

**THE DEPARTMENT OF ENERGY
FISCAL YEAR 2011 RESEARCH AND
DEVELOPMENT BUDGET PROPOSAL**

HEARING
BEFORE THE
**COMMITTEE ON SCIENCE AND
TECHNOLOGY**
HOUSE OF REPRESENTATIVES
ONE HUNDRED ELEVENTH CONGRESS

SECOND SESSION

MARCH 3, 2010

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**THE DEPARTMENT OF ENERGY FISCAL YEAR
2011 RESEARCH AND DEVELOPMENT BUDG-
ET PROPOSAL**

WEDNESDAY, MARCH 3, 2010

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE AND TECHNOLOGY,
Washington, DC.

The Committee met, pursuant to call, at 12 p.m., in Room 2318 of the Rayburn House Office Building, Hon. Bart Gordon [Chairman of the Committee] presiding.

BART GORDON, TENNESSEE
CHAIRMAN

RALPH M. HALL, TEXAS
RANKING MEMBER

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY

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Committee on Science and Technology

Hearing on

***The Department of Energy Fiscal Year 2011
Research and Development Budget Proposal***

Wednesday, March 3, 2010
12:00 p.m. – 2:00 p.m.
2318 Rayburn House Office Building

Witness List

Dr. Steven Chu
Secretary of Energy
U.S. Department of Energy

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY

**The Department of Energy
Fiscal Year 2011 Research and
Development Budget Proposal**

WEDNESDAY, MARCH 3, 2010
12:00 P.M.–2:00 P.M.
2318 RAYBURN HOUSE OFFICE BUILDING

Purpose

On Wednesday, March 3, 2010, the Committee on Science and Technology will hold a hearing entitled *"The Department of Energy Fiscal Year 2011 Research and Development Budget Proposal."* The purpose of the hearing is to receive testimony from the Secretary of Energy on the President's Fiscal Year 2011 budget request for energy research and technology development programs at the Department, including activities under the Offices of Science, Energy Efficiency and Renewable Energy, Fossil Energy, Nuclear Energy, Electricity Delivery and Energy Reliability, the Advanced Research Projects Agency–Energy, and the Loan Guarantee Program.

Witness

- **Dr. Steven Chu**, *U.S. Secretary of Energy*. Prior to his appointment as the 12th Secretary of Energy, Dr. Chu was the Director of DOE's Lawrence Berkeley National Laboratory, and a professor of Physics and Molecular and Cell Biology at the University of California. Dr. Chu was the co-winner of the 1997 Nobel Prize for Physics.

Background

The Fiscal Year 2011 budget request for the Department of Energy is \$28.4 billion, which represents a \$1.8 billion or 6.8 percent increase over FY 2010. This supports a wide range of activities within the DOE mission, including maintaining nuclear weapons deterrence capabilities, securing nuclear materials, improving energy efficiency, incentivizing production of renewable energy, curbing greenhouse gas emissions, and investing in research and innovation to enhance the nation's economic competitiveness. The FY 2011 budget request builds on \$36.7 billion in funding from the *American Recovery and Reinvestment Act of 2009* which is expected to be completely obligated by the end of FY 2010.

Of the total budget for DOE, approximately one-third is allocated for civilian energy research and technology development programs within the Science and Technology Committee's jurisdiction. The remainder is designated for weapons stockpile stewardship and nonproliferation activities in the National Nuclear Security Administration (NNSA) as well as both Defense and Non-Defense Environmental Cleanup (EM).

The FY 2011 budget request continues support for crosscutting initiatives that draw on the various program offices within DOE, including both new and existing proposals for Energy Innovation Hubs, and science and engineering education activities through RE–ENERGYSE (Regaining our ENERGY Science and Engineering Edge).

The Advanced Research Projects Agency–Energy (ARPA–E)

The Fiscal Year 2011 budget request for ARPA–E is \$299.9 million. This will be the first year that ARPA–E receives full operational funding through the annual appropriations process. ARPA–E was established in 2009 with \$15 million from the *Omnibus Appropriations Act of 2009* and \$400 million from the *American Recovery and Reinvestment Act of 2009*.

ARPA–E was originally authorized in the *America COMPETES Act of 2007* (P.L. 110–69). That Act followed on the direct recommendations of the National Academies seminal 2005 report, "Rising Above the Gathering Storm." The Gathering

Storm panel was chaired by retired Lockheed Martin Chairman and CEO Norman Augustine, and included, among a number of notable experts Secretary Chu. The panel made a recommendation to create a new energy research agency (ARPA-E) within the Department of Energy patterned after the successful Defense Advanced Research Projects Agency (DARPA) within the Department of Defense.

According to the Gathering Storm report, ARPA-E should be structured to “sponsor creative, out-of-the-box, transformational, generic energy research in those areas where industry itself cannot or will not undertake such sponsorships, where risks and potential payoffs are high, and where success could provide dramatic benefits for the Nation It would be designed as a lean, effective, and agile—but largely independent—organization that can start and stop targeted programs based on performance and ultimate relevance.”

Shortly after receiving Recovery Act funding, ARPA-E released its first Funding Opportunity Announcement (FOA) in April 2009, and it received an unprecedented response of almost 3,700 concept papers. After an intensive selection process utilizing expert volunteers from industry and academia, 334 of those were chosen to submit full applications. Ultimately, 37 projects were chosen to participate, totaling over \$150 million in awards to a diverse range of technologies and performers.

A second round of solicitations totaling \$100 million was announced in early December. Informed by a series of open workshops the second round focuses on three distinct areas: innovative materials and processes for carbon capture, transportation batteries, and liquid fuels from carbon dioxide. Despite the comparatively narrow scope of this solicitation, ARPA-E received over 600 concept papers. It is expected that awards will be announced in the coming this spring, and total 30–40 projects. A third round of solicitations is expected soon.

Given the high demand evidenced by the responses to the first and second rounds of funding, DOE and ARPA-E leadership acknowledged that it had the capacity to accommodate only a small percentage of applications. Consequently, the Department is hosting an ARPA-E Energy Innovation Summit on March 1–3rd to highlight some award-winning projects as well as those that did not receive awards but would likely still be of interest to the investor community.

Office of Science

The FY 2011 budget request for the DOE Office of Science is \$5.1 billion. This represents an increase of \$218 million or 4.4 percent over the FY 2010 enacted level of funding.

