, $43 million for the Inspector General's office, $62.7 million for the Office of the Chief Financial Officer, $37 million for the Office of General Counsel, and $2 million for Management Reform within the Office of the Secretary. The Management Reform effort will provide the Department with strategic direction, coordination, and oversight of management initiatives. The primary mission of this new office is to identify operational efficiencies to free up resources for priority mission activities. The Department is also requesting $12 million for a new Acquisition WorkforceImprovement initiative which will be utilized to increase the size and improve the training of our acquisition professionals.

The Department's human capital management efforts are focused on an integrated approach that ensures human capital programs and policies are linked to the Department's missions, strategies, and strategic goals, while providing for continuous improvement in efficiency and effectiveness.

To accomplish this goal, the Department will develop different strategies to attract, motivate and retain a highly skilled and diverse workforce to meet the future needs of the Nation in such vital areas as scientific discovery and innovation.

To improve stewardship of taxpayer dollars, the Department will continue to issue audited financial statements in an accelerated timeframe and provide assurance that the Department's financial management meets the highest standards of integrity. The Department's FY 2009 financial statements were reviewed by independent

auditors and received an unqualified opinion. This was made possible by implementing an aggressive plan to mitigate and remediate a number of financial management challenges that were identified by the Department and its independent auditors. In addition, the Department continues to strengthen the execution of program funding dollars by having regular execution reviews that will ensure funding is processed, approved and spent quickly and responsibly. The Department in FY 2011 will continue its effort to build and improve its integrated business management system.

The Department is continuing to make progress in improving project management and is implementing an action plan with scheduled milestones and aggressive performance metrics. The focus of the action plan is to successfully address the root causes of the major challenges to planning and managing Department projects. The action plan identifies eight measures that, when completed, will result in significant, measurable, and sustainable improvements in the Department's contract and project management performance and culture.

To improve financial performance in project management, the Department has increased the use of Earned Value Management (EVM) techniques within program offices. These techniques objectively track physical accomplishment of work and provide early warning of performance problems. A certification process was instituted for contractors' EVM systems to improve the definition of project scope, communicate objective progress to stakeholders and keep project teams focused on achieving progress. Currently, 70 percent of the Department's capital asset projects have certified EVM systems.

The Department continues to strengthen information technology management by consistent execution of robust IT Capital Planning and Investment Control oversight and reporting processes designed to ensure successful investment performance, including the use of EVM Systems as appropriate, and the remediation of poorly performing investments. Through the establishment and use of an Enterprise Architecture that aligns to the Federal Enterprise Architecture, the Department has ensured that all IT investments follow a comprehensive Modernization Roadmap.

The Department continues to take significant actions to improve its cyber security posture by implementing its Cyber Security Revitalization Plan to address longstanding, systemic weaknesses in the Department's information and information systems. Specifically, the Department seeks to ensure that 100 percent of operational information technology systems are certified and accredited as secure and that the Department's Inspector General has rated the certification and accreditation process as "satisfactory." Additional steps will be taken to ensure that electronic classified and personally identifiable information are secure.

The CHAIRMAN. Thank you for that statement.

Let me start and just mention an issue that I will not ask you to respond here, but to flag it for you because it is one of concern. Last year, the administration had proposed zeroing out the upgrade for the Los Alamos Neutron Science Center, and we had the head of the NNSA testifying before the Strategic Subcommittee of Armed Services this last year and the Energy and Water Appropriations Committee to the effect that keeping that facility operational was essential to maintaining our stockpile. So I have a concern that the proposal is continued this year to zero out that upgrade of that facility. I will try to get with you and try to understand better the position of the Department on that in the next few days, if I can.

Let me move to one of the overall issues that I think Senator Murkowski talked about and I know is a difficult one to manage, and that is how does the funding that was provided in the stimulus bill or the recovery bill relate to the funding levels you are now requesting in this new budget in particular areas?

One example I would ask about is this year's budget increases funding for grid energy storage research, which I think is a very good idea. Maybe you could explain to us how these funds, these new funds that are being requested, would complement or relate to

the demonstrations already underway under the Recovery Act in that area.

Secretary CHU. Yes, I would be delighted to.

Much of the Recovery Act funding on the smart grid is more toward to the user side. This is using the technology and piloting and demonstrating the technology that could be used for load leveling and things of that nature.

But as we increase our renewable energy, renewable energy is transient. Sometimes the wind stops blowing and the sun stops shining. Our experience has shown that once you go over 20–25 percent, even if you have a large-scale distribution system, you still need to integrate into that large-scale storage. So what we would like to do is begin—and we have started this already. Within our Bonneville Power Administration and WAPA to try to develop plans to anticipate. When we get to that large fraction and go beyond that, we will need to integrate storage. That is why we are requesting these funds.

The CHAIRMAN. Let me ask about this carbon capture and sequestration task force. I think President Obama announced recently, when he spoke to the National Governors Association, that he would be asking the Department of Energy and EPA to develop an interagency task force on the issue of carbon capture and sequestration and how that can be brought into a reality.

Could you elaborate on the role you see the Department of Energy playing in this activity and outline what this task force would be all about?

Secretary CHU. The task force that would be co-chaired by EPA and DOE has a goal to get the technology developed so that we can begin to get rid of the barriers toward beginning a routine deployment of CCS in 10 years. That requires a lot of things, but the Department of Energy, because of our strong technological base, is going to be playing a role both in the continuation of deployment of technologies today; and we also have a very aggressive research program to see if we can begin to improve upon the things that we know today in the capture part, and we also have a very aggressive program in the storage part. You need to demonstrate in different geological sites around the United States that the carbon can be stored safely, securely, and for long periods of time.

But it shows the commitment that we believe given the coal resources in the United States, and quite frankly the coal resources of the world, that this is something we have to do. It is a very important part of decreasing the carbon emissions in the world.

The CHAIRMAN. Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman.

Secretary Chu, let me start here with nuclear this morning. I understand that under the terms of the Nuclear Waste Policy Act, you are required to notify Congress of the reasons why the Yucca Mountain site is to be terminated. The statement that is contained basically is pretty simple. It says President Obama zeroed out Yucca funding in his budget. I am wondering when we might expect to get that rationale. Hopefully, it will be more instructive than just that the President has zeroed it out.

With Yucca Mountain off the table, from the administration's point of view, how do you intend to handle the issue of the fees that are imposed on utilities for the nuclear waste fund?

Secretary CHU. First, the whole intent of the Blue Ribbon Commission and the whole intent of our strategy coming in was that we know a lot more than we did in 1982 and subsequent years when the Nuclear Waste Act was written. So we have assembled a team of very distinguished people, you know, experts in the science and technology, geology, political leaders, to look at what we know today, but also to look at what we know about the coming decades. The NRC has stated repeatedly that dry cask storage will be safe for a half a century or more. This will give us time to look at better solutions than what was being done at Yucca Mountain.

So we are still wanting to move forward. We do not think the pulling of the Yucca application means that we are at a standstill regarding moving forward, but I do believe there are better solutions and that is the intent of the Blue Ribbon Commission.

Senator MURKOWSKI. How do you deal with the fees that continue to be imposed?

Secretary CHU. Yes. So we are required to constantly review whether the fees collected are appropriate, and we will continue to do so. So that has not really changed at all.

Senator MURKOWSKI. Let me ask you about hydro. I mentioned this in my opening statement. The administration will be pushing hydro because—this is your words—"an incredible opportunity and it is actually the lowest cost clean energy option." I absolutely agree with you.

When we look at the jobs that are associated, the National Hydropower Association figures that there are upwards of 700,000 cumulative and direct and indirect jobs that can be created working with potential hydropower. To me it seems like a pretty good investment these days, yet, when you look at the budget, this is the one area of renewables where we are seeing cuts, a significant cut, 20 percent, from what Congress approved last year.

Can you speak to the discrepancy in funding? I mentioned that solar and wind certainly seem to be the favored child. What is the situation with hydropower?

Secretary CHU. Actually my feeling—hydro is no different. I do think it is a very valuable resource and I would be glad to work with you and talk with you about that as we formulate the budget. We continually have to make tough choices, but I do believe that hydro is an important part of the mix. There are projects in hydro that have not been fully utilized, and this has nothing to do with large new hydro projects but just improving the efficiency of what we have today, plus tapping hydro storage which was for flood control, but where we can tap into that as well, again to me with a minimal environmental impact. But I will be happy to work with you on that.

Senator MURKOWSKI. I would like to pursue this more. I would like to know whether or not the funds that will be made available for hydro will be divided or disbursed between the more conventional hydro projects, and then you have the emerging technologies. In Alaska, we are interested in looking at the potential for ocean, tidal, in-river, hydrokinetic. But again, these are opportunities that

we would like to consider ways to pursue them. But when you see the substantial reductions in this area, it causes us to question whether or not we have that level of support from the administration. So I would love to talk to you some more about it.

Thank you, Mr. Chairman.

The CHAIRMAN. Senator Udall.

Senator UDALL. Thank you, Mr. Chairman.

Good morning, Secretary Chu.

Let me just start by making a couple of comments, in particular, focus on the budget. I know you have made some difficult choices in concert with the President. You have balanced the needs of clean energy technologies which have so many important opportunities for us. I support the President's freeze on discretionary spending, so in the end, it is about setting priorities. But thank you for your hard work in that regard.

I did also want to mention that I am pleased to see the investment in nuclear research and development programs, particularly the emphasis on small modular reactors. I introduced a bill late last year. We consulted with the Department of Energy. The ranking member and the chairman graciously cosponsored that legislation. So I look forward to moving forward in that particular area because there is real potential with modular nuclear reactors.

Let me turn to the home front. The National Renewable Energy Laboratory is based in Colorado. We are very proud of that facility. I want to thank you for including the final construction funds for the Energy Systems Integration Facility. As you know, it will serve as a point of coordination and collaboration on clean technology integration.

Everywhere I go, I hear that the University of New Mexico is on the cutting edge and the University of Alaska, the University of North Carolina, and Vermont. Every university, particularly the State systems, are excited about the potential. That is what we want. We want this race to the top, to borrow a phrase from the education world. I think this point of attention at the Renewable Energy Lab will serve us well.

Let me turn to the gap that you are well aware of between science and applied research. I know you have made that a focus of your efforts. Could you update us on your efforts to assure that key labs like NREL are achieving that goal?

Secretary CHU. First, the two under secretaries relevant in this, Kristina Johnson, the under for energy, and Steve Koonin, the under for science, are working very closely together. They have a very good relationship. A lot of the issues that were traditionally stove-piped in, let us say, the applied area, lots of discussions now with the Office of Science. The Office of Science has, in the past, developed a very rigorous review process that is being ported over to the other areas so that we can improve the decisionmaking process. It is not bad, but I think there is always room for improvement. The integration of a lot of the things. For example, in the Office of Science, they could be focused on many of the research needs that will enable one to actually think of much more dramatic breakthroughs. That is being integrated more closely with the more applied areas. Those applied areas also include the beginning of piloting and deployment.

So this remains something that is a central concern and focus for us because there is very little time, if you look at what we have to do by mid-century. We have to accelerate the deployment from the laboratories and universities and national labs into pilot programs and into the marketplace, being picked up by the private sector. So there are many, many discussions both formal and informal after work—I have to admit sometimes lubricated with "biofuels"—where the leadership are really trying to say, OK, what can we do now because we have control for the entire value chain of this. So it is something I would be glad to talk about in detail, but it is something we remain very focused on.

Senator UDALL. Your mention of biofuels—I know that there have been concerns at various points, as we have worked to encourage more biofuels, that one of the problems we might have are the producers might want to drink the biofuels rather than use them in their automobiles or trucks.

[Laughter.]

Secretary CHU. Carrying charges.

Senator UDALL. I hear my Arkansan friend down here chuckling about that.

In the remaining time, the chairman talked about storage, and we had a very important hearing late last year on the potential of storage which both involves transmission and production. You are doing some work on modeling of the grid to better understand how we incorporate that storage. Do you have the necessary personnel and resources to really dig deep into that opportunity?

Secretary CHU. We can always use more, but certainly, for example, the administrator of the BPA—I had a phone conversation with him about a month ago. He is very eager to look at integrating power generation with wind. The BPA, the Bonneville Power Administration, is 20 percent wind and 80 percent hydro. They have good hydro storage potential. They also actually have, it turns out, good compressed air storage potential. So I said this is great. You have my full backing. Push on this.

ARPA-E is looking at storage, not at the scale of hydro storage or compressed air storage, but certainly storage for large buildings and things. These are liquid metal batteries. Within a few years, we will know the prospect of increasing megawatt-hour storage by a factor of 10—because of that it would have a profound impact on the reliability of our electrical systems. It could mean that you could really have, in areas like the western part of Alaska, which are off-grid—you can actually develop renewables and you have a practical source of electricity off grid.

So it is very exciting and it actually makes it much more feasible to use photovoltaics generating the capacity. If you can have in a building that scale of storage, that means you can actually put on much more capacity on your rooftop.

So going forward, storage is a very important part of getting us to low carbon fuels.

Senator UDALL. Thank you. I look forward to working with you particularly in this area. Thank you.

The CHAIRMAN. Senator Burr.

Senator BURR. Thank you, Mr. Chairman.

Mr. Secretary, welcome. Thank you for your testimony.

You said that we know more now and that there are better choices than Yucca. Now, I happen to be one that has felt that Yucca as a planned site was—we are way past that. But tell me exactly. What do we know now?

Secretary CHU. I would be delighted to.

Let me give you an example. I do not want to prejudge what the Blue Ribbon Commission is going to be doing.

Senator BURR. No. I am trying to get you to justify for me why we need a blue ribbon panel if we know it.

Secretary CHU. Because I think I know something but I am smart enough to realize that I certainly know far from everything, and to get a distinguished bunch of people together to really look over all the things that are going to be anticipated—I cannot personally——

Senator BURR. Mr. Secretary, you and I both know that a new nuclear plant is a lot of money, $8 billion average. Many of the applications that are in are investor-owned utilities. They are going to do this in a combination of Government-guaranteed loans and shareholder investment. Do you think we are going to maximize the build-out of nuclear until we have resolved what we are going to do about nuclear waste?

Secretary CHU. No. We are going to have a solution to nuclear, the back-end fuel issue. I think scientifically we are going to have a solution to that, and I think given that, then there is no reason——

Senator BURR. When?

Secretary CHU [continuing]. To be a little bit tepid.

Senator BURR. When?

Secretary CHU. We have decades. As the NRC said, there is going to be at least a half a century.

Senator BURR. But temporary storage does not meet the requirement for shareholders to aggressively invest in the build-out of nuclear generation. As long as the Government loans are in place, we will probably have activity to build out. I personally believe that that is not enough nuclear generation plants for the future. So if we build out 2 dozen and then we stop, where are we better off than the fact that we have not built any for decades?

Secretary CHU. The intent of the loans and the reason the administration asked for more loan guarantee authority is to get 7 to 10 nuclear powerplants started. By that time, there is enough confidence in the investment community and the utility community to let the private sector take over. So the intent is not to stop at 7 to 10. The intent is to start it and let the private sector then take it over.

Senator BURR. Mr. Secretary, I make the case to you if the private investor community does not see an answer to the storage—permanent storage, not temporary storage—of nuclear waste, they will feel they might be in some way responsible for that storage and at the whim of a future administration that decides, well, you know what Secretary Chu—the path he was headed on really was not the right one because what we know today is we ought to bury this in the ground.

We have got to pick a path and go for it. We either know something and we should do it or we are going to kick this can down the road which, quite frankly, I am getting tired of doing.

But let me just say this. You are the one that is going to have to tell ratepayers that there is not a plan for permanent storage but they are going to continue to be soaked by the Federal Government, a required payment through their utility bill to fund the storage. I find that unacceptable, to be quite honest with you. They have been paying into this for years and they got nothing. We do not even have a plan now as to where we are going to go. We are going to set up another commission.

So I encourage you, whatever commission we set up, would you make sure that the timeline for their decision is as quick as possible? Before they start, share with them what we know now so we give them a starting point.

Secretary CHU. I would be delighted to do that and am beginning to do that.

Senator BURR. Good.

Secretary CHU. Let me just very briefly say that the two cochairs of this commission want to push ahead as rapidly as possible, and I share their enthusiasm.

Senator BURR. In Washington-speak, that can be at a snail's pace, and I hope we will not use Washington.

Mr. Secretary, the administration has proposed a 7 percent budget increase. When matched with the stimulus package, the way I calculate it, that is an 80 percent increase. Is that justifiable right now?

Secretary CHU. I believe it absolutely is justified. The administration said that—across the board, if you take out defense and the social programs, they were holding to a flat budget.

Now, the fact that the Department of Energy has gotten increase just reflects the priorities in nonproliferation, in national security. There is also a 2.8 percent——

Senator BURR. In national security, we are decreasing the funding of the SPR 43 percent. The SPR is there to provide us that access to petroleum if, in fact, the Middle East is cutoff. We are decreasing funding 43 percent.

We are not increasing funding of transmission. You have talked about the smart grid. But if you go to the northwest of Texas and you see a windmill farm, you see a third of the windmills turning and two-thirds not down for maintenance, down because the transmission lines will not handle that amount of generation moving it to a grid. But we have not targeted specifically more money to get electricity from a generated point to a grid. We are focused on the grid.

I would only suggest to you that whether it is wind or whether it is solar or whether it is another renewable, if we are not going to invest in the right areas, then we are not going to be able to tap successfully what the country can do.

Any comment on that?

Secretary CHU. Let me speak very briefly on the SPR. The projections now the EIA is giving us that the U.S. oil, the traditional oil, going forward will remain flat. Our increase in transportation fuel will increase, but it will be taken up by biofuels.

So we have a statute that says we need a reserve that allows 90 days of import protection, and we think that the current SPR gives us that. So that is why we are decreasing the budget. We had an up-tick in the budget to move one of the caverns. That is an environmental issue. But the feeling is that the U.S. petroleum is adequately protected.

Senator BURR. I thank the chairman who has been extremely patient. I will stay around for a second round.

But I would only make this comment. I think when this decision was made, the five heads of our intelligence organizations and law enforcement did not say to Congress that they had 100 percent confidence that there would be an attempt to attack us in the next 6 months. Now, I am not sure exactly how that computes, but I would only say that it should suggest to all the Members of the Senate that the world is not a safe place. The Middle East is not a stable region, and the likelihood is there might be an interruption and that may or may not last more than 90 days. So I thank you.

The CHAIRMAN. Senator Sanders.

Senator SANDERS. Thank you, Mr. Chairman.

Secretary Chu, thanks for being with us and thank you for the great job that you are doing.

You know, sometimes we forget and we do not look at the big picture, but I think since Richard Nixon there has been a vision in this country and discussion in this country about the need to break our dependency on foreign oil. Right? People have been talking about energy independence for decade after decade after decade.

Obviously, we have a very long way to go, but I think it would be unfair not to acknowledge that in the last year we have made the bolder steps forward than we have in the history of this country.

When Senator Burr talks about large increases in the energy budget, he is right. I applaud that because the time is long overdue that we end the insanity of spending $350 billion every single year supporting Saudi Arabia, getting involved in wars for oil rather than moving to energy independence. I note that in this budget, solar is increased by 22 percent, wind by 53 percent, geothermal by 25 percent, $300 million more for weatherization, and $75 million more for the State energy program. I think all of that is exactly the right thing to do.

I have a concern, in fact, that we are perhaps getting into a very dangerous area by adding another $36 billion in loan guarantees for new nuclear plants. I know that many of my friends are good conservatives and they tell us to get the Government out of everybody's life, but somehow when it comes to the Government supporting nuclear energy, well, I guess that is a pretty good thing. If it is such a good idea, why is the private sector not jumping in? The answer is it is risky business. It is risky business.