The request for **Basic Energy Sciences (BES)** is \$1.84 billion, an increase of \$198.5 million or 12.1 percent over enacted FY 2010 funding. As the largest program within the Office of Science, BES conducts research and supports major user facilities to examine the cross-cutting areas of materials and chemical sciences. In FY 2009, the program began support for 46 Energy Frontier Research Centers (EFRCs) focusing on specific research areas for energy applications that were identified in a series of recent reports and workshops. The annual budget for each EFRC is \$2–5M per year, and each supports ~6–12 researchers from a variety of institutions. In FY 2010, DOE is initiating an Energy Innovation Hub on producing liquid transportation fuels directly from sunlight, carbon dioxide, and water through a chemical process analogous to photosynthesis in plants, but without the need to maintain life processes. The Hub was funded in FY 2010 by DOE’s Office of Energy Efficiency and Renewable Energy in accordance with the FY 2010 Energy & Water Development Appropriations Act, but it is being managed by BES. In FY 2011, DOE has proposed to formally fund this Hub through BES as well. In addition, DOE is proposing the establishment of a Hub on Batteries and Energy Storage in BES, with a request of \$34 million for FY 2011. Energy Innovation Hubs have annual budgets of ~\$25 million, and will be able to support much larger research teams than EFRCs. No Federal funds for EFRCs or Hubs can be used for construction of permanent infrastructure, and all awardees must re-compete every five years.

The budget would provide \$426 million for **Advanced Scientific Computing Research (ASCR)**, an increase of \$32 million or 8.1 percent over enacted FY 2010 funding. This includes funds to continue upgrading the Leadership Class Facilities at Oak Ridge National Laboratory and Argonne National Laboratory.

Biological and Environmental Research (BER) would receive \$626.9 million under the President’s budget, which is \$22.7 million or 3.8 percent over current year funding. In addition to the role of BER in areas such as genomics, climate change research, and environmental remediation, the FY 2011 request supports continued funding for three bioenergy research centers established in FY 2008.

The request for **Fusion Energy Sciences (FES)** is \$380 million, a decrease of \$46 million or 10.8 percent below enacted FY 2010 funding. This decrease largely reflects a one-year reduction in the U.S. contribution to the ITER international fu-

sion project, from \$135 million to \$80 million, consistent with the project's current status as a final design is determined this year.

The FY 2011 funding request for **High Energy Physics (HEP)** is \$829 million, which is \$18.5 million or 2.3 percent more than the enacted FY 2010 level. This program conducts fundamental research in elementary particle physics and accelerator science and technology, including support for research on collaborative international projects such as the Large Hadron Collider.

Nuclear Physics (NP) would receive \$562 million, an increase of \$27 million or five percent over FY 2010 funding. NP supports research to discover and understand various forms of nuclear matter. It also supports the production and development of techniques to make isotopes that are in short supply for medical, national security, environmental, and other research applications.

Energy Efficiency and Renewable Energy (EERE)

The President's proposal of \$2.35 billion for the Office of Energy Efficiency and Renewable Energy at the Department of Energy represents a 5% increase from the enacted FY 2010 level. Under this request renewable energy investments would significantly increase for large-scale demonstrations in biopower, concentrating solar power, offshore wind, and advanced hydropower. Energy efficiency activities would continue to support R&D for innovative new building technologies and a new focus on retrofitting existing buildings. For the second year in a row the Administration is including a proposal to fund a new program coordinated with the National Science Foundation called RE-ENERGYSE. This would provide educational and training support to universities and community colleges.

The proposed funding for the **Solar Energy** program is \$302.4 million, an increase of \$55.4 million or 22.4 percent over FY 2010 levels. This reflects an increase of \$23.5 million to the Photovoltaic R&D subprogram covering the first full year of funding for its PV Manufacturing Initiative, a \$48.5 million increase to the Concentrating Solar Power subprogram to accelerate the installation of large-scale solar thermal demonstration projects in the American Southwest, and a proposed shift of support for the Fuels from Sunlight Energy Innovation Hub from EERE to the Office of Science, as described above.

The FY 2011 funding request for the **Wind Energy** program is \$122.5 million, an increase of \$42.5 million or 53.1 percent. This increase primarily reflects the establishment of a significant subprogram to accelerate the advancement of offshore wind through demonstrations and technology development.

The FY 2011 **Biomass and Biorefinery Systems** request would stay flat at \$220 million. This program seeks to produce cost-competitive renewable fuels from biomass feedstocks, (grass, trees etc.) through the advancement of technologies and practices to make the entire biomass supply chain more efficient. In coordination with the Office of Fossil Energy, the program will also establish a new \$50 million biopower initiative to accelerate the commercialization of technologies which produce electricity and heat from biomass.

The **Buildings Technologies Program (BTP)** would receive \$231 million, a 3.9 percent increase over FY 2010 enacted levels. This includes an increased emphasis on technology research and development for retrofitting the nation's existing building portfolio. The program will also focus on promoting the use of more efficient appliances. The Buildings Technology program seeks to complete legally required efficiency standards pursuant to the Energy Policy Act of 2005 and the Energy Independence and Security Act of 2007. Standards will be issued for a variety of appliances and equipment including fluorescent lamp ballasts, clothes dryers, residential refrigerators, furnaces and boilers.

Additionally, the request includes \$24 million for the Energy Efficient Buildings Systems Design Hub. This will focus on state-of-the-art energy science and technologies that integrate smart materials, designs, and systems to increase energy efficiency in buildings. This approach would maximize the efficiency of different components and systems in a building. This Hub would be a part of the Administration's proposed Energy Regional Innovation Cluster (E-RIC), a multi-agency initiative to spur regional economic growth while making buildings more energy efficient. This initiative involves six Federal agencies and up to \$129.7 million over five years to create a regional research center that will develop new building efficiency technologies and work with local partners to implement these technologies in area buildings.

The Administration's budget request would provide a total of \$40 million for the **Water Power** program. This provides support to advance both conventional hydropower and marine and hydrokinetic (MHK) technologies, each with \$20 million for FY 2011. This request is \$30 million below the explicit \$50 million authorization in the EISA for R&D for MHK technologies. The \$20 million request for FY 2011

is also below the FY 2010 appropriation of close to \$40 million for MHK technologies.

The proposed funding level for the **Geothermal Technology** program is \$55 million, up by \$10 million from the FY 2010 appropriation, but still \$35 million below the \$90 million authorized from EISA. This funding will continue the Department's focus on Enhanced Geothermal Systems (EGS), including three existing EGS demonstration projects, and add three new projects.

The **Industrial Technologies Program** would receive \$100 million, an increase of \$4 million from the FY 2010 appropriation. The program focuses on reducing energy-intensity by 25 percent in the U.S. industrial sector by 2017, a goal established by EPAct '05. This funding will focus on new initiatives in the chemical and cement industries and continue activities in other energy-intensive industry sectors, while also focusing more attention on crosscutting activities. Specifically, the program will continue to support Combined Heat and Power (CHP) activities in the industrial sector through its existing projects funded through Recovery Act funds and new R&D on cutting edge technologies.