But I do want to mention that this $36 billion in loan guarantees for new nuclear plants comes on top of an existing $18.5 billion that has not yet been used. From the taxpayers' perspective, it means that the CBO has told us the risk of default on new nuclear plants is above 50 percent.

So my own feeling is nuclear is probably the most expensive way to generate new energy. It is, in fact, risky. I applaud you and the President for beginning to put a whole lot of money into sustainable energy and energy efficiency, but I think, in fact, that is the future of America and not nuclear.

Let me ask you, Mr. Secretary. Talk to us a little bit about some of the breakthroughs that you anticipate, that you see are coming in solar. For example, Ken Salazar has talked not infrequently about the potential of solar thermal providing a substantial part of electricity in this country. We are beginning, I think, to make some progress. Can you give us a report on that?

Secretary CHU. Sure. There are two types of solar for generating electricity: solar thermal and photovoltaics. There are new ways of getting much more efficient, first, higher temperatures, tracking to get higher temperatures in solar thermal, concentrated solar. Solar thermal has the advantages that you can store for about a day the heat, newer fluids that allow these things to be more efficient. In photovoltaics, the cost continues to go down, the costs of modules. The solar modules themselves have now gone below $2.

Senator SANDERS. Can I interrupt you—I am sorry—just to ask you this question? At what point do you think solar would be competitive with the more conventional energy technologies? Are we closing in on that gap?

Secretary CHU. We are closing. Right now it does need subsidy help, but my hope is that especially in photovoltaics, for example, because it compliments so nicely the need for electricity during hot summer days, once we get an integrated module plus inverter micro-integrated—because the inverters, the electronics, actually do not last as long as the modules themselves, plus thin film—I see once we get that going, the price will really come down. At $2 an installed watt, certainly a $1.50 an installed watt, then I see all sorts of things popping up without subsidy.

Senator SANDERS. We do not have to worry about burying waste from solar energy. Is that not right? We do not have to spend billions of dollars figuring out how we get rid of that toxic——

Secretary CHU. Actually some of the thin film ones we have to be good about recycling the materials.

Senator SANDERS. Right, but not exactly radioactive waste.

Talk a little bit, if you might. I think there is widespread agreement that the most cost effective way of going forward in energy is energy efficiency. You are familiar with the PACE program. Can you say a word about what you see the potential for that concept?

Secretary CHU. We are working with other agencies, particularly Shaun Donovan's HUD. The idea is that energy efficiency we believe really does save money, but there are hurdles and one of the hurdles is the initial investment if you need $3,000 or $4,000. So PACE says a local jurisdiction, a town or a city, can volunteer. A homeowner says I want to do my house. We will increase your property tax. You get the money at a low interest loan. Your monthly payment of increased mortgage rate or property tax, for example, is less than what you are saving on energy. So it pays for itself.

Senator SANDERS. Mr. Chairman—Mr. Acting Chairman, I would just hope that we pay attention to this because one of the impedi-

ments to moving forward aggressively in energy efficiency is that people do not have the $5,000 or $10,000 to retrofit their home. By giving them the flexibility of paying it off through a few dollars more in property taxes, while they are saving money on their electric bill, is very clearly, I think, a win-win situation.

Thank you very much, Mr. Secretary.

Senator DORGAN [presiding]. Senator Sanders, thank you.

Senator Lincoln.

Senator LINCOLN. Welcome, Secretary Chu. We are glad to have you at the committee, and I certainly enjoyed working with you. I appreciate the great job that you are doing.

I would like to echo my colleague from Alaska's comments about hydro. It is very important in a State like ours where we have a tremendous amount of fast-moving water, and it has been a great source of energy for us in the State of Arkansas and I think something that we have managed well and would encourage you to look at that. Senator Murkowski brought up the cuts in hydro.

There are some interesting studies and industries. I know there is a group out of Massachusetts that is looking at putting the ability to capture the energy of moving water at the bottom of the rivers and some other different technologies out there. So I hope you will not give up on that. I think it is important for many of our States and it is something that we have access to. We may not have as much of some of the other renewables. We certainly have a little bit of everything, and that is a good thing.

Senator Burr brought up the nuclear issue. I guess one of my questions there would be to what extent is the administration committed to the discussion of possibilities for nuclear reprocessing technologies. That never was brought up.

Secretary CHU. It is a possibility. But again, right now what we have I do not think is proliferation-resistant and I know it is not financially viable only because of looking at the experience of Japan and their reprocessing which is about a factor of 2.5–3 over budget. This is going north of $20 billion.

Senator LINCOLN. But other countries are. That is why Japan shipped it somewhere to have it reprocessed.

Secretary CHU. They are, but their experience in these new reprocessing plants is that they are way over budget.

Senator LINCOLN. We can learn from that experience.

Secretary CHU. Right.

Our budget and our intent is to do research in reprocessing. There are other ways as well. For example, if we can develop once-through burning, which is actually what we call a much deeper burn, so that you can extract up to 30 percent of the energy from a once-through cycle, that would be transformative because we are extracting less than 1 percent of the energy content now.

Senator LINCOLN. It is amazing. I have toured several nuclear facilities, and when they have showed that to me and I have actually seen it, you are exactly right. I mean, there seems like there is a lot of waste that goes out.

Secretary CHU. Right. There is a large volume. So that is decreasing the amount of waste by a factor of 30.

So I think we are going to be looking at all those things. It has to be proliferation-resistant. It has to be economically viable.

Again, to either of those things, it is not clear what the path is, but that is what research is about.

Senator LINCOLN. Right. Would you agree that the reprocessing or the extension of what we are able to capture out of the leftover energy that we are not using could be a part of the competitiveness that you mentioned that is important in our nuclear industry?

Secretary CHU. Yes. We are looking—first, the real, very basic research stuff, I think, the Department of Energy simply has to support. But once it looks as though the private sector is getting interested, then it becomes a partnership with the private sector. Again, our view is that there are a lot of new ideas out there. These ideas have been popping up only in the last 5 years, 10 years. So it is a new day in town in terms of what the possibilities are.

Senator LINCOLN. Obviously, maximizing that resource is going to be what makes it more competitive, I would assume.

Just quickly, how quickly do you think you can move forward with the construction of these nuclear powerplants?

Secretary CHU. Despite appearances, we are working very, very hard on, first, getting the loan guarantees for SET. There are bumps in the road, but I have to say there have been times when I have been talking with the CEOs of the various companies on an every third or fourth day period trying to nurse these things along.

Senator LINCOLN. So that $40 billion that you requested for there—is that going to help accelerate the loans?

Secretary CHU. What it does is it allows us to more in the pipeline. The original $18.5 billion could, at most, do three to four new reactors. It has been our feeling, the feeling of the National Academy of Sciences, that you need more than that to give the confidence these things can be built on time, on budget. Once you have that, then we believe the financial markets, the rate commissioners say, OK, there is enough confidence. We know we can do this and we can build these things in a timely manner without excessive delays. At that point, we hope the private sector picks it up.

Senator LINCOLN. Good. I hope you will share with us the ways that you feel like you have improved on that loan guarantee program and what else you have got in store for that because we want to see those resources out there as quickly as possible. I appreciate it because I think there are a lot of folks out there that are looking forward to the opportunity of being able to get moving on that.

Particularly, I will certainly associate with the gentleman from Colorado. Biofuels are critical for us in rural America, but particularly in States like Arkansas. We want to work with you from the standpoint of the Agriculture Committee on how agriculture can really play a successful role in being a part of that.

Secretary CHU. Thank you.

Senator DORGAN. Senator Lincoln, thank you very much.

Mr. Secretary, are you having a good time? The reason I asked the question is you received the largest venture capital sum in the history of humankind when the Congress gave you $36 billion in the economic Recovery Act and you have wide latitude really with the use of that money to go out and change our energy future. So are you having a good time doing that?

[Laughter.]

Secretary CHU. Yes. Let me just say in some of the loans, the 1703 loans, the way the statutes are configured—we cannot fund some of the things we would like to fund. So that is why in the new budget, we are asking for $500 million so that we can help those loans because otherwise a lot of the more progressive, more daring things we simply cannot fund.

It is a very different story with the nuclear loans because they are self-financed. They don't really take something out of the Treasury.

But the short answer to your question is it is an incredible opportunity. You probably know Jonathan Silver, a very good man. We have started to put together only in this last year a very good team of people. It has got a very central focus. So we went from 0 to essentially, I think it is, now up to 11, and we think we can increase this.

Senator DORGAN. You were hamstrung by not getting the nominations through the Senate very quickly, and we recognize that.

But I do think that you have the opportunity to play a very transformative role in this country's energy future.

I want to ask you a series of questions, if I might. I have got four or five. I will do it quickly.

FutureGen. Have you decided what you want to do with FutureGen? If you have not, when will you, do you think?

Secretary CHU. We are working very closely with the FutureGen Alliance. So we hope within a couple of weeks, but certainly by mid-March we can get a decision on that. But I think they are working very hard. We clearly want them to put together a successful package, but it really remains to be seen.

Senator DORGAN. What I hear is you are forward- leaning on FutureGen. Is that what you are saying? I am trying to understand whether FutureGen is going to happen or whether some other approach is going to be used.

Secretary CHU. The issue here is the cost and whether the Alliance—I mean, they need some new partners. They are getting some of those partners. I think Senator Durbin has been very helpful in that respect. But there are still issues regarding that. We do not want a huge overhang into the future on our budget.

Senator DORGAN. One of the issues that I am very interested in as chairman of the appropriations subcommittee that funds these issues is the beneficial use of CO_2. We know that CO_2 is a problem. We want to have a lower carbon future. As we try to understand what to do with CO_2, part of it is the opportunity for beneficial use, that is production of algae as an example, enhanced oil recovery as an example, and there are others, the fellow that has figured out how to create concrete by mineralizing the flue gas and containing the CO_2.

Give me your assessment of beneficial use of CO_2 as a potential solution to a lower carbon future?

Secretary CHU. It is certainly a partial solution. To the list you just named, I would add methane coal bed production. Carbon dioxide will displace the methane and you can recover more natural gas. We have a research program, methane hydrate recovery. We are eager to get on with an experiment. This is research in Alaska for that. How do you extract natural gas which we see as transition

fuel? There are only two sources of energy that can be turned on fast enough when the wind stops blowing because we will probably only get about an hour or 2 lead time to say it is tapering off, and that is hydro and natural gas. So natural gas is going to be an important part of this. So we are continuing to do research on that.

Senator DORGAN. I would just observe the wind does not stop blowing in North Dakota, by the way.

[Laughter.]

Senator DORGAN. I want to ask you about the issue of transmission. The bill that we created here and I hope will get to the floor at some point will help create the interstate highway of transmission capability. We have tried to deal with the issue of planning, siting, and pricing, which are the impediments. One of the things I am interested in—is there new technology out there on transmission wires because we are using the same old technology for 50 and 70 years. I know there have been some advances, but if there is some new technology that allows us to make these corridors much more capable, that would be helpful.

Then second, attached to that, in order to electrify the vehicle fleet in this country with the 1 million vehicles on the road by 2015, which I believe is the administration's goal, we are going to have to maximize renewable energy. That means getting energy from where the wind blows and the sun shines and then putting it on the wires to move it to the load centers.

So give me your sense of the technology of transmission, and then do you believe we are on the road to 2015 really having a million vehicles moving toward an electrified vehicle fleet?

Secretary CHU. There is not a radical technology, but there is continual improvement. We are going to better materials for the wires so you can have more current carrying capability with less weight. There is an evolution toward much higher voltages which is what you will really need to bring the renewable resources to the population centers.

This is one of those things that really gets in my craw that China is now leading the world in the highest voltage transmission lines, whereas it was the United States that introduced electricity transmission distribution systems with Thomas Alva Edison.

There are some technologies that we are investing in that have to do with creating very high voltage DC that you can actually take down. Usually DC is only one-way. You generate here. You port it a long distance. You bring it down. If we have the technologies that can drop it down the way we do AC—but this requires some technology development in the high frequency switching of these very high voltages and high power. So that is something we are investing in.

Senator DORGAN. Just finally, are you positive about an electric drive future and 1 million vehicles by 2015?

Secretary CHU. Positive? I do not know about that. But I have a bet with Larry Summers regarding that. I think there will be a reasonably large deployment.

Senator DORGAN. Can you describe the wager?

[Laughter.]

Secretary CHU. No. It is a private one between he and I that I may or may not win.

But in any case, it is something that is a very important part of what we see in the energy future, namely that we want to electrify personal vehicles, especially the short-haul stuff, and that is a very important part of it.

Senator DORGAN. Mr. Secretary, let me just say for myself—and I think for some others as well—I am really pleased that you are where you are. I think you are a man for this moment, and this needs to be a transformative time for energy. So thanks for your work.

Senator Shaheen.

Senator SHAHEEN. Thank you, Mr. Chairman.

I would just echo your comments. I think we are all very excited that you are at the Department of Energy. It is really encouraging to see some of the steps that are being taken. I just visited the New Hampshire Electric Cooperative, and they are working with a grant they got through ARRA to do smart meters, and they are going to have some very interesting data and, I think, show what a difference it makes when we do have those new technologies and make them available to consumers, that consumers are going to respond and be more efficient.

One of the other programs that got a lot of money through the Recovery Act was the EECBG program, and that is something that has also been very popular in New Hampshire, a small State with lots of small communities. Demand has been six times greater than the available funds.

So can you talk about what you hope can be done to follow up on those grants made available through the Recovery Act?

Also, one of the concerns that we have heard from local communities is that a lot of the innovation that is coming is coming through local governments, school districts, municipalities, and small towns. They find it hard to access assistance. They are not sure where to go in the Department to get help or to share the information and the innovation that they are doing.

So can you also talk about your vision for responding to those small governments?

Secretary CHU. OK. First, there is a new program that is being stood up, and what we are doing is we are helping the cities, the towns. We are helping them say if you do these certain things, you will not trigger a NEPA review. So we are working with EPA and CEQ on what are categorical exclusions. If you do this, this, and the other thing, you do not need a NEPA review. A NEPA review could trigger an environmental impact statement. Once you go down that road, then you are seeing delays of a year, a half year, or more. So we are doing that. We are giving them language, essentially template language, that says you need to do this.

We have worked with our historical preservation societies. It is very common sense, but it needed to be done. If you are in a historical site, anything that you do, caulking, insulation, anything that is invisible to the outside, you do not have to have them review it. There is a blanket agreement that says you are good to go.

So many of the things that would introduce delays, especially to a local community which is not used to dealing with some of these things, we are trying to say if you do it this way, you can bypass that.

Also, when they want to design a request for a proposal, which is allowed under EECBG, again some of our local people are not used to this. So we are now saying here is an example of a proposal, a template of a proposal, that would be good to go, that satisfies all the legal requirements. If you mimic and copy the form of this proposal, that saves a lot of staff time, a lot of staff uncertainty.

Finally, we have made it known, in talking with the NARUC people, that we want to be responsive within 24, at most, 48 hours. So we have hotlines. We have Web sites. We have e-mail. Just e-mail us if you have a question. We will respond. So it is a very fast turnaround. We are doing all those things.

We are looking at our site offices to make sure that our site offices are doing the work flow in the most efficient way possible so that there is no hang-up in our site offices. So everywhere down the food chain, we want this money out as fast as possible because it is fundamentally jobs, as well as saving money faster.

Senator SHAHEEN. Thank you, and we appreciate that we are now over the hump in terms of getting the ARRA money out. That is very helpful.

One of the things that we also have a lot of in New Hampshire is biomass. We are the second most heavily forested State in the country. As you know, biomass can be helpful not just in providing electricity through utilities but also in providing heat. So that combined thermal use is something that we think is important so that we make use of biomass for both.

Can you talk about what the Department is thinking about in terms of the future of thermal energy?

Secretary CHU. Sure. There are several areas that can be used for biomass. One, of course, is transportation fuel, both the gasification of the biomass which would allow you to gasify waste products, wood chips, wheat straw, things like that to make very clean fuel. When you gasify, you take the carbon dioxide you sequester. There are enzymatic ways of doing this. Co-firing. So we are now beginning to invest in what it would take to treat biomass, blend it in with conventional fossil fuel so that you can actually generate electricity.

Now, the good news here is that once we start capturing the carbon from this, the fact that the plant has sucked a lot of the carbon dioxide out of the atmosphere—you capture the carbon from, let us say, a mixture of coal or natural gas—let us say coal and biomass. This becomes environmentally very friendly if you sequester that carbon dioxide. So the co-use of biomass in electricity generation by burning and capturing the carbon is something we are beginning to invest in and trying to get that going.

So there is a whole wide range of things. This is just taking advantage of some of the natural resources of the U.S. The agricultural resources of the U.S. are enormous. The amount of agricultural waste that is not being used, that is eventually—you know, microbes turn it into carbon dioxide and methane and it goes back into the atmosphere. We can begin to capture a lot of that energy. If we sequester it, this becomes slurping carbon dioxide out of the atmosphere, which is, quite frankly, something we will need.

Senator SHAHEEN. Thank you.

Senator DORGAN. Senator Stabenow.

Senator STABENOW. Thank you, Mr. Chairman.

Thank you also, Secretary Chu. I would echo others who have said that we are very appreciative of your leadership and the work of the Department of Energy. I would say on behalf of our State, in Michigan, that we appreciate that you have been a partner with us, and we are seeing results. There is much more to do, but I think we have turned a real corner. Thank you for that.

You have spoken earlier about China, and I am sure that you saw in the New York Times a very concerning article talking about China leading the global race to make clean energy. We know they are, right now, investing about $280 million a day, I am told. So we are in a real race in order to have those jobs here and our own energy independence.

The article talked about vaulting their competitors in Denmark, Germany, Spain, and the U.S. to be the largest maker of wind turbines, the largest maker of solar panels. Going on, they were quoted as saying most of the energy equipment will carry a brass plate "made in China." So I hope that our effort is all about seeing the words "made in America." That is what we want to see happen.

So to that end, I wanted to ask you about several different programs that have been positive in the Recovery Act and how you see them going forward.

First is battery technology. We know we have had a very significant investment in the Recovery Act. We in Michigan are seeing at least six new manufacturing facilities, different companies that are opening advanced battery manufacturing. But I am noticing that we do not have additional dollars in this budget going forward in a significant way. Battery technology, of course, is also critical for the development of wind and solar and other alternative energy.

So I am wondering if you could speak about where you see our efforts going forward on investing in battery technology.

Secretary CHU. We have a number of programs in the development of new technologies. In fact, one of the things we are proposing is a hub, one of our research hubs, on inventing still better batteries that can really transform. The advanced battery manufacturing is a very important part of the program. Where the dollars are most useful, I think, is looking at inventing in the radically new things that will guarantee that we are going to not only recapture leadership in battery manufacturing, but also will be pushing the frontier.

The lithium ion battery technology was one of those things not invented in Japan. It was invented actually in the U.S., but more perfected in Japan.

So we are putting in a hub. We are putting in a lot of other things. The RB is looking at battery technologies. So I think, again, can we invent the radically new things?

I think with this emphasis—responding to Senator Dorgan's question, the electrification of personal short- range vehicles is one very good way of decreasing our foreign oil dependency. It is a very clean system. You know, getting carbon out of the transportation sector is clearly the hardest thing that we have, and fuel efficient batteries and biofuels are the way.

Senator STABENOW. If I might just expand on that. As you know, I have legislation, working with a colleague, Congressman Peters in the House, the Advanced Technology Vehicles Act, that would focus us not only on small vehicles but on larger vehicles as well because we know that we have a tremendous opportunity with our larger vehicles, trucks, and so on. In fact, in Michigan, we are developing large batteries to be able to address those efforts.

So I am wondering what efforts are happening in the Department to focus on vehicles, specifically larger vehicles and trucks so there are more energy savings, carbon emission savings?

Secretary CHU. We have a new initiative, the Super Truck Initiative, where we think we can get perhaps 30 percent better efficiency out of our long-haul trucks, largely aerodynamics, a little bit of auxiliary power, more efficient heat recovery in diesel engines. But a lot of it is going to actually come out of aerodynamics. But we think 30 percent is achievable.

The good news is—because the turnover in the truck fleet is faster, and so this is, again, something where you can see a much faster—and because the trucking industry is so tuned to the cost of fuel, to the economics of it, the adoption of a new technology that really pays for itself will be faster.

Senator STABENOW. I know I have run out of time. I would just, first, thank you for the administration's strong support and your strong support for the manufacturing tax credit, what we call 48(c). The $5 billion increase is absolutely critical for us. I look forward to working with you as the author of the language that is called section 136 retooling loans of the energy bill of 2007. I look forward to working with you on how we may continue that effort as well. We have put a number of things in place that I think are very significant, the industrial technology program, a number of things. I was pleased to see additional money there as well which is probably the fastest way to increase our energy efficiency and reduce carbon emissions.

I think we are on the right track. I would just urge, working with us, that you continue to advocate for the level of resources that are needed for us to be able to win this race that we are in. Thank you.

Secretary CHU. Thank you.

Senator WYDEN [presiding]. I thank my colleague.

Secretary Chu, welcome. It is good to have you back. As you will recall, the last time you were here, I talked a bit with you about particularly expanding exports, expanding exports of wind turbines, solar panels, and renewable energy products around the world, largely because of the way you framed the issue. You said in the past—and I quoted Dr. Chu to Dr. Chu that one of the great economic challenges was making sure that we got some of those export markets, and I look forward to following up on that with you, particularly the developments with the Department of Commerce and the Trade Representative because I think nailing down that relationship, knocking some heads frankly, if you have to, is going to be essential.

What has happened since our last conversation is the President of the United States at the State of the Union set a goal of creating 2 million jobs by doubling U.S. exports over the next 5 years. Now, it is going to be very hard to attain that, I think, very worthwhile

goal unless we tap these markets overseas for renewable energy products in the export area.

So my first question to you is, what specifically do you intend to do in light of the President's announcement for creating 2 million jobs, doubling U.S. exports over the next 5 years? What are you going to do at the Department specifically to help the President attain that objective?

Secretary CHU. What we do is we support the research, the development, and the piloting, and finally deployment of new technologies, particularly energy technologies. I think we are still viewed in the world as the developers of some of the best high technology sectors. There is an overall strategy that we are a player in. We are not the major player, as you said. It is Commerce and Ron Kirk's office.

We are trying to get it so that, first, the companies in the U.S. have more confidence that they can export the highest technology stuff and you do not look under the hood and copy it. We are working with countries to say how important it is that they abide by patents, abide by intellectual property. But again, a large part of that is a mixture of State and other things. We are working with Defense and with State on export control. A lot of this is out-of-date. So they are looking at those things.

Again, to the extent that we can help Commerce in saying what are the things that we can export that are really not a threat to our national security—and so we have an active working relationship with Secretary Locke in Commerce through our Policy and International Affairs with David Sandalow. But mostly what we do is we develop stuff that we hope the rest of the world will want and buy.

Senator WYDEN. Respectfully, Mr. Secretary, I think you would have given me that answer before the State of the Union. What I want to know specifically is what new steps are going to be taken, and let me walk you through at least one that is in your bailiwick and I sure would like to see changed.

In approving applications for the Green Manufacturing Tax Credit—that is 48(c) of the tax code, and this is an area where the Department of Energy plays a critical role in approving projects that qualify for these credits—is the Department going to set in place new rules and new criteria that can help us make sure that we would be making products for the foreign demand?

In other words, I do not see, frankly, the Department moving. This is an area where you all clearly have a leading role to play. In fact, the IRS said we do not know a whole lot about this. We are going to make sure that folks who do can run it. If you all do not take steps now in an area that I think is particularly fertile for exports, I guess I am going to have to introduce a piece of legislation—and I serve on the Finance Committee—and work there and here to get this changed. But I think foreign demand ought to be a big factor in how those tax credits are awarded.

Do you agree? If so, what is going to change to make sure additional steps, in light of the President's announcement, are taken now?

Secretary CHU. I agree with you. I think this is part of our economic prosperity, that we have to increase our foreign exports, and I will be glad to work with you on that.

But specifically what were you——

Senator WYDEN. Does the Department give in the award of these credits any consideration for foreign demand for the goods and the producers? I mean, here is an opportunity for you to go out and take a statute and, in effect, under what I believe is your current authority—you can go out and say we are going to give these credits to people that are serious about exporting and exporting in an area where there is foreign demand. Right now, there is no criteria in this statute, and if you all do not put out a new set of criteria that boosts the role of exports in 48(c), the Green Manufacturing Tax Credit, I guess I am going to have to try and write a law that requires you to do it. I do not want to do that. I would like to Dr. Chu, somebody I like and respect, just go out and knock heads, get this done, and allow us to get it done quickly.

Secretary CHU. Let us start with I would be glad to work with you on this. I think anything that contributes to the manufacturing and economic prosperity of the U.S. I am fully in favor of. So I will be glad to work with you on that.

Senator WYDEN. So you will commit this morning to doing this and moving this up as a priority for these credits, 48(c), without the Congress having to move with legislation?

Secretary CHU. I will commit to looking at and working with you and your staff to seeing what type of loan authorities we can do and the tax credits we can give that will enhance the manufacturing and the wealth generation in the United States. This sounds like we are in line and we are in sync with this.

Senator WYDEN. Can you get back to me within 45 days on what specifically the Department will do in that area, 48(c), to beef up the prospect that more of those credits will go to American companies that are exporting to meet the foreign demand for renewables?

Secretary CHU. I will commit to getting back to you in 45 days.

[The information follows:]

The goal of the Advanced Energy Manufacturing Tax Credit (48C) Program is to help make the United States globally competitive in long-term, high-end manufacturing jobs and to increase access to affordable renewable energy for future generations. The U.S. Department of Treasury is responsible for implementing the 48C program, in consultation with the U.S. Department of Energy.

The 48C Program provides a 30 percent tax credit for investments in new, expanded, or re-equipped advanced energy manufacturing projects. Neither the legislation (Section 1302 of the American Recovery and Reinvestment Tax Act of 2009) nor the Notice (2009-72) distinguished between foreign and domestic customers of 48C recipients.

Under the 48C Program, all 48C applicants are required to demonstrate commercial viability and to submit a business plan listing confirmed or potential customers. Some successful applicants indicated a foreign market for their manufactured product, while other successful applicants indicated a domestic market. In providing consultation to the U.S. Department of Treasury, the U.S. Department of Energy did not distinguish between foreign and domestic markets. Rather, the key factor was the reasonableness of the assumptions and claims of any market for the manufactured product. Applications were scored against four criteria: job creation; greenhouse gas avoidance; technological innovation/commercial deployment; and shortest time to completion of the project.

Senator WYDEN. Very good. Thank you.

My colleague from Alaska, Senator Murkowski.

Senator MURKOWSKI. Thank you, Mr. Chairman.

Mr. Secretary, the chairman inquired briefly about stimulus dollars and I would like to pursue that just a little bit further. As of yesterday, the Department of Energy Web site showed that we have about $2.1 billion of the stimulus funds that was actually spent. As I understand it is about 6 percent of what the Department has received, and we understand that to be the third lowest rate for any Federal agency.

I appreciated Senator Dorgan's comments about are you having fun with it, because you really did as the Department get an incredible amount of Federal funding directed to you. It is one of those "be careful what you ask for, you might get it," and then you got to deal with it. There is frustration on this side, but I know that there has been frustration on yours as well as to how you make that happen.

What I am trying to determine is you have a goal of moving those dollars out. There is not a discrepancy, but there is a clear difference between obligating and spending those dollars. Part of my objection to what we saw with the stimulus was timely, targeted, temporary, and we are at that point where we are seeing that it is really very difficult to spend those Federal dollars within that 2-year period.

I want to ask you, because there is a lot of discussion now about another stimulus or a jobs bill, and I do not know what it may look like. I understand that we may be learning in matter of days in terms of what will be included with a new stimulus or a jobs bill.

But with the nearly $32 billion that is yet unspent, how do you deal with the backlog of funds that you have? Recognizing that you are very likely, as I understand a second infusion with a jobs bill coming forward, is this a situation where you need to say stop already? Or what is going on within the Department as we reconcile these 2?

Secretary CHU. Sure. I think I agree. I mean, we are disappointed in the amount of money costed. I can just go down the list.

Weatherization, $5 billion. This is a formula. We give it to the States. The States are widely variant in how they are getting the money out. There are some States who have costed over 20 percent. Other States have costed essentially zero. As we became aware of that, we are now sending people out to the States and those agencies and trying to help them get moving. I mean, this is a State agency or State agencies that are supposed to—this is true of weatherization. This is true of the State energy programs, the EECBG.

I talked a little bit about the rules that are required, and we are trying to give both the State and the local organizations templates that say, OK, if you do this, we can move along much faster because many of these organizations with the local organizations are not used to dealing with this magnitude of money or dealing with some of the Federal rules.

The loans. We started with essentially very, very—"skeleton" is not really the word—staff. We now have a dedicated loan official building up the staff. We talk to him maybe twice a week on how do you get these—these are very complex loans, lots of things to

negotiate. There are other parts of the Federal Government that have to chime in on this, Treasury and OMB as well. So all these things we feel we are moving on. It is certainly less than what I hoped initially, but things are moving along.

Senator MURKOWSKI. I appreciate that, and I think we are looking very carefully at what you have been able to actually spend down and where that has gone. We are talking about this second tranche if you will, a second stimulus or a third. I do not know what number we are on. But how will you spend more when you still have $32 billion that is yet hanging out there? I appreciate the difficulty in advancing it, but at some point, is it not better to say, wait a minute, we cannot take on more within the Department of Energy?

Secretary CHU. It depends on the flavors in the money. For example, in the 1603 tax credits, it does not require a request for proposals and evaluation of the proposals. It does not require a lot of things. It just requires us to say, OK, do you qualify for this tax credit. In those situations, the time from the time of application to the time where money is in the bank of the companies, I think it was an average of 20-some-odd days. If you have to ask a local agency or even a Federal agency to say you've got to put out a proposal, you have got to get a request for proposals, you have got to bring them in, the amount of the $36 billion or $34 billion—only $11 billion was, kaboom, here it is. Out of that $11 billion, a lot of it going to State agencies, we now have to help those State and local agencies spend the money.

So a lot of the frustration I share with you. We are spending now a lot of our time trying to help the local agencies spend the money because just obligating the money to local agencies we anticipated is not enough.

Senator MURKOWSKI. I appreciate your comments. I understand what you are saying, but I think it still takes me back to my initial concern where if you have $32 billion that remains unspent, you are seeking a budget increase to the Department this year, of about 7 percent, at some point in time as a Department you would communicate with our Democratic colleagues that are building this jobs bill, you indicate pretty clearly we are maxed out over here in our ability to spend these dollars in a timely manner. That is what we are talking about with the jobs bill, how we get the money out the door today to make a difference. This is where so many of us have expressed real anxiety and frustration over that initial stimulus package because it was not timely, targeted, and temporary in so many of those areas that we were keyed on.

I think in this Department we recognize that there is great opportunity, but again at a time when we are looking to reduce our budgets everywhere, I think we have to understand what is already authorized, your ability to spend it responsibly, not just spending the money so we can say we are spending the money.

Mr. Chairman, my time has expired, but Mr. Secretary, I just want to add you mentioned the methane hydrate research up in Alaska. We have been excited about that for a period of time. I recognize that within the budget, we have zeroed out the unconventional fossil fuel budget that supports that methane hydrate. It is my understanding that you have moved that over to the Office of

Science, but again that budgetary amount that we were hoping for has been reduced from $50 million to $18 million. I think we recognize the vast potential that we have with methane hydrates. I would like to work with you on that.

Thank you, Mr. Chairman.

Senator WYDEN. Thank you, Senator Murkowski.

We are joined by our colleague from Wyoming, Senator Barrasso.

Senator BARRASSO. Thank you, Mr. Chairman. Excellent job this morning at the National Prayer Breakfast.

Senator WYDEN. Thank you.

Senator BARRASSO. Mr. Secretary, welcome back to the committee. Good to see you again.

I had a couple of questions. I wanted to start with uranium, if I could.

In the budget, the Department budget includes an increase of about $180 million for environmental cleanup at the Portsmouth facility in Ohio. We have talked about that in the past. It had to do with uranium and excess uranium and selling uranium, but it seems that it is now a line item in the budget. So it is my understanding that you then plan to discontinue the proposed transfers of excess uranium in fiscal years 2011 and 2012 and 2013. Is that correct?

Secretary CHU. That is correct. We are shifting over the support of the cleanup from transferring uranium because we have statutes; we cannot affect the uranium markets that much. There are requirements that we do not go over a certain limit. So we had just decided simply to put it in the budget rather than to take our uranium and barter it.

Senator BARRASSO. Thank you, Mr. Secretary. I am glad to hear that the Department recognizes the significant problems that these uranium transfers are having on domestic uranium producers. I think it is a very good recognition on the part of the Department and I think the Department needs to abide by the management plan that was put into effect.

Do you know if the uranium transfers that are already planned for fiscal year 2010 are going to proceed as planned, and are there other plans in the making, other additional uranium barters?

Secretary CHU. I do not know the full details of that, but again, we are very aware of the fact that there is a statute that says that we cannot put more than 10 percent out there. We do not want to go to 9.9 percent, and so that is essentially why we backed off on the Portsmouth barter.

Senator BARRASSO. Thank you, Mr. Secretary.

I would like to move, if I could, to the clean coal and the loan guarantee program. You have expressed your commitment to this committee and to me privately to clean coal numerous times. Yesterday, President Obama announced the formation of a clean coal task force. Your budget includes $36 billion for loan guarantees for nuclear, about $500 million in credit subsidies for renewable energy, but it contains nothing for clean coal and carbon sequestration under the loan guarantee program. So it does not seem to fit with what the administration said about its commitment to coal or the mission of the loan guarantee program. Can you explain that to me, Mr. Secretary?

Secretary CHU. It goes to what our new budget—it goes to what Senator Murkowski was saying. What we are asking for in this budget and in the stimulus is we looked at the things that are oversubscribed, we looked at the things where we know we can move the money more quickly. There is a part of the loan guarantee in fossil that was not all used. So we said, OK, we are moving that along, but there is no need to ask for more money in that because we had not used the authority given to us. But whereas other programs where there was a shortage by a factor of 3; RB, a shortage of a factor of 100, that we can get out very quickly.

So those are the things we are asking for in the new economic loans and all those things, the things that we know we can move quickly. The things where if we have to work with middle people, the States, the local governments, that adds another layer of bureaucracy as part of this.

So we have loan guarantees in fossil.

Senator BARRASSO. Along that line, the Department has made a number of commitments under title 17, the loan guarantee program, for clean coal technology.

Secretary CHU. Yes.

Senator BARRASSO. Is there a timeline that you have for finalizing these existing commitments? Because there seems to be a holdup.

Secretary CHU. Right now there are two title 17's. There is the 1703 and 1705. Again, I would love to talk to you and Senator Murkowski about what we are doing in detail so you can understand what we are doing that we are not dilly dallying. These are very complex agreements and we also need, again under the statutes, to negotiate. Each loan is a one-off that you have to negotiate with each company and each applicant. We also have to protect the taxpayer's money. So there is not really a hang-up.

Senator BARRASSO. I would welcome that opportunity to meet with you and work with you on that, Mr. Secretary. I just want to make sure there are no kind of White House appointees who are not confirmed by the Senate, as you have been, who are weighing in on these projects either directly to you or to your subordinates. I have concerns that we want to make sure that this moves through.

Then finally, Mr. Secretary, just to bring to your attention, there is an oil field testing center in the Rocky Mountains called the Rocky Mountain Oil Field Testing Center. Your budget zeroes out the base funding stream for this program. It is in Wyoming. It stems from the President's pledge to the International Climate Community at Copenhagen. I can tell you, Mr. Secretary, I think that killing jobs in the United States, which I believe this will do, to earn international applause is bad policy. This is a program that offers small businesses and ventures and students the opportunity to test technology and learn in a real-world situation. So if I could, Mr. Secretary, I will submit a couple of questions to you in writing on that program. Thank you, Mr. Secretary.

Thank you, Mr. Chairman.

Senator WYDEN. I thank my colleague.

Mr. Secretary, I am going to also give you a couple of questions in writing, and if I could get a quick response, particularly in terms

of wave energy and advanced vehicles. Again, there are some questions in my mind about whether we are tapping all of our opportunities. For example, the Department's advanced vehicle programs are aimed at cars and trucks. We have got state-of-the-art plug-in motorcycles and streetcars in Oregon. So I will submit those in writing.

I am anxious to work with you personally on this matter that you are going to get back to me within 45 days on because that 48(c) of the tax code is a trampoline in my view for us to be able to tap the opportunity, with foreign demand being so high, to get our renewable products overseas, and it can play a big role in the President's laudable objective of increasing exports.

Anything else you want to add?

Secretary CHU. We submitted a budget. I heard a number of you have some misgivings about the budget. I would be glad to meet with you privately to discuss the rationale and come to solutions on these issues.

Senator WYDEN. We always like to give you the last word, and I am sure colleagues will take you up on it.

With that, the committee is adjourned and we will excuse you.

[Whereupon, at 11:37 a.m., the hearing was adjourned.]

[The following statement was received for the record]

STATEMENT FOR NATIONAL ASSOCIATION OF ROYALTY OWNERS (NARO)

NARO opposes certain items in the Department of Energy's 2011 budget as described in the document entitled "Terminations, Reductions, and Savings: Budget of the U.S. Government Fiscal Year 2011," as currently produced by the Office of Management and Budget. The following testimony describes our concerns that said policies will be harmful to America's energy policy as a whole, and also to royalty owners.

While NARO shares several policy concerns with the rest of the energy community, this testimony seeks to focus the Committee's attention more acutely on percentage depletion for royalty owners, which is the only tax deduction many NARO members take on their mineral royalty income. As will be discussed, many of the royalty owners which NARO represents do not have the wealth, time, and resources that larger energy and mineral companies do. As a result, they have a more limited ability, compared to the rest of the energy community, to organize and inform legislators of their concerns.

1. Who does NARO represent?

We are the National Association of Royalty Owners (NARO) and represent the concerns of an estimated 8.5 million American private owners of oil and gas mineral and royalty interests. We live and vote in all 50 states, even though our producing minerals may be in Arkansas, New Mexico, North Dakota, Oklahoma, Pennsylvania, Texas, and Utah, Wyoming or any of the 33 producing states. NARO has been educating and advocating for mineral/royalty owners since our original incorporation 30 years ago in 1980.

The average NARO member is over 60 years old, widowed, and receives less than $500 in monthly royalties as a supplement to their social security retirement income.

The majority (something over 70%) of the minerals in the U.S. are owned by individuals and leased to companies for development. Thanks to the efforts of one of our members, we recently took a snap shot of one "marginal" oil well (producing less than 15 barrels of oil per day) in Grady County Oklahoma. This one little well has over 300 individuals in 46 states receiving royalty payments from its production.