Nuclear Energy (NE)

For FY 2011 the Administration requests \$503 million for the Office of Nuclear Energy research and development, representing an increase of \$37 million over the FY 2010 enacted funding level. Close to eighty percent of that request is dedicated to the **Fuel Cycle Research and Development and Reactor Concepts RD&D** programs. The Administration recently expressed support for the expansion of nuclear power, and increased its commitment to loan guarantees for new reactors as well as commissioned a Blue Ribbon panel to consider long-term strategies for used nuclear fuel and waste storage.

The United States has been conducting research on the reprocessing of spent nuclear fuel since 2002 under the Advanced Fuel Cycle Initiative and more recently under the Fuel Cycle Research and Development program. In April 2009, the Administration signaled a change in this initiative when it announced it was no longer pursuing domestic commercial reprocessing under the Global Nuclear Energy Partnership (GNEP) program, which had sought near-term reprocessing technology development and deployment. GNEP had drawn criticism based on the substantial costs estimated for implementing the program and the technical challenges associated with developing, demonstrating, and deploying advanced technologies for recycling spent nuclear fuel that do not separate out a stream of weapons-ready plutonium. The National Academies expressed similar concerns in a series of reports. The new strategy of this program will be to examine three distinct fuel cycle strategies: once-through, modified-open, and full-recycle.

The Administration reorganized NE's advanced reactor research efforts and created the Reactor Concepts RD&D program. This new program will include Generation IV Nuclear Energy Systems, Next Generation Nuclear Power, a new focus on Small Modular Reactor design, and other advanced reactor initiatives. The Administration recognized that advanced reactor design is a vital part of closing the fuel cycle and increasing the efficiency and longevity of both the current nuclear fleet and those plants expected to be built in the near-term. Furthermore, next generation advanced reactors are expected to provide the capacity to utilize advanced fuels reclaimed through reprocessing.

The FY 2011 budget request also establishes the Nuclear Energy Enabling Technologies (NEET) program to provide support to the aforementioned programs and develop crosscutting technologies. Amongst the goals of this program will be exploration of advanced fuels and concepts that will increase the performance of technologies developed in the Reactor Concepts RD&D and Advanced Fuel Cycle Initiative programs. NEET will also encourage research into high-risk, high-reward concepts aimed at providing technological leaps for nuclear generation. Furthermore, under the NEET program, the Administration provides \$24.3 million for the Energy Innovation Hub for Modeling and Simulation. This hub program will continue its 2010 work in providing validated advanced modeling and simulation tools necessary to enable fundamental changes in how the U.S. designs and licenses nuclear power and waste management technologies.

An additional \$5 million is requested for RE-ENERGYSE under the Nuclear Energy Program.

Fossil Energy R&D

The proposed FY 2011 budget includes a significant reduction for Office of Fossil Energy (FE) funding. The Fossil Energy R&D program would receive \$587 million in FY 2011, a decrease of \$85 million compared to FY 2010 appropriations. Pursu-

ant to the Administration's policy to cut oil and gas subsidies the reduction comes largely from the proposed cancellations of the Natural Gas Technologies program and the Unconventional Fossil Energy Technologies program as well as no planned FY 2011 Congressionally Directed Projects. Coal-related projects would receive \$404 million, similar to FY 2010's funding levels.

The FY 2011 budget request for FE's Coal program will be a driver to accomplish the Administration's recently announced pledge to develop 5–10 Carbon Capture and Sequestration (CCS) demonstration projects by 2016. The Fuels and Power Systems program initiatives will focus on research, development, and deployment of technologies to use fossil fuels more cleanly and efficiently. This program also supports demonstration projects including the Clean Coal Power Initiative (CCPI) and FutureGen, though both of those programs will not receive funding for demonstrations under the FY 2011 plan, and instead FE will focus on project execution in all Rounds of CCPI and completion of National Environmental Policy Act (NEPA) procedures for ongoing projects. Included in this request is \$143.0 million for FE's Carbon Sequestration program including the Regional Carbon Sequestration Partnerships, \$65 million for the Innovations for Existing Plants program, and \$55 million for the Advanced Integrated Gasification Combined Cycle (IGCC) program. The Administration will continue to explore fuel cell and advanced turbine technologies for deployment in central coal power generation facilities. Furthermore, the Advanced Research program would receive \$47.9 million for its continued activities to improve efficiency and reduce costs of advanced coal-based systems. The Administration will propose a new budget structure for the FY 2012 Clean Coal program to align the four key research areas of efficiency, carbon capture, geologic storage, and cross-cutting research.

Electricity Delivery and Energy Reliability

The Office of Electricity Delivery and Energy Reliability (OE) is charged with managing programs to modernize the electric grid, enhance security and reliability of the energy infrastructure, and facilitate recovery from disruptions to our energy supply. The Administration's FY 2011 request for OE's Research and Development is \$144 million, a \$19 million increase over last year's funding. Included is additional funding for smart grid and energy storage technologies R&D. Within the smart grid research activities there will be a new focus on power electronics. These activities help utilities effectively deliver power to customers while providing increased reliability to bulk power systems. An integral part of this research will be on promising materials for semiconductors. A funding increase of \$26 million for energy storage technology research will be used to initiate activities in community energy systems based on vehicle batteries and the development of significantly larger lithium ion cells for stationary applications. Additionally, increased basic research and improved modeling capacities for Compressed Air Energy Storage (CAES) systems will be conducted. Also notable is a reduction in funding of \$10 million for Cyber Security for Energy Delivery Systems.

Loan Guarantee Program

The FY 2011 budget request proposes funding and authority to support approximately \$40 billion in additional loan guarantees for renewable energy, energy efficiency, and nuclear energy projects.

FY 2011 Budget Request - Department of Energy Research and Development Programs

Programs	FY 09 Approp	ARRA	FY 10 Budget Rqst	FY 10 Approp	FY 11 Budget Rqst	% +/- Over FY 10 Approp
Energy Efficiency and Renewable Energy	1928.5	16800	2318.6	2243	2355.5	5.0%
<i>Fuel Cell Technology</i>			68.2	0		
<i>Hydrogen Technology</i>	169			174	137	-21.3%
<i>Biomass and Biorefinery Systems</i>	217	800	235	220	220	0.0%
<i>Solar Energy</i>	175		320	225	302.4	34.4%
<i>Wind Energy</i>	55		75	80	122.5	53.0%
<i>Geothermal Technology</i>	44	400	50	44	55	25.0%
<i>Water Power</i>	40		30	50	40.5	-19.0%
<i>Vehicle Technologies</i>	273.2		333.3	311.4	325.3	4.5%
<i>Building Technologies</i>	140		237.7	200	230.7	15.4%
<i>Industrial Technologies</i>	90		100	96	100	4.2%
<i>Federal Energy Management Program</i>	22		32.3	32	42.3	32.2%
<i>Energy Education and Workforce Training (RE- ENERGYSE)</i>			115	0	50	
<i>Facilities and Infrastructure</i>	76		63	63	57.5	-8.7%
<i>Program Direction & Support</i>	145.8		358.1	185	287.3	55.3%