We estimate the number of royalty owners in each state to be:

AK 13,600	AL 33,150	AR 255,000	AZ 144,500	CA 510,000
CO 654,500	CT 17,000	DC 17,000	DE 2,550	FL 161,500
GA 85,000	HI 8,330	IA 33,150	ID 35,700	IL 76,500
IN 27,200	KS 147,900	KY 11,050	LA 125,800	MA 30,600
MD 35,700	ME 5,525	MI 44,200	MN 47,600	MO 110,500
MS 39,100	MT 47,600	NC 67,150	ND 24,650	NE 19,550
NH 13,600	NJ 47,600	NM 161,500	NV 44,200	NY 127,500
OH 30,600	OK 1,691,500	OR 51,000	PA 119,000	RI 5,525
SC 22,100	SD 5,525	TN 59,500	TX 2,975,000	UT 39,100
VA 85,000	VT 2,550	WA 39,100	WI 39,100	WV 19,550
WY 30,600			Total nationwide: 8,440,755.	

Remember, these are estimated numbers of royalty owners. The total number of mineral owners is much greater, as vast areas are unproductive or have not yet been explored and developed.

2. A look back at the rationale for percentage depletion in U.S. history

In 1913, the 16th amendment to the constitution made the Federal income tax a permanent fixture of American life. That same year, mineral/royalty owners, in accordance with the newly minted tax code, began to account for the depreciation of their mineral properties which resulted from the depletion of limited mineral reserves. Congress enacted this tax deduction so that mineral/royalty owners could deduct a "reasonable allowance for depletion of ores and all other natural deposits . . . " which results from extraction. What follows is an explanation of the conception of percentage depletion, and illustrates the continued need for the percentage depletion allowance for mineral/royalty owners today.

What is depletion? Put simply, in the context of taxation, it represents the depleting value of a limited reservoir of a non-renewable resource such as Natural Gas, Copper, Oil, etc. Tax liability in America has often been dependent on the value of the property being taxed. As the object of taxation changes in value, the tax liability changes accordingly. This is commonly accepted by federal and state governments with regard to all manner of property, whether brick and mortar, automobile value, etc. As an automobile depreciates, the tax rate is lowered in subsequent years. As the minerals are extracted from a given property, the reserves are depleted, and the value of that mineral interest depreciates, as should the tax liability.

Percentage depletion replaced discovery value depletion, which had been adopted in 1918 as an incentive to find new oil supplies that were needed in World War I. Under discovery value depletion, tax on minerals such as oil and natural gas were assessed at the time the minerals were discovered, but that proved to be an inefficient and unsavory policy for mineral owners, producers, and governmental tax authorities alike. Among Discovery value depletion's shortcomings; it resulted in lengthy, not to mention expensive, quarrels between taxpayers and tax administrators over the predicted quantity and value of the minerals, and the subsequent amount of depreciation that would occur from the depletion of reserves.

Even if the quantity and composition of minerals in the ground can be known with relative certainty, the markets for energy sources like natural gas and oil are volatile. This has been abundantly demonstrated with the dramatic price fluctuations of oil and natural gas in recent years. These turbulent markets make it difficult to predict the overall value of mineral reserves, especially beyond one year.

Beyond unpredictable markets, there were additional problems with discovery depletion. Even today, the science of interpreting seismic data and the drilling of exploration wells remain something of an art, albeit to a lesser extent than in previous decades. The accuracy of pre-extraction predictions on the quality and quantity of minerals can prove disappointing. However, the inability to know with certainty the total future value of oil or gas from a given mineral interest, and the quantity which is likely to be producible, results from more than just the imperfections of geological data analysis. The 'producible' quantity underground is unpredictable due to unknowable, yet inevitable changes in technology. The recent advances in horizontal drilling, and the impact it has had on hydraulic fracturing technology are a great example.

In the last decade, horizontal drilling innovations have allowed us to more cheaply use hydraulic fracturing in layers of shale rock where natural gas was previously unreachable due to the cost of recovery. Due to these technological improvements, hydraulic fracturing in shale has grown at an almost stunning pace. This has con-

tributed to an increase of more than 50% in proven reserves of shale gas in just one year, from 2007 to 2008 (the most recent year yet reported by EIA). These innovations have freed up so much previously unrecoverable gas that the U.S. is now sitting on an estimated 100 years supply of clean burning natural gas at current consumption levels. The U.S. is currently in serious contemplation about ways to ensure that our energy policies are environmentally responsible for our children's future. The rapid leap forward in shale drilling technology, and the resulting massively increased quantities of clean burning, locally abundant natural gas, are game changers for U.S. energy policy.

Because of the impossibility, both for taxpayer and tax administrator, of predicting the nature and timeline of technological advances, and the difficulty for both parties of defending variables like quantity of reserves, quality of reserves, and projected market value, congress eventually abandoned the practice of determining the discovery value of minerals for purposes of the depletion allowance. In 1926, congress simplified the process by allowing mineral/royalty owners the option to claim percentage depletion.

To figure percentage depletion, you multiply a certain percentage, specified for each mineral, by your gross income from the property during the tax year. This simplified procedure has proved essential to encourage the production of dozens of different minerals, both energy related and not. The percentage of income from a producing mineral property which one can claim as a deduction to account for depletion is currently 15% for oil and natural gas, and higher for certain other minerals. For example, the current rate for sulfur, uranium, asbestos, lead ore, zinc ore, nickel ore, and mica is currently 22%. These flat percentages save on compliance costs for both tax payer and administrators, because it prevents the potentially lengthy battle with each individual mineral owner over the value of depletion for their particular property.

3. Effects of the proposed eliminations on royalty owners

Under current policy, if the mineral owner feels that the depletion percentage specified by statute is unfair for their property's particular mineral profile, then they can still alternatively file for cost depletion. Large mineral interest owners such as energy companies are more likely to file for the cost depletion deduction. The reason for this is that they have already incurred the cost of a complex analysis of their mineral holdings as part of the process of exploration.

Larger mineral interest owning entities have incentive to be reluctant to share information with smaller or individual mineral owners from whom they may need to lease or re-lease mineral rights. They consider this information proprietary and necessary to compete in the marketplace. When compelled by statute to share information, they still have an incentive to under represent the value of the minerals to these smaller mineral owners because they want to pay them the smallest royalty that can be negotiated.

If small 'mom and pop' mineral owners have to rely exclusively on the energy companies to which they lease their minerals in order to obtain the estimated value of their minerals, then a common result would be an undervaluing of the minerals, resulting in an undervaluing of the cost of the depletion of their minerals. Percentage depletion acts as a hedge that protects these smaller royalty owners from the potential double disadvantage of receiving an undervalued royalty from an energy company and then having that loss compounded by a subsequent undervaluing of the cost of depletion.

As previously mentioned, the average NARO member's royalty income is five hundred dollars per month, with many getting considerably less. While collectively the minerals they own are of vast value, the minerals owned by a single individual are often relatively small in amount. A geological & reservoir assessment can be very costly for these small royalty owners. Geologists and engineers bill on an hourly basis, plus expenses, and it is hard to estimate the time an adequate assessment can take. Royalty owners cannot afford to see their income eaten up by the cost of independent geological & reservoir assessments, attorney's fees, and accounting fees that can quickly accrue in the pursuit of claiming cost depletion.

Also, as previously mentioned, the average NARO member is over 60 years old, and widowed. Some are apprehensive about the process of negotiating leases with energy companies. Percentage depletion is one tool that encourages these mineral owners to more strongly consider leasing their minerals for development.

While percentage depletion is of primary concern for NARO members, we realize secondarily that ALL of the proposed tax law changes in the FY 2011 DOE budget that affect oil and gas industry decisions to drill—such as no longer being able to expense intangible drilling costs—affect owners of undeveloped minerals, by rendering their properties valueless. We additionally realize that elimination of credits

for marginal wells and tertiary recovery would result in the plugging of thousands of older wells and a subsequent loss of vital supplemental income for countless retirees.

Several of our royalty owner accountants have looked at how the elimination of the depletion allowance will impact our elderly, low-income, royalty owners. We have found that in many instances, the elderly folks with incomes less than 50,000 dollars annually will now have their Social Security benefits become taxable because of the elimination of the depletion allowance. This will lay an undue burden on these folks, to not only pay additional tax because of eliminating the depletion allowance, but they will be forced to pay additional tax on currently non-taxable Social Security benefits.

We do not believe that congress's intent is to put these additional tax burdens on our elderly royalty owners, many of whom already struggle to pay their current property tax, ad valorem tax, severance tax, state income tax, local tax, non-resident income tax, and federal income tax on their producing minerals. Regardless of intent, the proposed tax increases (via deduction eliminations) in the DOE budget WILL have that effect on many!

Royalty owners are teachers, farmers, ranchers, homemakers, accountants, firemen, plumbers, retirees, dentists, small business owners, factory workers, engineers, pet groomers, widows, roofers, lawyers, policemen, florists, carpenters, bricklayers, and members of Congress; we are ordinary citizens, not multi-national corporations. We consider our mineral estates as assets to be managed and protected with responsible stewardship. For the majority of us, our minerals are part of a family legacy acquired through the hard work and sacrifices of our forbearers. Royalty income pays to educate our children, care for aging parents, and supplement salaried and Social Security income. We spend our money in our communities, give to our local charities and save for the future. Our financial benefits come solely from the mineral interests we own—deep under American soil. When those resources have been exhausted, the royalty income ends.

4. America's energy policy as a whole:

A large portion of US Energy Secretary Steven Chu's February 4th testimony to this Committee was dedicated to discussing the administration's plans to parse out research and development funding for various spheres of technology that the administration has deemed to be inadequately advanced. This funding is hoped to further advance said technologies enough to enable a transition to widespread reliance on them as alternative energy sources.

Though the dominate theme of his testimony was how investment can eventually improve alternative technologies, he did acknowledge, albeit sometimes indirectly, that we are not yet ready to abandon the energy sources that have become the workhorses of our economy. Let us first look at some of Secretary Chu's comments, and then at some important facts that demand serious attention during the process of formulating a comprehensive energy policy and departmental budget; facts which have seemingly not garnered the attention due to them.

A. Secretary Chu's Testimony

In Energy Secretary Chu's testimony, he listed several challenges to the " . . . ability of the United States to meet the growing demand for reliable electricity." He said that " . . . we will need breakthroughs and better technologies to meet our long-term goals." He expanded on the current limitations of these technologies during his discussion of DOE funded research groups called "Energy Innovation hubs."

He called for an additional EIH to be created to " . . . dramatically improve batteries and energy storage." The call for such dramatic improvements is a vicarious admission of the gap between, on the one hand, our current level of technological attainment and our current infrastructure, and on the other hand, the level of technology and infrastructure thought to be necessary to substantially replace fossil fuels.

Secretary Chu expressed hope that "Breakthroughs in digital network controls, transmission, distribution, and energy storage will make the power grid more efficient . . . " Those dramatic increases in efficiency and storage technology would be necessary in order to more heavily rely on energy sources like wind and solar without intermittently suffering significant energy shortages.

There is no doubt that these technologies will either improve eventually, or else other superior technologies not yet conceived will take their place. The problems are: First, on what timescale will these advances be made; second, what will be the specific quantitative and qualitative nature of these advances? Central planners and

prognosticators throughout history have struggled to grasp at, and have often fumbled with, predicting the answers to questions like these.

Let us once again return to the example of hydraulic fracturing technology. Few, if any, could have predicted the pace of the current energy renaissance that has occurred in the last few years in regards to the recovery of clean burning natural gas. It has resulted from rapid strides in drilling technology. According to Secretary Chu:

> Due to research sponsored by DOE from 1978 to 1990 [which studied] methane, coal bed, and shale gas, that research was finally picked up by the oil and gas industries. In 1990, Schlumberger started investing in shale gas research. That has effectively doubled the gas reserves of the United States.

It has been 32 years since DOE first researched shale gas, and 20 since Schlumberger began such research. Drilling for natural gas in shale has only become economically feasible within the last few years. The decades it took for shale hydraulic fracturing technologies to become economical should forewarn us not to be surprised at the untold decades to come before today's alternative energy sources might become viable.

In formulating our energy policies and budget, we would be wise to heed the old idiom: don't put the cart before the horse. We must have viable alternatives BEFORE we consider abandoning the energy workhorses of our economic security. Putting the "green" 'cart' before the energy 'horse' is precisely what our energy policy would do if we simply fund research for, as of yet, unreliable energy sources, and simultaneously pull the rug out from under our conventional domestic energy industry (i.e. removing virtually every incentive they have to produce, as is being proposed in the DOE budget eliminations).

B. Facing the facts as they are, not as some may wish them to be

Throughout this winter season (2009-2010), wind turbines in Britain have produced only 20% of their capacity due to lower than average wind resulting from a colder than average weather pattern. They currently rely on wind for only 5% of their total power, but have been planning to rely on it to meet a quarter of their power demand within the next ten years, due in part to pressure from the E. U. If they had been reliant on wind for 25% of their demand during this winter, then the wind generation deficit wouldn't just be an eyebrow raising note of caution, it would be an outright crisis, with dramatic, real, and painful human costs.

Let's examine, frankly and forthrightly, the energy situation as it exists. Alternative energy sources (i.e. not petroleum, nuclear, natural gas, or coal) accounted for 7.301% of total U.S. energy consumption in 2008 (the most recent year reported by EIA). Let's temporarily remove hydroelectric from the discussion, since the U.S. is not building more hydroelectric dams. Let's remove geothermal as well, since most available sources are already being exploited. Biomass is limited due to the limited acreage upon which to grow the fuels, and also because of concerns about the impact of large scale biomass crop production on global food prices as subsidized demand for the fuels makes them compete with food crops. We are essentially left with wind power and solar power as the only alternative "green" energy sources that are substantially expandable.

Wind and solar/photovoltaic energy combined account for just 0.605% of our total energy consumption. Fossil fuels currently provide 83.436% of our energy consumption. Even if you remove the technological limitations and reliability issues from the equation (i.e. the wind intermittently not blowing or the sun not shining) you're still left with a sobering fact: to replace fossil fuels, our wind and solar/PV generating capacity would have to be 137.91 times what it is today.

From 2007 to 2008 according to EIA, U.S. wind generating capacity increased to provide an additional 0.173% of our energy needs. Solar capacity increased even more slowly, only providing an additional .01% beyond its previous levels. If we add the increases together, then at this combined increase of 0.183% share of total consumption per year, solar and wind combined could close the gap, and grow to replace fossil fuels in just over 455 years.

Of course, 455 years is a bit ridiculous, as it assumes the growth rate seen in the last year of EIA data will be constant, which it obviously won't. It also precludes increases in generating efficiency per installation, etc. There is no crystal ball that can tell us what will happen next year, let alone decades or centuries from now. But, for the sake of the argument, let's say that we keep pumping hundreds of millions, or billions of dollars in subsidies a year into research and development for wind and solar. Can that timeframe be cut in half? Even at 10% of that figure we're looking at half a century. While the 455 years figure is certainly an exaggeration because it factors in neither unquantifiable future changes in supply and demand,

nor unforeseeable future technological advances, it is nonetheless a thought provoking figure based on real performance data.

The fact that solar energy generation has grown so slowly is quite disappointing considering the level of investment the government has been making. The federal government has been subsidizing solar energy for years, and the DOE's proposed FY 2011 budget plans to invest 302 million of taxpayer dollars into solar energy. Subsidizing the solar industry seems to have had some kind of effect on their bottom line, because shipping of solar cells was up 280% from 2007 to 2008 according to EIA. Unfortunately, for all the investment of taxpayer dollars into solar, and notwithstanding the increased shipments of solar cells, that very same time period showed only the aforementioned increase of .01% more of total U.S. power consumption being provided by solar/pv. This is partly because solar is currently a MUCH more expensive way to create electricity than clean burning natural gas. Thus far, this seems to strain credibility as a good return on investment, at least for the short and medium term.

5. The Need for Energy Independence

The American public, our national security interests, and our economy have long demanded, and still demand three results from the energy policy of our elected officials: an abundant, affordable, and uninterrupted energy supply. The more secure our energy supply is, the safer we feel, and in fact, the safer we are. Certain policy analyses recently expressed by administration officials leave some room to question whether those three things are fully understood by our leaders.

In Secretary Chu's testimony, he repeated the mantra of "reducing U.S. dependence on oil" four times. While the search for alternative sources may have its merits, the fact remains, as Secretary Chu himself pointed out in his address to the 2010 Washington Auto Show, that our "transportation fuels [are] almost totally dependent on petroleum." 95% of our transportation fuels are from petroleum. 28% of the total energy used in the U.S. is used for transportation.

Americans are going to purchase fuel for their vehicles somewhere, whether that supply is domestic or from abroad. Administration officials, including Secretary Chu and President Obama, have repeatedly talked about the need to break our addiction to foreign oil. An obvious step would be to maximize our domestic oil production.

In testimony submitted to the Senate Finance Subcommittee on Energy, Natural Resources, and Infrastructure on Sept. 10, 2009, Alan B. Krueger, Assistant Secretary for Economic Policy and Chief Economist, U.S. Treasury department, said that "The domestic price of oil is determined by global supply and demand because oil is an internationally traded commodity." He continued, saying "The relatively small U.S. share of global production means that any changes in domestic U.S. oil production will have a limited impact on the world supply of oil."

His focus on the "world" supply of oil myopically focuses on mathematical equations that in no way account for very real, legitimate national security concerns. The American people, and historically congress as well, have recognized the importance of maximizing the independence of an American supply. Although he painted a relatively rosy picture of the negative impact on domestic production that the proposed elimination of deductions will bring, he does concede that "on the supply side, a change in domestic producer costs could cause production to shift from domestic non-integrated producers to integrated domestic or foreign suppliers" of oil.

Assistant Secretary Krueger's basic conclusion, all things being equal, was that the "world" supply of oil and gas and therefore the supply available in the U.S. should only be negligibly affected by any decline in domestic production resulting from the elimination of percentage depletion and other deductions. It is understandable how a trained economist could arrive at this result. The first thing learned in any economics class is the Latin phrase: Ceteris Paribus, meaning "All other things being equal." Economists are trained to analyze hypothetical mathematical situations independently of harder to quantify human variables. If the "455 years" figure on the previous page seemed somehow suspect, then so too must Assistant Secretary Krueger's apparent trust in the stability of our supply of oil from the rest of the world. Ceteris Paribus may be a useful academic exercise that assists with the understanding of certain economic philosophies (via studying them in a vacuum); but in this situation, all things are regrettably not equal.

Of course the domestically produced supply does not seem as sizable when compared to the total world supply, but history is full of examples of supply chains, especially foreign supply chains, being suddenly and unpredictably interrupted for extended periods of time. To think that similar interruptions could not occur again in the future would be naive. In order to safeguard our ability to provide reliable and affordable energy, we must maximize our ability to produce energy domestically.

There seems to be a decent level of bipartisan agreement that we need to break our addiction on foreign oil, though there are disagreements on the most prudent way to do that. Other than maximizing our domestic oil production, and in light of the technological immaturity and expense of wind and solar, natural gas currently seems like the only viable alternative, and for several reasons.

The EPA has stated that "natural gas is the cleanest alternative transportation fuel commercially available today." The group NGV America says that the U.S. presently has around 1100 natural gas vehicle fueling stations, with about 50% open to the public. Around 1.5 million miles of natural gas pipelines are already in place throughout the country. This preexisting infrastructure would make it easier to deliver supplies to newly constructed filling stations well beyond those currently available. Also, natural gas is significantly cheaper, costing between half to one third the cost of gasoline.

According to a report from the Edison Electric Foundation and the Brattle Group, building new combined-cycle natural gas plants to generate electricity is significantly cheaper in dollars per kilowatts of capacity added than building new plants for utilizing nuclear, solar, wind, or new coal-combustion (CSS). The report says building a new combined-cycle natural gas plant would cost $1000/KW of capacity added. The most expensive type of new plant would be solar, costing $6,600 for the same capacity increase.

98% of the natural gas the U.S. uses comes from the U.S. and Canada. As stated earlier, there is likely enough in the U.S. for up to 100 years. There is relatively low cost for converting a conventional gasoline engine to run on it. It also burns much cleaner than petroleum and "twice as clean as coal" when burned for electricity.