Programs	FY 09 Approp	ARRA	FY 10 Budget Rqst	FY 10 Approp	FY 11 Budget Rqst	% +/- Over FY 10 Approp
Electricity Delivery and Energy Reliability						
<i>Research and Development</i>	84.7	4500	174	124.9	144.3	15.5%
Nuclear Energy R & D	515		403	503	503	0.0%
<i>Generation IV Nuclear Energy Systems</i>	180		191	220.1	*	
<i>Fuel Cycle R & D (formerly Advanced Fuel Cycle Initiative)</i>	145		192	136	201	47.8%
<i>Reactor Concepts R & D</i>					195	
<i>Reenergise</i>					5	
<i>Nuclear Energy Enabling Technologies</i>					99.3	

* Generation IV funding included in Reactor Concepts R & D

Fossil Energy R & D	876.3	3400	617.6	672.4	586.6	-12.8%
Coal	692.4		403.9	404	403.9	0.0%
<i>Carbon Sequestration</i>	288.2		0			
<i>Fuels and Power Systems</i>	404.2		403.9	404		
Natural Gas Technologies	20		25	17.8	0	
Unconventional Fossil Energy Technologies				20	0	
Program Direction	152		158	158	152	-3.8%
Special Recruitment Programs	0.7		0.7	0.7	0.7	0.0%
Plant and Capital Equipment	18		20	20	20	0.0%
Fossil Energy Environmental Restoration	9.7		10	10	10	0.0%
Cooperative Research and Development				5	0	
Office of Science	4772.6	1600	4941.7	4903.7	5121.4	4.4%
High Energy Physics	795.7		819	810.5	829	2.3%
Nuclear Physics	512.1		552	535	562	5.0%
Biological and Environmental Research	601.5		604	604.2	626.9	3.8%
Basic Energy Sciences	1572		1680	1636.5	1835	12.1%
Advanced Scientific Computing Research	368.8		409	394	426	8.0%
Fusion Energy Sciences	402.6		421	426	380	-10.8%
Science Laboratories Infrastructure	145.4		133	127.6	126	-1.3%
Safeguards and Security	80.6		83	83	86.5	4.2%
Science Program Direction	186.7		214	189.4	214.4	13.2%
Science Workforce Development	13.6		21	20.7	35.6	48.5%
ARPA-E	15	400	10	0	300	

Chairman GORDON. The hearing will come to order.

Let me just bring everybody up to speed on where we are. Although the memorial service is over, the House, I understand, may still be technically in recess for a few more minutes. We have the right to move forward, but I have consulted with the Minority, and I want to be sure they feel comfortable with that because we are going to then have a series of votes in an hour and a half or so and I want to be sure that Dr. Broun has plenty of time to ask all he wants to ask. So if we are going to do that, we need to get started. So with no objection, then we will begin now. I thank you all.

Good morning. I want to welcome everyone to today's hearing on the Department of Energy's Fiscal Year 2011 Budget Request, and I especially want to welcome our witness, Dr. Chu. In an effort also for brevity, Mr. Hall has suggested that we either waive or make our opening statements brief, and so I will be brief and simply say that for those that believe in destiny, Dr. Chu, your destiny was to be here at this moment and this time to bring your unique set of skills, maybe not here at this hearing room but here as the Secretary of Energy. You do have a unique set of skills that are needed, I think, as we are moving really both for national security as well as economic security, a time of losing jobs in the 21st century, as we are looking for the new jobs of the 21st century.

So we welcome you here and I congratulate you on a tremendous turnout yesterday for the ARPA-E [Advanced Research Projects Agency-Energy]. For those that weren't there, there were over 2,000 people that came to the ARPA-E. If I could just real quickly, since Ralph always tells stories, I will tell a quick one. Tony Tether, who was a former director of DARPA, when we were talking to him about ARPA-E and how it should be set up, he recommended that if he could, he would have ARPA-E—I mean DARPA—all on one floor and there would be unisex bathroom in the middle of it so that everybody would have to come there at some time and have interaction. Well, there was only one coffeepot at this meeting yesterday with 2,000 people and they were all around the coffeepot. You could hear the really the stimulating discussions about what about this, what about that. So I think it was a great success.

[The prepared statement of Chairman Gordon follows:]

PREPARED STATEMENT OF CHAIRMAN BART GORDON

I want to welcome everyone to today's hearing on the Department of Energy's Fiscal Year 2011 Budget Request.

I especially want to welcome our witness, Secretary Chu.

Dr. Chu, you have sat before this committee on a number of occasions, and your testimony is always valuable and appreciated. With all of the changes at the Department we certainly look forward to an interesting discussion today.

It has been an exciting and historic year for the Department of Energy. The 2009 Recovery Act provided DOE with almost \$40 billion to jumpstart our green economy, and to lay a strong foundation for our country's future through significant investments in research and development.

While this is a tremendous opportunity for the Secretary, it also presents an unprecedented challenge in ramping up programs that, at best, spend around one-tenth of that in a normal year.

I believe we entrusted the right person with this task, and that we will look back on this investment as the one that sowed the seeds of change for a new U.S. economy.

The Recovery Act included \$400 million in start-up funding for the Advanced Research Projects Agency for Energy—ARPA-E—a program we authorized in the *America COMPETES Act* two years earlier.

As Secretary Chu knows well, I have a strong interest in the success of ARPA-E, and our Committee has been engaged in rigorous oversight of the agency throughout its inception and early development.

Today, I am pleased to say that we are impressed with the progress that you and Dr. Majumdar, ARPA-E's new Director, have made in such a short amount of time.

In DOE's history, it had been unheard of to carry out technical reviews of some 3700 proposals—and then to get the money out the door to the winners—within just a few months. We have heard stories on how this experience compares to previous applications to, and negotiations with, DOE. I'd like to hear if there are any positive lessons we can learn from this process that can be applied to the rest of the Department.

So obviously I am happy to see the Administration's request of \$300 million for ARPA-E in FY 11, and I believe ARPA-E is moving fast enough to justify an even larger investment in the very near future. But it appears to be an appropriate, well-justified amount to build on the successes we're seeing today.

I am also pleased with the request for the DOE Office of Science, which—along with the Administration's requests for NSF and NIST—continues this agency on a doubling path as recommended by the National Academies' *Gathering Storm* report to keep America competitive well into the future.