Secretary Chu's testimony reports that DOE is "committed to being good stewards of the taxpayers' money." If that is true, then we sincerely urge the Committee, Secretary Chu, DOE, and the Administration at every level to support a budget that will support natural gas as an alternative energy source.

6. Conclusions

Secretary Chu did acknowledge in his testimony the continued need for conventional energy. He said that "The world will continue to rely on coal fired electrical generation to meet energy demand. It is imperative that the United States develop the technology to ensure that base-load electricity generation is as clean and reliable as possible." Interestingly, in his 20 pages of testimony, secretary Chu failed to mention natural gas at all, other than to say:

> . . . we eliminated more than $2.7 billion in tax subsidies for oil, coal and gas industries. This step is estimated to generate more than $38.8 billion in revenue for the federal government over the next 10 years.

In 1952, the President's Materials Policy Commission examined percentage depletion, and concluded that:

> . . . no alternative method of taxation has come to the Commission's attention or could be devised by the Commission which, in its judgment, promises to overcome these limitations and still achieve the desired results, particularly not without seriously dislocating well established capital values and other arrangements in the industries concerned, with highly adverse effects on supply. Taking the practical situation as it finds it, the Commission believes that any radical alteration of existing tax arrangements would be undesirable.

The "limitations" they referred to are the imperfect allotments of the cost of depletion that can occur under percentage depletion. "Desired results," in this case, refers to encouraging the production of American minerals in order to provide the energy to grow our economy and to provide a greater measure of independence and security.

We believe the U.S. would presently be better served by a DOE budget which invests in maximizing domestic oil and natural gas production. We believe this because natural gas is cheap, locally abundant in supply, clean burning, and efficient. As a transportation and electricity generating fuel, it can work in tandem with currently imperfect and experimental technologies like wind and solar. When the wind isn't blowing, the sun isn't shining, or yet to be invented experimental energy storage systems malfunction, natural gas can provide us the uninterrupted electricity we rely upon, cheaply, and cleanly. Investing in the natural gas industry will buy us the time we need for the market to truly perfect alternative energy systems that are presently unreliable.

We take exception to the provisions in the DOE budget which propose to raise the tax burden on what are currently America's only reliable energy sources by "38.8 Billion" dollars over the next decade, which will slow domestic development. Those provisions include raising the tax burdens on many of America's most vulnerable retired royalty owners. In our pursuit of an energy policy that encourages domestic production, we must not allow the smallest participants in America's energy production to go unprotected from abuse by the larger ones. The protection that percentage depletion provides to them must, itself, be protected.

The DOE budget will eliminate the percentage depletion deduction used by 'the little guy,' (AKA: small time royalty owners) while leaving the cost depletion deduction used by big energy companies untouched. Percentage depletion is an important incentive for domestic energy development, which helps supply the energy we need to drive our economy while making us less dependent on foreign sources of energy. It does this while simultaneously protecting small time royalty owners, who unlike 'big energy' corporations, can't afford to file cost depletion. The proposal to eliminate it should be removed from the DOE budget for fiscal year 2011.

We appreciate the opportunity to provide the Committee with our thoughts and concerns on these issues and welcome any questions about this testimony or the sources we may have utilized.

APPENDIX

RESPONSES TO ADDITIONAL QUESTIONS

RESPONSES OF HON. STEVEN CHU TO QUESTIONS FROM SENATOR BINGAMAN

Question 1. Los Alamos Neutron Science Center—As you know, the Administration has proposed zeroing out the upgrades for the Los Alamos Neutron Science Center. Last year, the Administrator of the National Nuclear Security Administration (NNSA) testified before the Strategic subcommittee of the Senate Armed Services Committee and the Energy and Water Appropriations Subcommittee that keeping the facility operational was essential to maintaining our stockpile. A facility upgrade was then authorized and appropriated as the most cost effective and timely means to achieve that. Why was it zeroed out this year and what are your thoughts on this?

Answer. Los Alamos Neutron Science Center (LANSCE) continues to make an important contribution to the needs of the nuclear security enterprise and science users, and is expected to continue those roles in FY 2011. NNSA spends approximately $70M annually on LANSCE operations supporting stockpile management. Operation of LANSCE into the longer-term future would require significant funding for additional refurbishment. After receiving funding from the Congress for Project Engineering and Design (PED) in FY 2009 and FY 2010, we are using these funds to investigate the requirements to extend the life of the linac and improve its reliability. We are also considering a possible future expanded role in materials and nuclear science research, but have not yet revalidated the mission need for these potential future requirements.

It is therefore premature to allocate additional funding within the budget request for linac refurbishment. The Secretary has asked NNSA to work with the Under Secretary for Science and the Office of Science to consider options for enabling the materials and nuclear science that are needed to sustain stockpile management and to enable scientific advances envisioned within the Department of Energy. We expect to complete this work in time to make recommendations as part of the FY 2012 budget formulation phase.

Question 2. International Engagement in Clean Energy Development—The Department is facilitating the development and adoption of clean energy technologies around the world in China and many other counties—can you please tell the committee about the Department's strategy for international engagement and how that fits into the Agency's larger mission?

Answer. The Department is actively engaging the international community to address the challenges of long-term energy security and climate change, both of which require concerted global action. A major component of this engagement is the development and widespread deployment of clean energy technologies that can reduce reliance on imported oil, mitigate the worst effects of climate change, and help transition the United States to a clean energy economy. Through a variety of multilateral mechanisms, such as the Global Partnership of the Major Economies Forum on Energy and Climate and the International Energy Agency's Climate Technology Initiative, the Department collaborates with international partners to increase investment in clean energy R&D and accelerate the diffusion of transformational low-carbon technologies and practices. Additionally, the recent launch of the Renewables and Efficiency Deployment Initiative (Climate REDI) seeks to promote the dissemination of renewable energy and energy efficiency technologies specifically in developing countries. On the bilateral front, the Department manages a broad portfolio of cooperative agreements with both developed and major developing countries, including China and India, which seeks to gain a better understanding of clean energy development through exchanges of information, sharing of best practices and lessons learned, and joint research. Through such widespread multilateral and bilateral cooperation, the Department is working to accelerate the transition to a sustainable low-carbon economy.

Question 3. Energy Information Administration—Can you explain in more detail the proposed increase for the Administration, particularly the financial markets initiative and improving the quality of data?

Answer. The $18.2M increase above EIA's funding level for FY 2010 improves its capability to close important gaps in energy information, strengthen analysis, and address significant data quality issues. Specifically:

- $8.0M of the increase doubles the sample size of the 2011 Commercial Buildings Energy Consumption Survey, providing information critical to understanding energy use and performance measurement for energy efficiency programs.
- $1.3M expands analysis of energy market behavior and data to address the interrelationship of energy and financial markets.
- $3.1 M continues implementation of improvements in oil, gas, and electricity data coverage, quality and integration.
- $1.9M supports upgrades to the National Energy Model, which would improve the ability to assess and project supply, demand, technology trends and policy affecting U.S. and world energy markets.
- $1.5M initiates efforts to track and analyze the adoption of "Smart Grid" technologies and dynamic electricity pricing plans, which would improve the forecasting of electricity markets and assist policymakers in determining if policy goals were being met.

A further description of plans for the financial markets initiative and energy data quality improvements is provided below.

Energy and Financial Markets Initiative.—Launched in September 2009, EIA's Energy and Financial Markets Initiative aims to improve energy market transparency, support sound policy and efficient markets, and increase public understanding—activities that are central to EIA's mission. EIA's traditional coverage of physical fundamentals such as energy consumption, production, inventories, spare production capacity, and geopolitical risks continues to be essential but, moving forward, EIA is also assessing other influences, such as speculation, hedging, investment, and exchange rates, as it seeks to fully understand energy price movements.

EIA issued a Federal Register notice in January 2010 seeking public comments and recommendations for additional information needed to support analysis of financial markets and EIA's traditional fundamental analysis. The additional funding requested in FY 2011 will allow EIA to take action based on the comments and recommendations it receives, through data purchases and/or new data collection efforts. It also would allow for increased analytical efforts focused on various aspects of financial markets and their interaction with energy markets, such as the possible impact of index funds on oil price formulation and the use of modeling techniques to assess the impact that investment flows from various entities might have on oil prices.

Data quality.—EIA has requested additional funding for improvements in coverage, quality, and integration of oil, gas, electricity, and other energy data. This request reflects issues arising directly from EIA's aging information technology infrastructure that is poorly adapted for keeping up with the changing information needs of policymakers, the broader energy industry and its associated markets. All aspects of developing and disseminating data have been affected, from maintaining survey frames (i.e., lists of possible respondents), to collecting and processing data, to analyzing the data once acquired, to providing information to the public. This funding will support a modernization effort to fill critical data gaps; update the statistical techniques used in data collection; better protect the integrity of data collected, processed and published; assure documentation of data processing decisions; and reduce lifecycle development and operating costs for EIA's statistical programs.

Question 4. Strategic Petroleum Reserve—Your budget does not request funds for the expansion of the Richton, Mississippi facility to expand to 1 billion barrels—could you explain your reasoning and if this could impact mitigation plans for future events that affect refinery production such as hurricanes along the Gulf Coast?

Answer. The Administration is currently reviewing SPR expansion policy. While this review is occuring, the FY 2011 President's Budget proposes the cancellation of $71 million in balances from prior years appropriated for expansion activities and use of these funds to partially fund the SPR's budget requirements for FY 2011.

Question 5. EERE—the budget proposes a level budget for biofuels of $220M, while switching the allocation funding from liquid to electricity production using biomass—are you concerned that this may take away the continuity for ensuring we have adequate funding for advanced biofuels which are the underpin the renewable fuels standard enacted into law in 2007?

Answer. This FY 2011 change in funding allocation is not expected to negatively affect efforts to support the commercialization of advanced biofuels to help meet renewable fuel standards goals. The Recovery Act funded the construction phase of one of the commercial-scale biorefineries. Taking this factor into consideration, the FY 2011 budget request supports the integrated biorefinery project funding needs through September 2011.

The proposed biopower initiative will accelerate the development of advanced technologies to enable substituting biomass for coal in power generation. These advanced biopower technologies will have positive economic and environmental impacts for the existing utility industry, which would promote widespread commercialization.

Question 6. Building Efficiency—The Senate is considering possible legislation (HomeStar) to encourage making residential buildings more energy efficient, which provides enhanced rebates for specific efficiency measures (insulation, heating and cooling systems, etc.) and for whole home energy savings retrofits.

While you have not had the opportunity to review the legislation in detail are you supportive of such a policy?

Answer. Yes, the Department supports a policy of encouraging homeowners to take action to make their homes more energy efficient. Residential energy efficiency improvements such as adding insulation, upgrading heating and cooling systems, and undergoing whole-home retrofits have multiple benefits. Benefits include: homeowners save money on utility bills; carbon emissions are reduced; and domestic jobs are created in the contractor/construction sector.

Question 7. Carbon Capture and Sequestration Task Force—President Obama recently announced to the National Governors Association that he would be tasking the DOE and the EPA with developing an interagency task force for carbon capture and sequestration oversight. Could you please elaborate on your role and that of the DOE with this task force? Could you outline what the main function of this task force will be? Is the function more of an oversight role, regulatory design, or a technical consulting organization?

Answer. The purpose of the Interagency Task Force on Carbon Capture and Storage is to develop a comprehensive and coordinated Federal strategy to speed the commercial development and deployment of carbon capture and storage technologies. The President determined that the Task Force should be co-chaired by designees from the Department of Energy and the Environmental Protection Agency.

The Task Force has been directed to develop a proposed plan to overcome the barriers to the widespread, cost-effective deployment of carbon capture and storage (CCS) within 10 years, with a goal of bringing 5 to 10 commercial demonstration projects online by 2016. Ultimately comprehensive energy and climate legislation that puts a cap on carbon will provide the largest incentive for CCS because it will create stable, long-term, market-based incentives to channel private investment in low-carbon technologies. The Task Force plan should explore incentives for commercial CCS adoption and address any financial, economic, technological, legal, institutional, social, or other barriers to deployment. The Task Force should consider how best to coordinate existing administrative authorities and programs, including those that build international collaboration on CCS, as well as identify areas where additional administrative authority may be necessary. The Co-Chairs shall report progress periodically to the President through the Chair of the Council on Environmental Quality.

Question 8. Carbon Capture and Sequestration R&D—There appears to be a continued commitment for carbon capture and sequestration research and development at Fossil Energy. The focus is mainly CCS couple with coal-fired electric utilities. Is there flexibility in the proposed budget for CCS applications to other energy intensive industrial applications, such as fuels refining, cement manufacturing, steel mills, etc? That seems to be a research & development area where rapid gains can be made at a more modest level of investment that could be conducted concurrently with the more coal-focus R&D.

Answer. The Office of Fossil Energy has done extensive work in carbon capture and storage (CCS) related to fossil energy facilities. Since approximately half of the Nation's electricity is produced by coal-fired power plants and coal has a greater emission of CO_2 per unit of electricity produced than oil or natural gas, the emphasis on capturing carbon dioxide from this sector is essential. Electricity generation using carbon based fuels is responsible for over a third of the CO_2 emissions in the U.S. and globally the amount of CO_2 from other industrial sources is smaller than coal. However, since the storage of CO_2 is generally indifferent to the source of CO_2, obtaining CO_2 from industrial sources is also an important pathway to pursue.

Therefore, the Department recently released a Funding Opportunity Announcement for Industrial Carbon Capture and Storage from ARRA funding that will pro-

vide over $1.32B for large-scale industrial CCS projects from industrial sources (cement plants, chemical plants, refineries, steel and aluminum plants, manufacturing facilities). Carbon capture technologies are being developed for all sectors and will continue to be pursued since many of the technologies developed will be applicable to both the utility and industrial sectors.

Question 9. Oil and Gas R&D—There have been broad cuts to the oil/gas R&D programs at Fossil Energy (ultra deep program). In light of the growing interest in natural gas extraction from unconventional gas plays (shale gas, tight gas sands, and methane hydrates), is there any focus on environmentally safe extraction of these resources?

Question 10. Geothermal—In light of the recent issues surrounding the enhanced geothermal project at Geysers in California, has this impacted the focus and goals of the geothermal program at the DOE?

Answer. Enhanced geothermal systems (EGS) have enormous potential as a source of clean, renewable energy. The Department remains committed to achieving EGS technology readiness by 2015. As with any new technology, it needs to be fully developed and various technical and environmental issues need to be worked through. Also, as expected with any novel technology, new issues are constantly being identified as the research proceeds.

For example, DOE is actively engaged in addressing seismic risk associated with underground energy activities. In 2004, DOE initiated development of the International Protocol for Induced Seismicity from geothermal development with the help of Lawrence Berkeley National Laboratory (LBNL) and the international seismic community. The work was informed by panels of international experts, and the first edition of the Protocol was published in 2008 and adopted by the International Energy Agency in 2009. DOE is committed to routinely updating the Protocol based on a better understanding of EGS technology, and all federally funded EGS projects are required to follow the protocol.

DOE also continues to work with the geothermal industry, in coordination with LBNL, to ensure that the experiences gained from The Geysers site can help advance EGS throughout the world.

Question 11. Grid Energy Storage—This year's budget increases funding for grid energy storage research, which I support. Can you please explain how these funds will complement the demonstrations already underway under the stimulus?

Answer. The work done through the America Recovery and Reinvestment Act (ARRA) emphasizes deployment, while the work supported through annual appropriations focuses on the technology research and development. The Department has selected 16 large-scale energy storage demonstration projects to receive a total of $189 million in ARRA funds. These projects will provide field tests of known technologies that will show the value of energy storage in a limited number of applications. Performance will be carefully monitored and technical and economic data will be collected in a database and made available to utilities to encourage further projects and aggressive deployment.

The FY 2011 request for energy storage research will support further research and development, which is necessary to bring down costs and increase the reliability of storage devices. In FY 2011, new and existing storage devices will be extensively bench tested to provide utilities with reliable evaluations and assessments. Expanded collaborations with state energy offices and utilities will lead to additional demonstrations of new technologies and in new applications. Analysis studies will develop tools and methodologies to help utilities to optimally deploy storage facilities on the grid.

Question 12. Hiring—The American Recovery and Reinvestment Act of 2009 resulted in an order of magnitude increase in funding for the Office of Electricity and Energy Reliability. The awards made under this funding in FY 2009 and FY 2010 will require significant oversight and monitoring into FY2011 and later years. At the same time, the modernization of our electric grid is seen as the key enabler for achieving our clean energy and climate goals; the Office of Electricity and Energy Reliability is tasked with ensuring that that we will have the technology and know-how to realize this 'smart grid.' I am concerned that the requested funding levels for additional FTE's in FY2011 falls short of what is needed to effectively provide oversight and monitoring of grants and cooperative agreements. Does the Office of Electricity have the necessary numbers of skilled FTE's to aggressively achieve the vision of a modernized electric grid?

Answer. The FY 2011 budget request for the Office of Electricity Delivery and Energy Reliability (OE) includes a $7.6 million increase to maintain the level of FTEs filled over the last two years with Recovery Act funding to support Recovery related activities, as well as additional FTEs to support the expanded non-Recovery related activities. The planned number of FTEs requested in FY 2011 will allow OE to have

the sufficient level of skilled, bench strength necessary to achieve the goals of the organization.

Question 13. Appliances—You have requested a 14% increase for the appliance standards program. This will allow DOE to comply with the court settlement directing the Department to resolve the backlog of standards. However, Congress is currently considering legislation to modify the program and establish new or revised standards for many products.

Has the department considered modifying its rulemaking schedule and priorities in light of likely Congressional action? For example, will the Department consider lowering the priority for rulemakings for standards for products Congress is considering setting a standard by statute, or exempting a class of products by statute?

Answer. The Department is expanding and strengthening its ability to fulfill obligations under existing statutes. This includes increasing staff and analytical capabilities and reviewing possible new areas for standards available with existing authority. This expanded capacity will make it easier for DOE to move quickly in implementing any new legislation. If new legislation is passed into law, DOE will adjust schedules as necessary and reevaluate resource needs, priorities, and schedules. When legislation becomes law, the standards set by statute supersede DOE developed standards. Therefore, if Congress establishes legislation that exempts a product class, and that legislation becomes law, then DOE will adhere to the product class exemption.

Question 14. Clean Tech Supply Chain—There is a growing awareness that many of our advanced energy technologies (e.g. electric vehicles, solar photovoltaics, and wind-turbines) depend upon elements whose future supply is predicted to be limited and/or restricted, such as indium and several of the rare earth metals. Could you discuss what actions the Department is taking to:

(a) Ensure that there is adequate supply of these elements to meet future growth goals for clean energy technologies; and

(b) Pursue research to identify and investigate alternative earth abundant materials and elements for use in clean energy technologies?

Answer. The Department is keenly aware of the potential for supply constraints among a variety of materials crucial to the widespread development and deployment of clean energy applications. Although a number of these strategic elements, such as lithium and rare earth metals, exist in abundant and geographically dispersed reserves, most of their mining and processing are currently concentrated in only a few areas outside the United States. This reality presents particular vulnerabilities, most notably the potential for supply disruptions due to market fluctuations or adverse geopolitical developments. The Department is committed to actively monitoring the supply and availability of these strategic materials while exploring strategies to manage the risk of both short-and longterm supply disruptions, including through encouragement of diverse supply chains and alternative or substitute materials. For example, the Department's Advanced Research Projects Agency—Energy (ARPA-E) recently provided funding for research into certain high energy density magnetic properties which may provide alternatives to the currently used neodymium-iron-boron magnets that utilize rare earth metals. The Department will continue to monitor this issue and work across Federal agencies to develop sustainable long-term solutions.