We will be taking another look at these agencies in the reauthorization of the *America COMPETES Act* this year, and look forward to working with you to make this new bill as strong and effective as we can.

Another area we will be focusing on this year is nuclear energy. I'm sure there will be some lively discussions this afternoon on the Administration's decision to cut funding for Yucca Mountain, but given the recent assessments by the Nuclear Regulatory Commission and the National Academies that a major repository isn't needed anytime soon—and may never be needed—I'm most interested in where we go from here.

I am pleased that loan guarantees for the first new nuclear plants in three decades have finally been issued, and I'm impressed with the quality of members selected for the bipartisan Blue Ribbon Commission on nuclear waste, just announced by the President.

I understand that the Department will also be releasing a nuclear energy R&D plan in the near future, and we look forward to reviewing it as soon as possible. We expect this plan to be an important reference as we craft a comprehensive nuclear energy research and development bill this year.

In closing, Secretary Chu, I've appreciated working with you over the past year, and urge you and DOE to continue reaching out to us on anything we can do to help you make the Department as effective as possible. With that, I'd like to yield to the Committee's distinguished Ranking Member, Mr. Hall.

Chairman GORDON. With that, I will yield to my newly championed Ranking Member on his way to his 14th term, undefeated—16th? What is it, no knockdowns, no—anyway, he is back and I am glad.

Mr. HALL. I will just ask unanimous consent to place my statement that you ought to have to listen to into the record. Without objection?

[The prepared statement of Mr. Hall follows:]

PREPARED STATEMENT OF REPRESENTATIVE RALPH M. HALL

Thank you, Mr. Chairman, for holding this hearing today. I want to welcome Secretary Chu back for his second visit to the Committee. I look forward to continuing to work with you on the energy challenges that are central to DOE's mission and the Nations well-being.

When it comes to energy and DOE's budget there is of course an abundance of important issues to discuss, but I want to focus my comments on three high level areas: (1) energy independence and security; (2) the status and outlook for nuclear energy; and (3) science and innovation as a priority investment toward maintaining America's long-term economic competitiveness.

Most important—and most concerning—to me in this budget is its approach to energy security. While I recognize and generally support efforts to advance energy efficiency and renewable energy sources, any serious approach to strengthening American energy independence must be "All of the Above," and complemented by a comprehensive effort to expand traditional sources of domestic energy, primarily oil and natural gas. We are all concerned about jobs, so this Administration should be

heartened by the fact that the domestic oil and natural gas industry experienced nine percent job growth from 2002–2008. Unfortunately, this budget proposes dramatic tax hikes on domestic energy development and aims to eliminate the fossil energy R&D programs, including the proven and successful Ultra-Deep program that I helped to establish in the Energy Policy Act of 2005. These actions—combined with delays in opening up new areas for domestic energy production and efforts to ration carbon use through Cap and Trade—will result in higher energy costs, reduced job growth, and increase our dependence on foreign energy sources, including those provided by regimes hostile to American interests.

With respect to nuclear energy, I appreciate the Secretary’s stated desire to “re-start the nuclear energy industry in America.” However, the signals on nuclear remain mixed, and I hope to see the Administration’s desire translated into real action and support, from loan guarantees, to licensing to R&D. Nuclear waste storage is critical and the Administration’s determination that Yucca Mountain is not a workable option seems cavalier when not based on any scientific, engineering or economic analysis. I have written the Secretary asking for more information on his decisions and plans in this area. I look forward to his thorough and timely response, and to working with him on this as we go forward.

Last, I want to reiterate my strong support for investments in the basic research activities that drive American innovation and competitiveness. In 2007, the S&T Committee led passage of the *America COMPETES Act*, which placed the DOE Office of Science on a path to double over seven years. While I am pleased that the President appears mindful of the need for basic research and development, I am concerned with how the Administration is choosing to direct the American taxpayer’s research dollars. I have long feared that ARPA–E would divert funding from the Office of Science, and it appears that this budget reflects that reality. Moreover, there seem to be multiple other programs with overlapping goals and activities that must be better explained and distinguished from traditional agency activities. For example, it is unclear how the activities supported by the newly established and requested energy innovation hubs, the energy frontier research centers and traditionally applied energy programs are different. We need improved clarity on this question to enable prioritization and minimize confusion and potential duplication of effort.

In our current economy we need to be judicious with taxpayer dollars. I am concerned with where this budget is taking us and the ways the Administration is choosing to direct energy research dollars.

While I have many more questions and concerns that I hope to cover in our discussion and subsequent interactions, these are my top priorities that I look forward to hearing from the Secretary on.

Thank you again for taking the time to be with us today.

[The prepared statement of Mr. Costello follows:]

PREPARED STATEMENT OF REPRESENTATIVE JERRY F. COSTELLO

Good Morning. Thank you, Mr. Chairman, for holding today’s hearing on the Department of Energy (DOE) research and development (R&D) budget for Fiscal Year 2011 (FY 11).

The President’s budget calls for \$28.4 billion in FY 11 for Energy R&D, a \$1.8 billion increase from FY 10. The President’s budget continues to invest in a balanced energy R&D program that emphasizes the development of renewable energy sources, such as ethanol and biodiesel, while continuing to use our most abundant and affordable domestic source of energy, coal. I applaud the administration’s strong support of the Office of Fossil Energy’s (FE) Coal R&D program. Fifty-one percent of electricity produced in the U.S. is generated by coal, and 49 percent of the electricity in my home state, Illinois, comes from coal.

The administration’s \$400 million investment will expand research, development, and deployment of clean coal technologies, including carbon capture and storage (CCS), to ensure this stable and affordable source of energy remains clean and efficient.

I was pleased with the DOE’s decision last year to continue investing in FutureGen, the world’s first commercial-scale CCS demonstration project. I have been a firm supporter of the FutureGen project since its inception, and DOE’s \$1 billion investment through last year’s American Recovery and Reinvestment Act reinvigorated the project. Since DOE’s investment, FutureGen is on the fast-track towards completion and has welcomed two new members, Illinois-based Caterpillar and Exelon. Despite this progress, DOE’s FY 11 budget does not provide any further

funding for FutureGen, and I would like to hear how DOE will continue to support and invest in FutureGen without additional funding.

In addition, I also strongly support the DOE's decision to focus the next round of the Advanced Research Projects Agency-Energy (ARPA-E) funding on high-risk, high-reward carbon capture research. The results of these projects will show us the future of CCS and coal in the U.S., and the projects will build on the work being done now at universities and research centers across the U.S., including the Coal Research Center at Southern Illinois University-Carbondale.

Balancing this investment in fossil energy, the budget invests \$2.4 billion in Renewable Energy and Energy Efficiency R&D, including biofuels and biomass. I strongly support this ongoing investment in developing these new renewable energy sources and ensuring our national energy policy is sustainable and balanced.

Finally, the President's budget represents a change in direction for the national nuclear energy policy. The budget requests \$503 million for the Office of Nuclear Energy (NE), an increase of \$37 million over FY 10. This increased funding, in addition to \$54.5 billion in loan guarantees for the construction of new reactors, demonstrates the administration's support for the expansion of nuclear power. About 49 percent of Illinois' power is generated through nuclear energy, and we should continue to develop our nuclear energy program. Since the administration decided to eliminate funding for Yucca Mountain while expanding our reliance on nuclear energy, I would like to hear what steps DOE is taking to store nuclear waste as more nuclear energy is produced.

I welcome Secretary Chu, and I look forward to his testimony. Thank you again, Mr. Chairman.

[The prepared statement of Mr. Garamendi follows:]

PREPARED STATEMENT OF REPRESENTATIVE JOHN GARAMENDI

Thank you Mr. Chairman for holding this important hearing on the Department of Energy's (DOE) Fiscal Year 2011 budget.

Secretary Chu, welcome to the Committee and thank you for your testimony. I am very pleased to see the commitment to research, science, engineering and STEM education at DOE in the President's budget. These investments in our children's future are long overdue.

In addition to being home to Lawrence Livermore and to the Joint Genome Institute, my district is adjacent to the 9th Congressional District represented by Congresswoman Barbara Lee that is home to another world leading research and institution, the Lawrence Berkeley National Laboratory. Berkeley Lab, under the new leadership of Dr. Paul Alivisatos, is making great progress on the development of advanced energy and environmental solutions.

As home to four major national scientific user facilities—the Advanced Light Source, the National Center for Electron Microscopy, the Molecular Foundry and the National Energy Research Scientific Computing Center—the Lab serves thousands of scientists annually from around the world. From supporting Nobel prize-winning work to finding solutions to health, energy and climate challenges, these user facilities are the best that our country has to offer and I urge the Department to fully fund and support them aggressively.

In particular, I urge the Department to adequately fund the research needed for the next generation of photon light sources. There is great potential here for understanding materials and chemical reactions at a scale unmatched by current tools.

Additionally, I want to take this opportunity to praise the National Energy Research Scientific Computing Center. It is THE work horse of the Office of Science advanced computing program serving over 3,000 users annually. I strongly urge the Department to more fully utilize NERSC for working with industry and academia to address our energy and environmental challenges.

Chairman GORDON. Without objection. And Dr. Chu, as you know, your written statement will be made a part of the record and so we welcome your oral statement followed by each Member will have an opportunity to question you for five minutes.

So with that, Dr. Chu, the Secretary of Energy for the U.S. Department of Energy, welcome. You may begin.

**STATEMENTS OF DR. STEVEN CHU, SECRETARY OF ENERGY,
U.S. DEPARTMENT OF ENERGY**

Secretary CHU. Thank you, Chairman Gordon, and thank you, Ranking Member Hall. Members of the Committee, I thank you for having the opportunity to be here before you today to discuss the President's fiscal year 2011 budget request for the Department of Energy.

President Obama has stated that a nation that leads the world in creating new sources of clean energy will be the Nation that leads in the 21st century global economy, and 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 this 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 the carbon pollution that threatens our planet.

The President's budget request includes an investment of \$2.4 billion in energy efficiency and renewable energy sources. It also promotes innovative energy efficiency and renewable energy projects through \$500 million in credit subsidies 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. Through this budget, we will increase research, demonstration and deployment of wind, solar, geothermal energies, make buildings 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 as well as \$495 million for nuclear energy research and development.

On February 16th, President Obama announced conditional commitments for more than \$8 billion in loan guarantees for what will be the first nuclear power plants to break ground in nearly three decades.

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

I know this Committee is deeply interested in the Department's research agenda. Indeed, you have been instrumental in some of the key R&D initiatives in this budget request. I thank the Committee for your efforts to pass the *America COMPETES Act* and for your work to reauthorize this important legislation.

The budget request supports the Department's three new complementary approaches to marshalling the Nation's brightest minds to accelerate energy breakthroughs. The first approach is 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 and respond 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 which invented and developed the

transistor. Ideally, this work will be done under one roof. The Department will continue funding the three energy innovation hubs introduced in fiscal year 2010, but 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 Department proposes expanding the Energy Frontier Research Centers to capture emerging opportunities in new materials and basic research for energy needs.

The third funding approach is one that was made possible by this Committee, the Advanced Research Projects Agency-Energy, or ARPA-E. ARPA-E is technology oriented. We seek the boldest and best ideas for potentially transformative energy technologies and funding them to see if they will work. ARPA-E is also dedicated to the market adoption of these new technologies. The fiscal year 2011 budget request includes \$300 million for ARPA-E. This week, ARPA-E sponsored a successful conference here in Washington, as Chairman Gordon mentioned, to bring together our Nation's energy innovators. I want to thank Chairman Gordon for taking part in this event and for his continued leadership on ARPA-E.

To develop clean energy solutions and maintain nuclear security, the Department must cultivate the workforce of the next generation. In fiscal year 2011, we are requesting \$55 million to start a "RE-ENERGYSE" initiative to support K-20-plus science and engineering education.

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. The Department is requesting a significant increase, more than \$550 million, in new funding for the NNSA Defense Nuclear Nonproliferation program to help the President's goals of securing vulnerable nuclear materials around the world in four years.

To ensure the safety, security and effectiveness of our nuclear stockpile, we are requesting \$7 billion to upgrade our infrastructure, support the work of our national labs and recruit the skilled workforce we need.

The budget also protects public health and safety by cleaning up the environmental legacy of our Nation's nuclear weapons program. In 2010, the Department will discontinue its application to the Nuclear Regulatory Commission for a license to construct a high-level waste geologic repository at Yucca Mountain. To deal with our nuclear waste management needs, the Administration has announced an independent bipartisan commission co-chaired by General Brent Scowcroft and Congressman Lee Hamilton to conduct a comprehensive review of the back end of the fuel cycle and make recommendations for safe, long-term solutions.

Building a clean energy future won't be easy but it is necessary for our economy and our security. As a scientist, I am optimistic and I believe we can meet these challenges and lead the world in the 21st century. President Obama and I look forward to working with this Committee and this Congress to build a stronger, safer,

more prosperous future. I would be pleased to answer any questions at this time.

[The prepared statement of Secretary Chu follows:]

PREPARED STATEMENT OF SECRETARY STEVEN CHU

Chairman Gordon, Ranking Member Hall, 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 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 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 FY 11 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 FY 11 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, 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 competitiveness, safety and proliferation resistance of nuclear energy in the United States and

abroad. On February 16, President Obama announced conditional commitments for more than \$8 billion in loan guarantees for what will be the first U.S. nuclear power plant to break ground in nearly three decades.