Question 15. Hiring—In a special report by the Department of Energy's Office of Inspector General entitled, 'Selected Department of Energy Program Efforts to Implement the American Recovery and Reinvestment Act,' it was found that as of December 2009, the Office of Energy Efficiency and Renewable Energy had filled roughly half of the 288 positions using the direct hire authority authorized under the American Recovery and Reinvestment Act. The Office of Electricity and Energy Reliability had only hired about 36 percent of needed employees identified on its Recovery Act staffing plan. What steps is the Department taking to fill these additional positions?

Answer. In addition to the special hiring authority for filling positions in the Offices of Energy Efficiency and Renewable Energy (EERE) and Electricity and Energy Delivery (OE) under the Recovery Act, the Department has recently been granted direct hire authority for certain other Recovery Act positions. This authority allows filling these positions on a time limited basis through September 30, 2011, and is available, along with the more specific authority granted for EERE and OE, to fill Recovery Act related positions. At this time, all Recovery Act hiring requests for EERE have been processed by the Office of the Chief Human Capital Officer. One hire for OE is currently in process. EERE and OE are currently re-evaluating their need for additional staff to support Recovery Act.

Question 16. Energy Innovation Hubs—In the FY2011 Budget request, a new Energy Innovation Hub centered on Batteries and Energy Storage is proposed. Could you please explain in greater depth:

a) What will be the mission of the hub; and

b) How this hub will interface with and add value to the energy storage research being performed within the Office of Science, the research, development, and demonstration work being carried out by the Office of Electricity and Energy Reliability and the Office Energy Efficiency and Renewable Energy, as well as ARPA-E?

Answer. Today's electrical energy storage approaches suffer from limited energy and power capacities, lower-than-desired rates of charge and discharge, calendar and cycle life limitations, low abuse tolerance, high cost, and poor performance at high or low temperatures. Many of these fundamental performance limitations are rooted in the constituent materials making up the storage system and in the fundamental physics and chemistry that govern the transport and storage of energy in the material. The research challenges are inherently multi-disciplinary.

The Batteries and Energy Storage Hub will target science knowledge gaps that are preventing breakthroughs in technology platforms for both grid and mobile applications. Specifically, the Hub will address a number of research areas identified in the Basic Energy Science workshop report Basic Research Needs for Electrical Energy Storage. The Hub will expand our scientific base for synthesis of novel nanoscale materials with architectures tailored for specific electrochemical performance, develop new methodologies to characterize materials and dynamic chemical processes at the atomic and molecular level, and expand our competencies in simulation and prediction of structural and functional relationships using leading computational tools.

The Hub's ultimate technological goals are development of radically new concepts for producing storage devices from materials that are abundant and have low manufacturing cost, high energy densities, long cycle lifetimes, and high safety and abuse tolerance for a broad range of energy storage applications. The breadth and depth of the scientific challenges associated with these goals will require that the Hub integrate premier scientific talent from the disciplines of chemistry, physics, materials sciences, biology, and engineering. The engineering and manufacturing challenges will demand close consultation with industry. The Hub will provide an interdisciplinary, unified research framework for energy storage research, bringing fundamental and applied research teams together in a single coherent research program that will cross-fertilize activities to accelerate fundamental understanding, materials discovery, and progress towards commercialization of new energy storage technologies.

Responses of Hon. Steven Chu to Questions From Senator Murkowski

ALASKA-SPECIFIC

Question 1. Mr. Secretary, last year you came to Alaska with some fellow Cabinet members and saw firsthand how expensive diesel-fired electricity is in rural areas. The cost of energy in Alaska, especially in rural Alaska, averages about nine times more than in the Lower 48 states. For electricity rates to drop in rural Alaska, we need federal grant assistance to help with the high capital costs of installing renewable energy in isolated areas.

In the 2007 Energy Independence and Security Act, Congress recognized this need and authorized such aid. Section 803 of the Act authorized a grants program to provide matching funding for renewable energy projects but, unfortunately, despite your recent visit this provision has yet to be funded. Would you support some funding to begin implementation of this authorized program? What else can the Administration do to help make renewable energy installation more affordable in places like Alaska?

Question 2. As you know, last year I was extremely disappointed that the Administration zeroed out all funding for the Arctic Energy Office. That office, which had an annual budget of about $4-7 million, has done great work in Alaska over the previous seven years. Right now, as they close shop, they're working on much needed renewable energy developments in the state. And yet, the Administration's FY 2011 budget request contains no new funding to continue cold-climate energy work. What is the Department willing to do in FY 2011 to improve energy technology and energy efficiency efforts in cold-climate states like Alaska?

Answer. The Department's commitment through the Office of Energy Efficiency and Renewable Energy is to continue support for the National Renewable Energy Laboratory's efforts on the Transforming Energy in Alaska program. This effort will continue to support many opportunities that develop in Alaska including collabora-

tion on the use of biomass for displacement of diesel heating fuel for U.S. Coast Guard bases throughout southeast and southcentral Alaska.

Question 3a. The Department's FY 2011 budget request zeroes out the unconventional fossil fuel budget that supported methane hydrate research. However, I understand that the Department is planning on continuing its methane hydrate research efforts in the Office of Science—Is that correct?

Answer. Yes. In FY 2011, the Office of Science's Basic Energy Sciences program will initiate a new research program in gas hydrates ($17,517,000). This program will study fundamental scientific questions surrounding methane hydrates: How do they form? What is their role in the global carbon cycle? What is their role in seafloor ecological systems? How extensive are they? How stable are they? In the short term, the program will also study hydrates via controlled in situ depressurization and physical, thermal, and chemical stimulation in the Arctic with supporting laboratory and numerical modeling to enable interpretation and extrapolation of results. Existing core sample data from the Arctic hydrate formations will provide the scientific information of how the hydrate structure sits in the pore space at various depths. The planned tests in the Gulf of Mexico in FY 2011 will take in situ core samples at various depths and locations for evaluation. Computer simulations will be compared with data from previous in situ tests. This activity will also support theory, multi-scale modeling and simulation, and experimental research in areas such as the intermolecular forces that govern the structure and properties of gas hydrates and studies of gas hydrates in the natural environment.

Question 3b. I believe the request for methane hydrate research is FY 2011 is about $18 million. In the 2005 energy bill, Congress authorized up to $50 million a year for methane hydrates. Given the very positive review of methane hydrate research released just last week by the National Academy of Sciences, why isn't the Department providing additional research funding for this area?

Answer. Funds appropriated for this research have historically been less than the authorization level. Yet previous support has been essential in enabling the Department to establish industrial and international partnerships to tackle critical research and development objectives, as identified by several studies. The FY 2011 request is sufficient to enable our highest priority activities.

Question 3c. I understand that there will be funding for an Alaskan North Slope test well within the Office of Science, is that correct? How much funding will be dedicated to that effort?

Answer. Plans for several field tests are being developed and evaluated during FY 2010. The results of these evaluations, along with the availability of funds in FY 2011, will determine our future plans for field tests, including the Alaskan North Slope test.

HYDROPOWER

Question 1. Mr. Secretary, last September at a Clean Energy Forum in Pennsylvania, you said we could add 70,000 megawatts of additional hydropower capacity by installing more efficient turbines at existing dams, increasing the use of pumped-storage projects, and encouraging the use of run-of the-river turbines. You stated that the Administration "will be pushing this" because it's an "incredible opportunity and it's actually the lowest cost clean energy option." A new jobs report from the National Hydropower Association estimates that there is upwards of 700,000 cumulative direct and indirect jobs that could be created by developing 60,000 megawatts of potential hydropower by 2025.

And yet, despite all this incredible potential, hydropower is the only renewable resource that takes a hit in DOE's FY 2011 budget request. You're seeking $41 million for "waterpower"-a 20% cut from what Congress approved last year.

Would you support providing more tax credits and grant aid for both small and large conventional hydropower development? How about providing incentives for pumped storage projects?

Answer. Additional capacity and generation from conventional hydropower represents a potentially significant portion of the Nation's future energy portfolio. The significance of hydropower capacity is exemplified by a recent Memorandum of Understanding signed by the Secretary of Energy and the Secretary of Interior and the Assistant Secretary of the Army on March 24, 2010 to promote the use of hydropower.

The FY 2011 budget request identifies the resources necessary for the Department of Energy (DOE) to meet the goals and priorities for hydropower set by both Congress and the Administration. The FY 2011 budget request includes funds to assess the potential for incremental or new hydropower generation through capacity and efficiency upgrades and powering existing non-powered dams. DOE is also investing

in projects to improve methods for applying and valuing ancillary benefits of conventional and pumped storage hydropower assets to meet the needs of the Nation's changing electricity grid. DOE's Water Power program also received $31.7 million in Recovery Act funding which supports reequipping existing hydrokinetic facilities.

Hydropower is currently treated differently than other renewable energy technologies in terms of Federal financial incentives and tax credits. For example, only certain types of hydropower that do not require the construction of new dams (either incremental capacity additions to existing facilities or run-of-river systems installed at licensed non-powerproducing dams) can receive either Production or Investment Tax Credits, while new hydropower facilities are not eligible. Qualified hydropower receives a Production Tax Credit worth 1.1 cents per kilowatt-hour, half the amount received by wind, geothermal, and other renewable energy resources. No tax credits or incentives are currently provided for pumped storage facilities.

Question 2. Of the $41M requested by the department for hydropower, how much do you propose to spend on emerging hydrokinetic technologies? Where will your research efforts be directed?

Answer. The Department of Energy (DOE) plans to allocate approximately half of its Fiscal Year 2011 appropriation for water power towards the research, development and promotion of emerging hydrokinetic technologies. In Fiscal Year 2011, the DOE plans to focus its efforts on seven key areas:

1. System development, deployment and verification to improve device functionality and generate cost, performance and reliability data;
2. Research tools to develop design codes and models necessary for supporting system development and testing;
3. Ensuring adequate test centers and facilities are developed to generate and collect system data;
4. Technology characterization to analyze and evaluate test data;
5. Resource assessments to quantify energy availability and location;
6. Studies and projects to evaluate and minimize key environmental risks to permitting and deployment of demonstration projects; and
7. Economic analysis and market development to disseminate technology and resource data and integrate information into energy benefit and deployment models.

SPR

Question 1. The President's FY11 budget request proposes the cancellation of $71 million from the Strategic Petroleum Reserve project planned for Richton, Mississippi to add capacity to the SPR. The SPR is roughly at a 727 million barrel capacity even though the 2005 Energy Policy Act calls for capacity to be expanded to 1 billion barrels. When does the Administration plan to add additional capacity to SPR?

Answer. The Administration is currently reviewing SPR expansion policy.

Question 2. Also, in the Administration's budget materials, you say that the FY 2011 SPR request "provides for the assessment of energy efficiency and GHG control at SPR facilities to meet DOE goals for 15% LEED buildings by 2015, for application of wind/solar, and to lower GHG emissions of all DOE facilities." Is the Department authorized to use money appropriated for SPR expansion for wind and solar activities? Please explain.

Answer. The Department's FY 2011 request for the SPR program includes $1 million to assess energy efficiency and GHG control opportunities at SPR facilities, i.e., the potential conversion of existing SPR buildings to LEED standard, the potential application of wind and/or solar technologies at the SPR sites, and identifying opportunities to lower GHG emissions from the SPR storage operations.

The Administration's FY 2011 budget does not propose the use of money appropriated for SPR expansion for wind or solar activities. The money proposed would be SPR operational funds used to assess the application of wind and/or solar technologies to SPR facilities, not for the funding of the Department's wind and solar programs.

STIMULUS FUNDING

Question 1a. I'd like you to provide clarification for some of the terms used to describe stimulus funding. On DOE's website, there are three principal divisions: funds spent, funds awarded, and funds authorized.

Can you explain what the term "awarded" means? Can you tell me how it differs from funds that have been obligated and actually disbursed to funding recipients? Can you tell me how much money has actually been obligated—meaning the Department is legally obligated to spend those funds?

Answer. The Department of Energy's website "Energy.gov/Recovery" shows Recovery Act amounts authorized, awarded, and spent. In this case, authorized equates to funds appropriated to DOE in the Recovery Act; awarded equates to obligations; and spent equates to gross outlays or the amount of obligated funds that have been paid to contractors or grant recipients.

As of February 22, 2010, of the $36.7 billion of DOE Recovery Act Funding, approximately $25.6 billion has been awarded, and $2.4 billion payments have been made to recipients.

Question 1b. I'd like you to provide clarification for some of the terms used to describe stimulus funding. On DOE's website, there are three principal divisions: funds spent, funds awarded, and funds authorized.

Let's take Smart Grid funding as an example. The stimulus authorized $4.4 billion, and the President announced $3.4 billion in grant awards last October. Shortly after that, the Department of Labor put out a press release touting a grant for Nevada that was part of the President's announcement, which makes it seem like each actual grant generates several separate press releases. Can you tell us how much Smart Grid funding has actually been spent? How much has been obligated? And where you expect those numbers to stand at the end of 2010?

Answer. In October 2009, the Department announced it had selected 100 projects for grants totaling $3.4 billion under the Smart Grid Investment Grant program, following a competitive process. Once selections were made, DOE began working with the selectees on the scope of work, terms and conditions, and other aspects of the grants.

As of May 8, 2010, the Department has obligated more than $3.2 billion of the $3.4 billion allocated for the Smart Grid Investment Grant (SGIG) program. Final awards were initially slow, because the selected organizations raised a number of significant issues that had to be addressed. One of the most significant issues was resolved on March 10, 2010, when the Internal Revenue Service announced a determination on the tax treatment for grantees receiving SGIG awards. Under the revenue procedure, the Internal Revenue Service is providing a safe harbor under Section 118(a) of the Internal Revenue Code (IRC) for corporations receiving funding under the Smart Grid Investment Grant program. With the determination that Smart Grid Investment Grants to corporations are non-taxable, corporate utilities are able to launch their investments with a clear indication of the tax status of their projects. Now that this issue is resolved, the Department has been working expeditiously to complete awards, finalizing 86 of the 100 planned awards as of May 8, 2009.

By the end of FY 2010, the Department expects to fully obligate all Smart Grid Investment Grant funds. To date, a little over $2 million has been spent for technical support to implement the Smart Grid Investment Grant program. Spending will increase significantly over the next few months when all grants are awarded and work under the grants begins.

NUCLEAR

Question 1. Please provide more detail on what types of technologies you expect the new Nuclear Energy Enabling Technologies program to develop and support. Is it necessary to have a new, separate program from the Reactor Concepts and Fuel Cycle programs to achieve these goals?

Answer. The proposed Nuclear Energy Enabling Technologies program has three elements. The first element, Crosscutting Technology Development, supports multiple reactor concepts (existing and future) and will research technologies in four specific areas: reactor materials, advanced methods for manufacturing, new sensor technologies for monitoring material and equipment conditions in reactors, and proliferation risk assessment.

The second element, Transformative Nuclear Concepts R&D, is much broader in scope and will support, via an open, competitive solicitation process, investigator-initiated projects that relate to any aspect of nuclear energy generation including, but not limited to, reactor and power conversion technologies, enrichment, fuels and fuel management, waste disposal, and nonproliferation. This effort will encourage the identification and development of "outside the box" technology options in all aspects of the civilian nuclear energy program beyond what may be currently envisioned and to ensure that good ideas have sufficient outlet for exploration.

The third element, the Energy Innovation Hub for Modeling and Simulation, is a specific example of the type of crosscutting, transformative activity that will enhance many research areas within NE, by applying existing modeling and simulation capabilities to create a "virtual" reactor user environment for engineers and scientists.

These activities are proposed under the new Nuclear Energy Enabling Technologies program to encourage innovative research relevant to multiple reactor and fuel cycle concepts, and pursue "out-of-the-box" options that offer the promise of dramatically improved systems across the full spectrum of nuclear energy. Where appropriate, these activities will be managed and executed in a matrix fashion, in coordination with the Reactor Concepts and Fuel Cycle program elements to efficiently support and facilitate the achievement of our program's goals.

Implementation under the proposed Nuclear Energy Enabling Technologies umbrella program will help avoid duplication of research effort; provide better coordination of research conducted in the specified areas; and bring the best research expertise from the national laboratories and universities to bear on common issues or requirements among the different reactor and fuel cycle technologies. Also, in conducting this research under a common program, more efficient use of appropriated funds is expected.

Question 2. As its first regular appropriations request for ARPA-E, the Administration requests $300 million. Do you anticipate that $300 million will be the amount that is requested each year?

Answer. ARPA-E received an appropriation of $400 million under the American Recovery and Reinvestment Act of 2009, and $15 million under the Omnibus Appropriations Act, 2009. In ARPA-E's organic legislation, the America COMPETES Act of 2007 (42 USC 16538), Section 5012(m)(2) authorizes appropriations of $300 million for FY 2008 and "such sums as are necessary" for the subsequent two fiscal years. The FY 2011 request for ARPA-E is $300 million. Requests in future years will fund the most promising investment opportunities while maintaining the Administration's commitment to fiscal responsibility.

Question 3. The Nuclear Power 2010 program, which the Administration is not seeking continued funding for, provided assistance for the submission to the NRC of two construction and operating license (COL) applications for two reactor designs. The nuclear industry has maintained that delays in the NRC licensing process is one of their biggest obstacles to constructing new nuclear reactors and DOE involvement is necessary to move the process along. Is funding provided in the 2011 budget for COL assistance?

Answer. No funding has been requested in the FY 2011 budget for construction and operating license (COL) assistance. The Department believes sufficient progress has been made on the NRC licensing review of the two COL applications sponsored by the Nuclear Power 2010 program. The Dominion Energy North Anna COL final environmental impact statement is expected in April 2010 and the safety evaluation report with no open items is expected in September 2010. The NuStart/Southern Company recently received their Early Site Permit, and the COL final safety evaluation report with no open items is expected in October 2010. Final hearings for both COL applications have not been set by the NRC, but are expected in early FY 2011.

The Department believes no further Federal funding of these projects is warranted and that industry can support the remaining reference COLA licensing activities for the AP1000 and the Economic Simplified Boiling Water Reactor (ESBWR).

ENERGY STAR

Question 1. Within DOE's FY 2011 budget request, you recommend the further promotion of Energy Star labels for major appliances such as windows, refrigerators, dishwashers and compact fluorescent lights. However, DOE staff has briefed Committee staff on transferring the promotion of these products to the EPA. Is it the Administration's intent to transfer the promotion of Energy Star labels for these appliances from the Energy Department to the EPA? If so, what is the rationale?

Answer. The Department of Energy (DOE) is transferring the marketing of ENERGY STAR 114 products to the Environmental Protection Agency as DOE enhances its technical work, including testing and verification in support of ENERGY STARS products. This arrangement of work uses agency resources effectively and builds upon the strengths of each agency.

GEOTHERMAL

Question 1. I appreciate that the budget calls for a 25% increase for geothermal power development, given the great potential that hydrovent and enhanced geothermal systems have for developing carbon-free electric power. As you know, there is currently an EGS demonstration project in Alaska that could power up to 25 rural villages with low-cost geothermal power in the future. If EGS systems show prom-

ise, what can we do to further efforts to commercialize and deploy geothermal in the future?

Answer. The Enhanced Geothermal Systems (EGS) approach to geothermal power production is indeed promising, but it is not yet ready for large-scale commercialization and deployment. Commercialization of EGS will require: improving the science and engineering understanding of EGS; improvement and development of the technologies needed to access, evaluate, manipulate, and operate EGS reservoirs; and solving non-technical policy barriers.