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. I know that this committee is keenly interested in the Department's research agenda. Indeed, this committee has been instrumental in laying the groundwork for some of the key research and development initiatives in this budget request through its efforts to pass the *America COMPETES Act*. I know that the committee continues to work during this Congress to reauthorize this legislation.

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 Department proposes expanding the Energy Frontier Research Centers to capture emerging opportunities in new materials and basic research for energy needs.

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. ARPA-E is also dedicated to the market adoption of these new technologies. This week, ARPA-E sponsored a very successful conference here in Washington to bring together our nation's energy innovators. I want to thank Chairman Gordon for attending this event, and for his continued leadership on 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.

In 2010 the Department will discontinue its application to the Nuclear Regulatory Commission (NRC) for a license to construct a high-level waste geologic repository at Yucca Mountain, Nevada. 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 recently, 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 FY 2011 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), funds supporting 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 tech-

nologies 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 in additional loan authority for innovative energy technology development. During FY 2010, the LGPO streamlined the application review process. The new authority requested will help the Department to encourage and to accelerate the availability of loans to leverage private sector investment in clean energy projects.

- **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 cross-cutting 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 ten 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 five 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 eight 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 nu-

clear 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 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 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 five 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 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.

Energy Information Administration: Providing Independent Statistics and Analysis

The FY 2011 request for the Energy Information Administration (EIA) is \$128.8 million, which is an \$18.2 million increase over the FY 2010 current appropriation. EIA conducts a comprehensive data collection program through more than 60 surveys that cover the full spectrum of energy sources, end uses, and energy flows; generates short- and long-term domestic and international energy projections; and performs informative energy analyses. EIA disseminates its data products, analyses, reports, and other information services to customers and stakeholders primarily through its website.

The increased funding improves EIA’s capability to close energy information gaps, strengthen analysis, and address significant data quality issues. It provides for an expanded survey of energy consumption in commercial buildings that will provide more baseline information critical to understanding energy use. That survey also is a basis for benchmarking and performance measurement for energy efficiency programs. The budget request also provides for: expanded analysis of energy market behavior and data to address the increasingly important interrelationship of energy and financial markets; continued implementation of improvements in data coverage, quality and integration; upgrades to the National Energy Model; and initiation of efforts to track and analyze the adoption of “Smart Grid” technologies and dynamic electricity pricing plans.

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 multi-year 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 three 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 Workforce Improvement 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 long-standing, 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.

DISCUSSION

Chairman GORDON. Thank you, Dr. Chu. Questions begin now. I recognize myself for five minutes.

THE CANCELLATION OF YUCCA MOUNTAIN

The Administration's decision to cancel funding for Yucca Mountain has proven to be perhaps the most controversial change that the Department has undertaken, yet the Administration originally signaled its support for nuclear power and its interest in expanding the advanced nuclear fleet through its loan guarantee announcement. So in your professional opinion, what is the impact of the Administration's Yucca Mountain decision on the expansion of nuclear power in the United States?

Secretary CHU. I believe it is going to have no impact on our expansion. The NRC has declared that nuclear waste where it is now and moving to dry cask storage will be safe for many decades. That gives us time to prepare a much better, more comprehensive view of what is going on. We know a lot more than we did in the early and mid 1980s when the Nuclear Waste Act was passed. So this blue ribbon commission now has an opportunity to step back, look at the whole template of options that exist today and could be developed in the next 20, 30, 50 years and that is where we are heading.

Chairman GORDON. As I understand it, they have 18 months to report or give an interim report and then six more months to do a final report. That seems like a long time. Are you expecting it to take that—I mean, is that the outside of it? Are you expecting it take that long?

Secretary CHU. No, that is the outer limit. I think both chairmen are very anxious to get started. The first meeting will be held, I believe it is March 24th and 25th.

Chairman GORDON. You have put together a good, balanced group so I think that this is an Augustine type of group and so we look forward to that particular report.

CREATING AND RETAINING DOMESTIC JOBS

You know, and oftentimes too, we are all concerned about taxpayer dollars being used to develop technology through the Department of Energy or elsewhere here in this country that winds up

creating jobs elsewhere. And so with ARPA-E and the other programs that you are putting together, are you doing anything to help make sure that, you know, the bulk of those jobs will stay here in the United States?

Secretary CHU. It is certainly our intent and our interest. First you have to develop the ideas, but you are quite right, Mr. Chairman, that you need a comprehensive plan. You need investment tax credits, you need a number of things so that you keep the manufacturing of these new technologies here in the United States. I think that is a very important part of our path towards economic—

Chairman GORDON. So are you working on that package, or is it here yet, or when will that be rolled out?

Secretary CHU. Well, we are working on it but you have to get some of the incentives and so that when a manufacturing company says—let me just say one of the biggest incentives is a home market. If you have a home market for some of the energy technologies, what any manufacturer, multinational manufacturer wants to do is, they want to manufacture in that home market; so the best incentive is to create that home market and that demand, and so that is one of the crucial things that will hopefully help us.

BUY AMERICAN STRATEGIES

Chairman GORDON. And when you think of home markets, the biggest buyer is of course the Federal Government, and we have seen the analogy that with DARPA, that they had a buyer already there with the Department of Defense. You know, are there efforts to look at how we can make the Federal Government the buyer of some of these new technologies even if they may be 10 percent or 20 percent more expensive? You know, if a new light bulb is more expensive than, for example, the contemporary one, is there a way that we can give some preference to some level so that we can then get that supply chain and can we look at with DOD on islands and other remote areas that don't have a grid there where the alternative energies, you know, could be placed?

Secretary CHU. That is being done. In fact, DOD as one prime example is looking very actively. They have a new, I think it is at an assistant secretary level for energy now at the Department of Defense. Because of their budget, they can actually create some market draw, if you will, and to adopt new technologies. They are very concerned about these things, and that is precisely one of the strategies we are looking at.

Chairman GORDON. Well, I think this Congress has shown over and over a preference to buy American. I think we might add to that, you know, buy American new technology. And so I hope as you discuss this that you will come to us if there are authorizations or something we need to do to help expand those markets.

Secretary CHU. Oh, I will raise one thing. The budget request for \$5 million in this advanced manufacturing thing, the so-called 48C, that was oversubscribed three to one for the first part of it in the Recovery Act, and so we hope that Congress will be willing to support that. That is again a key to keeping manufacturing here in the United States.

Chairman GORDON. Thank you, Secretary Chu.

Mr. Hall is recognized for five minutes.