Improved scientific and engineering understanding of EGS is fundamental to scaling from demonstration level projects to commercially viable operations. Additionally, improved understanding of the scientific and engineering requirements for successful EGS is imperative to widening the geographic and geologic deployment of EGS in the future. Areas for improved understanding are wide ranging and include topics such as: understanding the response of in situ reservoir rocks (across physical scales) to EGS operations; development of robust computational algorithms and tools for modeling relevant coupled processes; adaptation and development of novel remote sensing methods and technologies; and other fundamental issues associated with manipulation of subterranean environment.

The technological improvement and development for EGS deployment includes technologies that are known today, as well as others yet to be identified. It is well understood that many technologies employed in other industries (e.g., oil and gas) are applicable to EGS development but are not capable of operating in the extreme environments associated with potential EGS sites (e.g., high temperatures, hard rocks, corrosive fluids, etc.). Additionally, as the understanding of the science and engineering needs for EGS are expanded, technology needs will also be identified.

Finally, the commercialization of EGS depends upon effective solutions to non-technical policy barriers. Unlike solar and wind energy, the geothermal resource is largely hidden; incentives that act to mitigate risk to industry would help push EGS development forward. Simplified and standardized permitting processes would address significant barriers and bottlenecks in the site selection and development processes. Increased transmission availability will ensure that EGS developers are able to reach the grid.

An improved understanding of the fundamental science and engineering needed to support EGS development, the tools and technology necessary to support its development, and supportive development policies would act to hasten the deployment of EGS as a source of carbon-free electric power.

WIND

Question 1. The Administration is seeking $123 million for wind power research this year—that's more than a 50% increase. Part of this is for the Department to undertake research and development work for offshore wind projects, correct? Does the administration's initiative mean the Department does not require congressional authorization in this area? Will the Department be examining the use of dual platforms that would help offshore wave energy projects develop simultaneously?

Answer. The Administration's Fiscal Year 2011 budget request includes funding for activities that promote and accelerate responsible offshore wind power research and development (R&D). The Department of Energy (DOE) plans to partner in a demonstration offshore wind project to address the specific deployment barriers facing the first commercial projects. The DOE will also establish a national offshore wind research and development effort. The Energy Policy Act of 2005, Section 931(a)(2)(B)(ii), authorizes DOE to conduct such a program.

Furthermore, the proposed offshore wind R&D program will address additional issues of mutual interest to the offshore wind and wave energy industries. These issues include undersea transmission infrastructure, potential environmental effects, equipment marinization, and project siting.

SOLAR

Question 1. The Administration's FY 2011 budget request for solar is over $300 million—a 22.4% increase from last fiscal year. Part of the rationale for this increase is to make solar energy cost competitive by 2015. How realistic is that goal? Please be specific as to PV and CSP technologies, and compare such costs to other technologies like nuclear, hydropower, coal, wind, and geothermal. Al.

Answer. The 2015 goal is realistic and can be met across a significant portion of the U.S. in multiple markets. Specifically, with continued cost reductions, photovoltaics (PV) will become increasingly competitive in residential, commercial and utility scale markets, while concentrated solar power (CSP) will become increasingly competitive in utility scale markets.

When combined with the 30 percent Investment Tax Credit (ITC) passed by Congress in 2009, PV technology is currently competitive in a number of residential and commercial markets with a combination of high retail electricity prices, good solar resources, and/or local solar incentives. These markets include Arizona, California, Colorado, Florida, Massachusetts, New York, New Jersey, and Nevada. A recent study by the National Renewable Energy Laboratory examined the competitiveness of PV in residential electricity markets across the U.S. and found that achieving cost reductions in line with the Solar Program's targets will lead to PV becoming broadly competitive first in the Southwestern and Northeastern states, and then in the Southeastern and Midwestern states by 2015.[1]

However, reaching the goal of grid parity without incentives will require a reduction in installed system prices of roughly 50-70 percent from 2009 benchmarked levels. While this level of cost reductions may appear ambitious, it is in line with recent industry trends and bottom-up engineering estimates of potential cost reductions through the PV supply chain. It is an achievable goal with continued and intensified funding in PV technology development, systems integration research and market transformation, all of which are major parts of the Department's Solar Program.

Similarly, the installed price for CSP systems, including the 30 percent Federal ITC, is currently at parity with the California Market Reference Price (MRP), the price paid in the California market for new peak generation resources. Being competitive with the MRP has contributed to significant growth in the number of CSP projects in the California market and throughout the Southwest. CSP systems are projected to reach parity with new peak and intermediate power generation prices in the Southwest without subsidies between 2015 and 2020. To reach parity with base load electricity prices without the need for subsidies, CSP systems will require approximately a 50 percent reduction in cost. This is projected to occur between 2020 and 2030 with the introduction of thermal storage technologies and new CSP tower systems, both of which are major parts of the Department's Solar Program.

Even with expected cost reductions, PV and CSP technologies are still likely to be more costly in the 2015 time frame than some conventional technologies like nuclear, hydropower, and coal or some renewable technologies like wind and geothermal when you look at total lifecycle costs. These cost comparisons, however, do not fully capture the value provided by solar technologies through other factors such as reducing greenhouse gas emissions and environmental impacts, rapid construction times, scalability, and, with CSP, the ability to include low-cost thermal storage. PV systems are also the only conventional or renewable electricity technologies that can be deployed residentially which eliminates transmission infrastructure issues and also provides financing through mortgages and home equity loans. For these reasons, when combined with projected cost reductions, solar technologies will become increasingly competitive in a range of markets throughout the U.S. and will play an increasingly significant role in the U.S. energy mix in both the short-and long-terms.

The major increase in funding for the Solar Program in FY 2011 includes two new initiatives. The PV Manufacturing Initiative is designed to help secure a strong U.S. manufacturing base by funding collaborative research through both university and industry partnerships. For FY 2011, $30 million is proposed for this initiative which will be leveraged with private sector funding. The Solar Demonstration Zone Initiative will provide the resources required to demonstrate leading edge CSP and other solar technologies. These demonstrations will provide a critical step in attracting conventional financing and allowing these technologies to bridge the commercialization "valley of death." For FY 2011, $50 million is requested for this initiative which will also be leveraged with private sector funding.

ENERGY EFFICIENCY

Question 1a. Over the past two months, my staff has repeatedly asked DOE for a detailed analysis of how it is allocating funding among the many energy efficiency programs it administers. My staff has not received a single reply, which is troubling because we have seen press reports that the Administration would like to create a new multi-billion dollar program, called "Cash for Caulkers" to move more money towards similar energy efficiency projects.

Please provide me with a detailed analysis on how stimulus funds have been obligated and spent within the following energy efficiency programs:

- The Weatherization Program

[1] Denholm, et al. 2010. Break-Even Cost for Residential Photovoltaics in the United States: Key Drivers and Sensitivities. NREL technical report NREL/TP-6A2-46909

- Energy Efficiency and Conservation Block Grants
- The State Energy Program
- Energy Star Rebates
- Any other program funded within ARRA, and under DOE's jurisdiction, concerning energy efficiency

Answer. The Department of Energy (DOE) is committed to ensuring that Recovery Act funds are obligated and outlaid in a timely manner. Of the approximately $15 billion in Recovery Act funding allocated to energy efficiency projects, about 90% has been obligated as of April 9, 2010. Please see Attachment A for a project-level analysis of obligations and payments data of DOE's energy efficiency projects receiving this $15 billion in Recovery Act funding as of April 9, 2010. Furthermore, to ensure that funds are being spent, DOE staff actively monitor and reach out to recipients. Continuous updates can be found at: http://www.gao.gov/recovery/.

ATTACHMENT A

U.S. Department of Energy ARRA Projects Report - Energy Efficiency Recovery Act Projects
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Program Office	EERE Technology Program	Project Description	Spend Plan	Anticipated Obligation Timeframe for Remaining Funds
EERE	Office of Weatherization and Intergovernmental Programs	EE Conservation Block Grant Program	$3,184,000,000	September 2010
		Weatherization Assistance Program	$4,975,000,000	
		State Energy Program	$3,084,500,000	
		EE Appliance Rebate Programs	$298,500,000	
	Buildings Technologies Program	Advanced Building Systems	$97,001,000	July/August 2010
		Residential Buildings (Building America, Builders' Challenge, and Existing Home Retrofits)	$68,052,000	
		National Accounts Acceleration in Support of the Commercial Buildings Initiative	$52,011,408	
		Buildings and Appliance Market Transformation	$53,512,500	
		Solid State Lighting	$48,609,000	
	Federal Energy Management Program	Enhance and Accelerate FEMP Service Functions to the Federal Government	$16,915,000	May 2010
		Energy, Water & Emissions Reporting and Tracking System	$5,472,500	
	Industrial Technology Program	Combined Heat and Power (CHP), District Energy Systems, Waste Heat Recovery Implementation and Deployment of Efficient Industrial Equipment	$154,458,848	May/June 2010
		Improved Energy Efficiency for Information and Communication Technology	$48,647,463	
		Industrial Assessment Centers and Plant Best Practices	$9,950,000	
		Advanced Materials RD&D in Support of EERE Needs to Advance Clean Energy Technologies and Energy-Intensive Process R&D	$48,444,708	
	Vehicle Technologies Program	Battery Manufacturing	$1,990,000,000	May 2010
		Transportation Electrification	$398,000,000	
		Clean Cities AFV Grant Program	$298,500,000	
		Commercial Vehicle Integration (SuperTruck) and Advanced Combustion Engine R&D	$109,248,538	
		[illegible]	[illegible]	

Question 1b. Over the past two months, my staff has repeatedly asked DOE for a detailed analysis of how it is allocating funding among the many energy efficiency programs it administers. My staff has not received a single reply, which is troubling because we have seen press reports that the Administration would like to create a new multi-billion dollar program, called "Cash for Caulkers" to move more money towards similar energy efficiency projects.

Please also provide the funding implementation schedule for all remaining projects to be funded with ARRA monies, within each of the before referenced programs.

Answer. Below is a summary of funding implementation as ofFebruary 25, 2010, unless otherwise specified.

- The Weatherization Program—This project was 96 percent obligated as of April 9, 2010. The remainder of funds is for two funding opportunity announcements (FOAs); one FOA for a Training & Technical Assistance Program and one FOA for a Consumer Rebate Program. Applications to the Training & Technical Assistance FOA are currently under review. A Request for Information for the Consumer Rebates FOA is under review.
- Energy Efficiency and Conservation Block Grants: As of April 9, 2010 this project was 80 percent obligated. Approximately 14 percent of funds remaining to be obligated are part of a competitively selected portion of this program. The majority of the remainder of unobligated funding for this project is due to eligible entities (for the formula grants) which have not yet applied or entities which have withdrawn. The application deadline for this project is September 30, 2010.
- The State Energy Program: Nearly 100 percent of funds have been obligated for this project.

- Energy Star Rebates: One hundred (100) percent of funds have been obligated for this project.
- Four other energy efficiency programs under the jurisdiction of the Office of Energy Efficiency and Renewable Energy comprise an additional $3.4 billion in Recovery Act funding: the Building Technologies Program, the Federal Energy Management Program, the Industrial Technology Program, and the Vehicle Technologies Program. About $2.7 billion, or 80 percent, of these funds have been obligated across 15 projects as of April 9, 2010. Further, an additional $173.5 million under the Vehicles Technologies Program is scheduled to be obligated by May 2010. Please see Attachment A for a project-level analysis of obligations and payments data as of April 9, 2010 for DOE's energy efficiericy projects receiving Recovery Act funding, as well as estimated timeframes for obligating remaining funds.

Question 1c. Over the past two months, my staff has repeatedly asked DOE for a detailed analysis of how it is allocating funding among the many energy efficiency programs it administers. My staff has not received a single reply, which is troubling because we have seen press reports that the Administration would like to create a new multi-billion dollar program, called "Cash for Caulkers" to move more money towards similar energy efficiency projects.

I assume that DOE has a tracking mechanism on how ARRA funding is actually spent after it is awarded, and on what types of projects. Please provide the funding implementation schedule for each state, and when the money will actually be spent.

Answer. The Department of Energy (DOE) has systems to track recipients' use of Recovery Act funding. DOE expects funds for the State Energy Program (SEP), the Weatherization Assistance Program (WAP), and the Energy Efficiency Block Grant Program (EECBG) to be expended within three years. DOE has been working closely with state and local recipients to ensure awarded funds are being used appropriately and in a timely manner. As of February 25, 2010, DOE obligated to recipients 100 percent of funds for the SEP, 96 percent of funds for WAP, and 73 percent of funds for EECBG.

In some cases, recipients received conditional awards that limit their ability to spend funds until certain conditions are cleared [e.g., National Environmental Policy Act (NEPA) determinations]. DOE is working with recipients to clear those conditions as expeditiously as possible. Recipients are making progress in obligating and expending these funds. For example, as of February 25, 2010:

- States have obligated $777 million in SEP funds and expended about $60 million. DOE's target is for states to obligate $1 billion of SEP funds by the end of March 2010 and $2.5 billion by the end of June 2010. As such, DOE also has targets of awarding 90 percent of strategy conditioned funding and making 75 percent of NEPA determinations by the end of March. DOE is closely tracking progress towards achieving these targets.
- Weatherization recipients have expended $573 million. DOE expects States to increase their rate of expenditure as weatherization activities ramp up in the spring and summer months; the months of greatest activity in cold weather states.
- State and local recipients have expended $83.3 million under EECBG. DOE also has targets of awarding 90 percent of strategy conditioned funding and making 75 percent of NEPA determinations by the end of March. DOE is closely tracking progress towards achieving these targets.

Also, continuous updates to Recovery Act spending can be found at http://www.energy.gov/alaska.htm and http://www.recovery.gov/Pages/home.aspx.

Question 1d. Over the past two months, my staff has repeatedly asked DOE for a detailed analysis of how it is allocating funding among the many energy efficiency programs it administers. My staff has not received a single reply, which is troubling because we have seen press reports that the Administration would like to create a new multi-billion dollar program, called "Cash for Caulkers" to move more money towards similar energy efficiency projects.

Finally, the DOE IG has recently issued reports on alleged "waste, fraud and abuse" within programs currently being funded by the stimulus. Please describe what you are doing to address the concerns that have been raised, and other implementation issues that have arisen within the programs you oversee, including State Energy Programs and funding within the Energy Efficiency and Conservation Block Grants that are related to ARRA funding. What are the concrete steps you are undertaking to address the alleged "waste, fraud and abuse" as well as other implementation problems, as you propose billions more to do similar programs?

Answer. In response to the Inspector General's recent reports on alleged waste, fraud, and abuse, senior and program management have established corrective ac-

tion plans, with milestones, that include weekly reporting to monitor the progress of the corrective actions in satisfying the recommendations provided by the DOE IG. In addition, quarterly reporting on all corrective actions will be submitted to the Office of Risk Management and Office of Inspector General for review and comment.

The Office of Risk Management is in regular and ongoing discussions with program offices to analyze current implementation status, risks, and controls to mitigate the possibility of waste, fraud, and abuse. On a monthly basis, the Department reviews each program's progress towards meeting the goals and objectives of the Recovery Act, including risk assessments, financial status, and performance measures. In addition, the Office of Risk Management has participated in State, sub-grantee, and home visits in conjunction with the Office of Weatherization and Intergovernmental Programs (OWIP) that were led by the Recovery Act Team to assess the preparedness of the States for this expanded Recovery Act project. The Office of Risk Management continues to work with the program office by helping to develop the OWIP monitoring manual and the field monitoring questionnaire.

CASH FOR CAULKERS

Question 1a. Over the last couple of months we have heard many press reports about a new program your Administration is developing called HOMESTAR, otherwise known as "Cash for Caulkers." As of yet, we have not received any information regarding how it would be implemented, and who would run it.

Please describe what outside groups have been involved in drafting the legislation. In addition, who provided the President's Economic Recovery Advisory Board the language to create the program?

Answer. An industry-led coalition calling itself the "Home Star Coalition" has been working to draft legislation that would create a program known as "Home Star." The Department understands this coalition has been working closely with the Senate Energy and Natural Resources Committee as part of that drafting process. The Department is unaware of the specific authors on the President's Economic Recovery Advisory Board (PERAB) report.

Question 1b. Over the last couple of months we have heard many press reports about a new program your Administration is developing called HOMESTAR, otherwise known as "Cash for Caulkers." As of yet, we have not received any information regarding how it would be implemented, and who would run it.

Press reports indicate that the goal is to have this program be "quick and easy" like "cash for clunkers." Before anyone knew it, the "cash for clunkers" program was oversubscribed, and Congress had to take an additional $2 billion from the DOE renewable loan guarantee program to pay for it. Do you have a plan for ensuring that the government doesn't get on the hook more money than it can deliver? How?

Answer. DOE is prepared to execute any program authorized and funded by Congress. DOE's understanding is that such a program would receive a fixed appropriation and that the program would end once the appropriated funds have been expended.

Question 1c. Over the last couple of months we have heard many press reports about a new program your Administration is developing called HOMESTAR, otherwise known as "Cash for Caulkers." As of yet, we have not received any information regarding how it would be implemented, and who would run it.

Is there a sufficient qualified workforce in place to do this type of home retrofit work?

Answer. DOE has worked with the Environmental Protection Agency (EPA) for several years to support the Home Performance with ENERGY STAR® program, which works with contractors who deliver whole-home retrofits and quality assurance. This contractor workforce is continually expanding. In addition, the construction industry is currently experiencing very high unemployment due to the slowdown in new home construction. These trained contractors are available to enter into the home retrofit industry immediately.

Question 1d. Over the last couple of months we have heard many press reports about a new program your Administration is developing called HOMESTAR, otherwise known as "Cash for Caulkers." As of yet, we have not received any information regarding how it would be implemented, and who would run it. DOT had to scramble to find personnel to administer the "cash for clunkers" program, and the program was still overwhelmed. Trading cars is infinitely simpler than renovating the vast range of different housing and building types in the country. How will the Administration process the requests for funds? Who will be eligible to receive the funds?

Answer. DOE has closely examined the Report to Congress from the "cash for clunkers" program, and is studying the payment processing mechanism used in that

program. DOE understands the Home Star Coalition is working on details within potential draft legislation.

Question 1e. Over the last couple of months we have heard many press reports about a new program your Administration is developing called HOMESTAR, otherwise known as "Cash for Caulkers." As of yet, we have not received any information regarding how it would be implemented, and who would run it.

Is there a sufficient workforce to ensure quality assurance? How do you plan to monitor quality assurance to ensure that the work is being done, being done properly and will actually result in energy savings? How many additional government employees or contractors will be needed to do this?

Answer. DOE has worked with EPA for several years to support the Home Performance with ENERGY STAR® program, which works with contractors who deliver whole-home retrofits and quality assurance. Based on lessons from this program, DOE is confident there are sufficient national providers of quality assurance to enable a scale-up of home retrofit work. The resources DOE would need to run a new home retrofit program would depend on the size of the program's appropriation.

Question 1f. Over the last couple of months we have heard many press reports about a new program your Administration is developing called HOMESTAR, otherwise known as "Cash for Caulkers." As of yet, we have not received any information regarding how it would be implemented, and who would run it.

How did you determine which retrofit products would be eligible for rebates?

Answer. DOE understands that the industry-led Home Star Coalition has internally determined a suggested list for which retrofit products would be eligible for rebates in the draft legislation.

Question 1g. Over the last couple of months we have heard many press reports about a new program your Administration is developing called HOMESTAR, otherwise known as "Cash for Caulkers." As of yet, we have not received any information regarding how it would be implemented, and who would run it.

Who will be eligible to provide the worker training for the program? Will programs developed by both union and non-union workers be eligible to provide the training and workforce within the short and long term horizon of the program?

Answer. DOE is eligible to establish program rules on worker training based on the program's standing authorization.

Question 1h. Over the last couple of months we have heard many press reports about a new program your Administration is developing called HOMESTAR, otherwise known as "Cash for Caulkers." As of yet, we have not received any information regarding how it would be implemented, and who would run it. Are individual homeowners eligible to obtain rebates if they do their own work on their home?

Answer. This determination has yet to be made and will need to be addressed in the proposed legislation.

Question 1i. Over the last couple of months we have heard many press reports about a new program your Administration is developing called HOMESTAR, otherwise known as "Cash for Caulkers." As of yet, we have not received any information regarding how it would be implemented, and who would run it.

How many types of jobs are created by each eligible retrofit (i.e. Window replacing, caulking, insulation, duct sealing etc.)?

Answer. Based on DOE's experience with the Weatherization Assistance Program, the following job categories are involved in the process of home retrofitting: carpenters, electricians, HVAC mechanics, plumbers, sheet metal workers, and weatherization workers.

ENERGY STORAGE

Question 1. Is the Office of Science Energy Innovation Hub on Batteries and Energy Storage going to examine a broad spectrum of energy storage technologies and their potential impact for both mobile and stationary applications?

Answer. Yes, the Hub will expand our Nation's scientific base for synthesis of novel nanoscale materials with architectures tailored for specific electrochemical performance, develop new methodologies to characterize materials and dynamic chemical processes at the atomic and molecular level, and expand our competencies in simulation and prediction of structural and functional relationships using modern computational tools. The research will be applicable to both mobile and stationary applications with the detailed technological focus determined by the successful proposal team.

Question 2. When does the Office of Electricity anticipate completing its roadmap for energy storage technologies? Will this roadmap look at all of the potential electric storage devices that could be used for electric grid applications?

Answer. The Department of Energy is in the process of preparing the roadmap for energy storage technologies. We expect it will be comprehensive in scope.

Question 3. What role does DOE have in ensuring that energy storage technologies are sufficiently developed and demonstrated to allow for utilization of these technologies by the utilities?

Answer. The Department has requested a significant increase in FY 2011 for energy storage activities in the Office of Electricity Delivery and Energy Reliability (OE), which has the lead within the Department for applied research, development and deployment of energy storage applications for the electric grid. OE focuses on bringing new technologies to commercialization, and works closely with utilities, state energy agencies, and technology providers to further deployment of storage technologies on the grid. OE conducts an ongoing program to develop, bench test, and field test energy storage devices for grid level energy storage. It also supports a testing facility at Sandia National Laboratories which determines the reliability and efficiency of new storage devices, so that utilities have reliable performance data on available technologies. Analytical tools are being developed to help utilities and Independent System operators (ISOs) understand cost/benefit relations of different technologies and to optimize placement of storage facilities on the grid. OE will also monitor the progress of the storage demonstration projects funded under the American Recovery and Reinvestment Act through site visits, reliability analysis, and coordinating data acquisition. Data obtained from these projects will be made available to utilities.

While OE works directly with utilities on technology applications, other offices in the Department are engaged in research on energy storage that may eventually lead to technologies that can be deployed by utilities. The Office of Science conducts basic research in energy storage materials and the fundamental mechanisms that underpin electricity storage. The Advanced Research Projects Agency-Energy (ARPA-E) focuses on developing leapfrog solutions for high capacity, utility-scale energy storage applications. Also, the Office of Energy Efficiency and Renewable Energy evaluates where energy storage systems can support the application of renewable technologies it develops and sponsors demonstrations of on-site energy storage technologies to support renewables deployment.

RESPONSES OF HON. STEVEN CHU TO QUESTIONS FROM SENATOR SHAHEEN

Question 1a. The FY 2011 budget proposes $50 million for a new large-scale biomass power program to help large utilities who are co-firing coal power generation with biomass or switching from coal to biomass. I support the use of biomass power, but I have worked in this Committee to ensure that we use these biomass resources as efficiently as possible. Burning wood to make power helps reduce emissions, but if 75-80% of that energy is lost in the form of waste heat we are wasting a very important natural resource.

Can you tell me how this program will focus on thermal efficiency?

Answer. The initiative will conduct research, development, demonstration and deployment of advanced biopower technologies to improve the efficiency of biomass power systems and promote and accelerate the commoditization of biomass. The initiative will include assessments of feedstock resources, feedstock logistics and sustainability. It will also include research, development and testing of conversion intermediates such as biochar, syngas, pyrolysis oil, and densified biomass in advanced technology systems capable of improved operating efficiency. The goal of this program would be to facilitate the building of biopower facilities and enable biopower generation with less than 30 percent losses in the form of waste heat.

Question 1b. The FY 2011 budget proposes $50 million for a new large-scale biomass power program to help large utilities who are co-firing coal power generation with biomass or switching from coal to biomass. I support the use of biomass power, but I have worked in this Committee to ensure that we use these biomass resources as efficiently as possible. Burning wood to make power helps reduce emissions, but if 75-80% of that energy is lost in the form of waste heat we are wasting a very important natural resource.

What policies need to change so we are not inadvertently encouraging large electric biomass facilities (usually only 25% efficient), while discouraging decentralized, more local use of woody biomass in community thermal applications (usually 75-80% efficient), such as in campuses, hospitals, schools and institutions?

Answer. The Department is not aware of any current Federal energy policies that would inadvertently provide advantages for large biopower facilities and discourage smaller distributed facilities.

Question 2a. The Energy Independence and Security Act (EISA) of 2007 included a provision Section 471—for Energy Efficiency and Sustainability Grants to help

communities, school districts and universities implement or improving district energy systems, combined heat and power systems, production of energy from renewable resources—like biomass—and develop sources of thermal energy.

A number of communities across New Hampshire are clamoring for assistance to help design and build these systems and many of them will be powered with biomass.

What is the status of implementing this program authorized in EISA?

Answer. Section 471 of the Energy Independence and Security Act (EISA) of 2007—entitled Energy Efficiency and Sustainability Grants and Loans for Institutions—authorized funding for Fiscal Year 2009 through 2013 in the amount of $250 million annually for grants and $500 million annually for direct loans to provide institutional entities assistance in improving their energy efficiency and sustainability. Section 471 also included very specific requirements regarding the nature of grant activities, grant size, conditions for awardees, maturity of loans, and other implementing criteria. However, since the passage of EISA, Congress has not appropriated designated funding to implement Section 471 activities. Two Recovery act awards were made to "institutional entities" that fit the definition of EISA Section 471, for approximately $29 million. The Recovery Funding Opportunity Announcement did not follow the selection criteria within Section 471 or the award funding maximums. With numerous competing priorities and without designated funding, the Department has not initiated any Section 471 activities.

Question 2b. The Energy Independence and Security Act (EISA) of 2007 included a provision Section 471—for Energy Efficiency and Sustainability Grants to help communities, school districts and universities implement or improving district energy systems, combined heat and power systems, production of energy from renewable resources—like biomass—and develop sources of thermal energy.

A number of communities across New Hampshire are clamoring for assistance to help design and build these systems and many of them will be powered with biomass.

Why is the administration proposing a new program to help large-scale users of biomass power when we have laws on the books that haven't been implemented yet?

Answer. The Administration is considering a variety of technology options to reduce U.S. greenhouse gas (GHG) emissions. Biopower offers one renewable energy opportunity, among others such as wind and solar energy, to achieve GHG reductions.

The Energy Policy Act of 2005 authorizes the Department of Energy to support research, development, deployment, and commercial application of biopower under Section 932 (Title IX, Subtitle C). The Department requested FY 2011 funding for a biopower program that is anticipated to result in highly efficient biomass power technologies applicable to both small-and large-scale power systems. The proposed biopower program is designed to help meet the Administration's objectives for reducing GHGs, creating green jobs, and spurring new businesses and markets. Furthermore, it will accelerate the deployment of biopower technologies in support of potential future national renewable portfolio standards. Biopower is also an option for meeting state-level renewable portfolio standards.

Question 3. EIA has projected an exponential increase in presently non-commercially available cellulosic ethanol production in the coming 2 decades, and virtually no (4%) increase in thermal use of biomass, which has proven, available technologies, in this same time period. Is this based on anything other than an assessment and projection of existing policies that are promoting that direction?

Answer. EIA projects that the production of cellulosic biofuels will benefit significantly from both Federal and State-level programs that are already in place, including the Federal renewable fuel standard that includes a specific mandate for the use of cellulosic biofuels. The expected rate of technological change and projected world oil prices also play a role in the projection for increased cellulosic biofuels production in the Annual Energy Outlook 2010 (AE02010) reference case, which is based on current laws and regulations. By 2035, U.S. cellulosic ethanol production is projected to use 1,035 trillion Btus of biomass and provides approximately 3.6 percent of the liquid fuels supply in the United States. The production of other cellulosic motor fuels, such as biomass-to-liquids diesel fuel via the Fischer-Tropsch process, uses an additional 2,375 trillion Btu of biomass (see table below).

Regarding the thermal use of biomass, it is unclear to what AE02010 projection the 4 percent figure in the question is referring. In fact, thermal uses of biomass in industry, and especially in the electric power sector, grow substantially in EIA's AE02010 reference case projection. Biomass use in the industrial and electric power sectors combined is projected to increase by about 82 percent and be responsible for about 26 percent of the total increase in all biomass consumption between 2008 and

2035. Some of the increase in biomass consumption is spurred by State-level renewable portfolio standards.

Biomass Consumption (Trillion Btu)

	2008	2035	Percent Increase	Absolute increase
Cellulosic Ethanol Production	0	1,035	NA%	1,035
Other Cellulosic Biofuels Production	0	2,375	NA%	2,375
Total Cellulosic Motor Fuels	0	3,410	NA%	3,410
Electric Power Sector Biomass Use	170	1,110	553%	940
Industrial Sector Biomass Use	1,291	1,547	19.9%	256
Buildings Sector Biomass Use	549	534	-2.7%	-15
Total	2,010	6,601	128%	4,591

Question 4. In the Northeast, we now use 84% of the nation's home heating oil. Yet current policy seems to encourage use of our forest resources inefficiently for electricity or liquid biofuels while leaving the heating oil scenario in place.

Since heating oil is a transportation fuel, wouldn't it make sense to displace as much of this as possible with the local forest resources used efficiently, freeing up that diesel fuel for on-road use?

Answer. DOE's Thermochemical Conversion Platform focuses on the conversion of biomass into renewable fuels such as diesel, jet fuel, gasoline, and heating fuel oil. These technologies, when implemented commercially, will use lower quality biomass such as forest thinnings and slash, agricultural residues, and possibly cleaned municipal solid waste. These types of processes will not put undue stress on the Nation's existing forest or agricultural lands. The technologies being developed will be deployable within the current refinery infrastructure, thereby reducing the cost of the final fuel. These fuel products could directly replace their petroleum counterparts and contribute to displacing foreign oil, making the U.S. more energy independent while lowering greenhouse gas emissions.

Question 5. Is forest and agricultural biomass densification for renewable thermal fuels considered a "renewable fuel refining and blending technology" and an eligible manufacturing technology under section 48C, the Advanced Energy Manufacturing Credit?

Answer. The Department of Energy (DOE) would need specific information about the proposed project and the property it will manufacture to determine 48C eligibility. Information included in an application would need to describe what aspect of densification is being proposed as a project. For example, if a company proposed to manufacture equipment that would be used for densification of renewable thermal fuels, such an applicant would qualify, assuming it meets all other requirements. However, if the company simply operated densification equipment, the activity would not qualify for a Section 48C tax credit because it does not constitute a manufacturing technology. Notice 2009-72 Section 4 defines a Qualifying Advanced Energy Project as one that "re-equips, expands, or establishes a manufacturing facility for the production of specified advanced energy property." Further, property that can be used for the refining or blending of any transportation fuel, not solely for the refining or blending of renewable fuel, is not eligible, as per Section 4.01(3). All of this is available online at http://www.energy.gov/recovery/48C.htm.

RESPONSES OF HON. STEVEN CHU TO QUESTIONS FROM SENATOR BARRASSO

Question 1a. The Department of Energy budget request zeroes out the base funding stream for the Rocky Mountain Oil Field Testing Center in Wyoming. The justification says it is an effort to phase out support for fossil fuels. The proposal would result in job losses in Wyoming.

RMOTC offers small businesses, inventors, and students the opportunity to test technology and learn in a real-world situation. The facility is being used to work on numerous issue, ranging from using geothermal energy to make oil production more energy efficient to train students from Casper College in wind energy and mechanical engineering.

RMOTC must have a base funding stream to remain operational.

Do you consider training students in renewable energy and mechanical engineering is a handout to the oil industry?

Answer. No, training students in renewable energy and mechanical engineering is not a handout to the oil industry; however, the Department does believe that the oil and gas industry is capable of training its workers without funding from the Federal government. The Department is confident that training for students in renewable energy technologies will continue through programs funded elsewhere within the Department, particularly from the Office of Energy Efficiency and Renewable Energy.

Question 1b. The Department of Energy budget request zeroes out the base funding stream for the Rocky Mountain Oil Field Testing Center in Wyoming. The justification says it is an effort to phase out support for fossil fuels. The proposal would result in job losses in Wyoming.

RMOTC offers small businesses, inventors, and students the opportunity to test technology and learn in a real-world situation. The facility is being used to work on numerous issue, ranging from using geothermal energy to make oil production more energy efficient to train students from Casper College in wind energy and mechanical engineering.

RMOTC must have a base funding stream to remain operational.

Do you think giving small businesses a chance to test their innovative technologies to make our energy cleaner is a bad thing?

Answer. To the contrary, providing small businesses a chance to test their innovative technologies to make our energy cleaner is most beneficial. Through fully reimbursable (funds-in) agreements, RMOTC will contract with industry, academia, and other government agencies to field test and demonstrate oil and gas technologies, new environmental products, and focused energy efficient, geothermal and other renewable technologies as they relate to oil and gas operations.

RESPONSES OF HON. STEVEN CHU TO QUESTIONS FROM SENATOR SESSIONS

Question 1. Over a year ago, this Committee asked you to provide us with the basis for the decision to eliminate Yucca Mountain as an option for our Nation's geologic repository and you have repeatedly told us "we can do better." In my opinion, that is not a basis for the decision. Why have you repeatedly avoid answering the question and fail to provide any new data or technical evidence as to why Yucca Mountain is now no longer suitable as a repository?

Answer. The Administration has made a decision to bring the Yucca Mountain project to an orderly close. This decision reflects the Administration's belief that we can find a better solution that achieves a broader national consensus. That is why we have convened the Blue Ribbon Commission; it will provide advice and make recommendations on alternatives for the storage, processing, and disposal of civilian and defense used nuclear fuel and nuclear waste.

Question 2. The Office of Civilian Radioactive Waste Management is a statutory office under section 304 of the Nuclear Waste Policy Act, therefore what authority does the Department of Energy have to abolish this office absent a Congressional amendment to the Act?

> Nuclear Waste Policy Act [P.L. 97-425]
>
> Sec. 304. (a) ESTABLISHMENT.—There hereby is established within the Department of Energy an Office of Civilian Radioactive Waste Management. The Office shall be headed by a Director, who shall be appointed by the President, by and with the advice and consent of the Senate, . . .
>
> (b) FUNCTIONS OF THE DIRECTOR—The Director of the office shall be responsible for carrying out the functions of the Secretary under this Act. The Director of the Office shall be directly responsible to the Secretary.
>
> (c) ANNUAL REPORT TO CONGRESS—The Director of the Office shall annually prepare and submit to the Congress a comprehensive report on the activities and expenditures of the Office.

Answer. The Secretary of Energy has broad authority under section 643 of the Department of Energy Organization Act ("DOE Organization Act") to "establish, alter, consolidate or discontinue such organizational units or components within the Department as he may deem to be necessary or appropriate." (42 U.S.C. § 7253(a)) This authority is limited only to the extent that the Secretary seeks to abolish "organizational units or components established" by the DOE Organization Act, to the transfer of functions vested by the DOE Organization Act in any organizational unit or component, and as to the National Nuclear Security Administration. Section 304 of the Nuclear Waste Policy Act established the Office of Civilian Radioactive Waste Management, but in doing so it did not amend the DOE Organization Act. (42 U.S.C. § 10224) Because the Office of Civilian Radioactive Waste Management was not established by the DOE Organization Act and it is not part of the National Nu-

clear Security Administration, the Secretary has unlimited authority to "alter, consolidate or discontinue" the Office of Civilian Radioactive Waste Management pursuant to Section 643 of the DOE Organization Act.

Question 3. It is my understanding that the Department of Energy has issued 17 separate Environmental Impact Statements which specifically define Yucca Mountain as the disposal pathway for high level waste. Are those Environmental Impact Statements still valid in light of your decision that Yucca Mountain is no longer an option?

Answer. Each DOE Environmental Impact Statement takes into account the facts and circumstances as they exist at the time the document is produced. A change in those facts or circumstances does not render the EIS (or the Record of Decision which is based on the EIS) invalid.

Question 4. Would you please describe to me the legal obligations that the Department of Energy has with regards to preserving the scientific information, core samples, studies, and research that the Department has conducted in connection with the licensing of Yucca Mountain? Can you tell me the status of the above mentioned items-are they being destroyed or preserved?

Answer. In general, the Department will preserve all material in its Licensing Support Network databank in its current form during the pendency of the NRC proceeding and any appeals. In addition, the Department will preserve records and material produced in connection with the Yucca Mountain Project in compliance with federal requirements and consistent with DOE's objective of preserving the scientific knowledge from the Yucca Mountain project.

Specifically, the Department is required to comply with the records retention and disposition requirements of the Federal Records Act and related regulations. The Federal Records Act establishes the framework for records management programs in Federal agencies and prohibits the destruction of Federal records, except in accordance with the procedures described in Chapter 33 of Title 44 of the United States Code. These procedures allow for records destruction only under the authority of a records disposition schedule approved by the Archivist of the United States. Records schedules provide for specified retention periods, which are, in some cases, permanent—meaning that the records involved would never be destroyed.

As noted above, the documents related to the licensing proceeding will be preserved during the current proceeding and through any appeals. The Department will comply with the Federal Records Act, NARA regulations, and NARA-issued or -approved records schedules for such items. Beyond that the Department will consider whether there are additional steps that it should take to ensure that the scientific knowledge gained from the Yucca project is not lost. For example, it has already been decided that a number of the scientific studies and research reports produced for the Yucca Mountain project will be retained permanently under the NARA-approved records schedule for our Office of Scientific and Technical Information (or OSTI).

Question 5. The President's FY 2011 budget request indicates that the Department of Energy intends to use the balance of FY 2010 funds for Yucca Mountain to close out the project. The President's FY 2010 request did not seek funds to close out the project. Does the Department intend to submit a reprogramming request to this Committee for the specific purpose of closing out the Yucca Mountain Project?

Answer. On February 17, 2010, the Department of Energy sent the Chairman of the Subcommittee on Energy and Water Development of the Committee on Appropriations a notification of its intent to reprogram funds for Yucca Mountain Project and program office termination activities within the Nuclear Waste Disposal and Defense Nuclear Waste Disposal appropriations.

Question 6. The President requested an additional $36 billion in authority to guarantee loans for nuclear facilities (for a total of $54.5 billion) will these loans be released prior to the final report issued by the Blue Ribbon Commission?

Answer. In announcing the establishment of the BRC on January 29, 2010, Secretary Chu directed the Commission to produce an interim report on its recommendations within 18 months and a final report within 24 months. The Commission's work is not linked in any way to the operation of the Loan Guarantee Program and its timetable for issuing future loan guarantees for new nuclear power plants. A license from the NRC is one of the conditions that must be satisfied prior to issuance of a loan guarantee for each project. The Department of Energy is relying on the U.S. Nuclear Regulatory Commission (NRC) to determine if each reactor design fulfills the regulatory requirements for design certification and a construction and operating license. In granting a license for a new nuclear plant, it is up to the NRC to determine whether there is reasonable assurance that a permanent disposal facility will be found.

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