Mr. HALL. Thank you, Mr. Chairman.

THE ULTRA-DEEPWATER PROGRAM

Mr. Secretary, I think we are very fortunate to have more than 50 years of natural gas supply, according to the Energy Information Administration, and natural gas is a clean source of energy. It can help bridge the transition from fossil fuels to next-generation fuels. Yet a lot of these reserves are in areas that are little difficult to produce economically and efficiently, and I have been working for 10 years on the Ultra-Deep legislation. I know you are very familiar with it. We finally passed it and got it in the energy bill that was passed, I think, two years ago. 2005, how many years is that? You remember my problem with mathematics. But anyway, we finally got it into that bill and that bill was passed, and I flew out west to Arizona to sign that bill with Senator Domenici, the President did, and Joe and I flew with him, and at that time he gave everybody a pen but he turned to me and said, "Hall is with us here. He just came along because he wanted some free coffee on Air Force One." What he didn't know was, I had six of his mugs in my briefcase at that time.

But the long and the short is, we went out there, we signed that bill and it was in the bill and our President signed it then, and since has tried to take it out, was unable to take it out because the House Floor voted not to take it out and it is there now. You know, it is based on the fact that we know energy is there but we can't get it up, and if we get technology to get it up and we trade the energy that they get up that they won't get up if they don't get the technology. It looks like it makes sense to me.

Last year I stated my disappointment with the President's 2010 budget to terminate the Ultra-Deepwater and unconventional natural gas and other petroleum resource programs. So again, let me express my disappointment that even after our discussion on that day in March of 2009, the budget seeks to eliminate the Ultra-Deep program, and for that matter, the fossil fuels research and development budget. Let me reiterate, I strongly disagree with this policy which ignores the ongoing importance. Even your own EIA says oil and natural gas will play in our domestic energy picture through the year 2035. The energy security aspects of this issue are obvious, and after last year's hearing where you promised to look into and educate yourself to the programs created by section 999 of the Energy Policy Act of 2005, I had hoped the scientific and technologic contribution would be just as obvious to you.

I am not going to take up all my time with my question, Mr. Chairman. The policy of terminating the Ultra-Deep program is especially troubling in light of the fact that this Administration has approved a preliminary commitment to lend up to \$2 billion to Brazil's state-owned oil company, Petrobras, to finance offshore deep-water oil exploration in the Santos basin near Rio de Janeiro. I don't understand something like that. I don't think it makes any sense at all to do that. While I am not necessarily opposed to technology transfer to develop natural gas resources in our pursuit of energy security, we ought to be promoting and using innovative technologies for our own domestic exploration. So I guess my ques-

tion to you is, do you support the termination of the Ultra-Deep program?

Secretary CHU. Yes, I do. If you will allow me to explain, I did look into it after our first discussion. First, I do believe that natural gas is a transition fuel in this century in order to get a clean energy supply. I might also add that the Department of Energy since 1978 has explored—and this is, I think, one of our real success stories—has explored natural gas development in methane coal beds and especially in shale gas at a time when the oil and gas companies didn't want to look at that, and that is effectively the shale gas supplies and the methane coal bed supplies. Most people think it has increased our gas reserves from 30 percent to as much as doubling our gas reserves.

My feeling about Deepwater is, we have a methane hydrates program that is now shifted over to the Office of Science, but it is a program I feel that we should develop. That is still at a time when the oil and gas industry does not want to invest in it. They are willing to go along but as soon as—I feel and the Administration feels, as soon as the oil and gas industry sees this and they have the commercial means, the financial means to develop that, then we want to let the companies take it over. In those instances where commercial companies say this is too speculative, we don't want to do this, I think that is the role in the Department of Energy. And so the methane hydrates program is something I support, the shale gas program historically over the years, for 15 years. We stopped it one year before that, Chalmers picked it up and said it is perfect. And so that is really the strategy we want to use.

Mr. HALL. But the program has been working the last three and a half years at about 20 universities that are producing and contributing to it. It pays for itself out of energy that we won't get if we don't get the technology. If we get the technology, we will get it. And now we are talking about transferring that. Let me ask you this. Do you think it is acceptable to fund exploration in other countries but not domestically?

Secretary CHU. I am not actually familiar with this loan you spoke of, of funding Petrobras, so I would have to look at the—

Mr. HALL. Please do.

Chairman GORDON. If the Secretary would yield, I think what happened is, I think the XM Bank has loan money to Brazil for their drilling, but the XM Bank did it at the request of American industry. It is American companies' equipment. And so it is not the Federal Government, it is XM Bank loaning money to buy American equipment then to go to Brazil, as I understand it.

Mr. HALL. And I will repeat my question. It is not who does it, but do you think it is acceptable to fund exploration in other countries but not domestically when we should be able to do it here, when it is proven that we have the repay with what we get that we won't get if we don't get it?

Secretary CHU. I think, you know, the university research you speak of, I think that is wonderful but I also think gas companies do have the financial resources to support that.

Mr. HALL. But you will look into it, won't you?

Secretary CHU. I will look into it again. I will.

[Additional material submitted for the record follows:]

PREPARED RESPONSE OF SECRETARY CHU

DOE acknowledges that applied research and development does help industry increase domestic resources in an environmentally responsible manner. However, given current world oil prices, we expect that major oil companies can support ongoing levels of offshore activity.

Regarding Brazil, the Export-Import Bank of the U.S. (EXIM) decided to offer at least \$2 billion in loans or loan guarantees to help finance purchases of U.S. goods and services by Petrobras. According to EXIM's President Fred P. Hochberg, "This increases the likelihood that American—not foreign—workers will be employed to satisfy part of the company's planned \$175 billion investment during the next five years." Mr. Hochberg also noted that the mandate of the EXIM is to help create and sustain U.S. jobs by financing U.S. exports.

Mr. HALL. I will ask you next time about it. You are very pleasant.

Secretary CHU. I try to be.

Mr. HALL. I yield back.

Chairman GORDON. Mr. Hall is very serious about this too.

Secretary CHU. I understand.

Chairman GORDON. We want to look at it and see if there are incentives to bring the oil companies to bear here.

Mr. Wu, you are recognized.

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

ENERGY HUB GOALS

I will be very brief in my questioning, Mr. Secretary, to encourage you to take as much time as you in discussing this particular topic. I find your rollout of the hub lab concept very, very interesting. There are three that are out for proposals, and if you could discuss some of your goals, what are you looking for in proposals and what you hope to achieve over time. I would be very interested, perhaps with the most emphasis on the most recent rollout on energy-efficient buildings.

Secretary CHU. Well, the goal is the following. I look back, I started thinking about this maybe three or four years ago. How do you accelerate innovation? And there were times in the United States where you really wanted to accelerate innovation. In particular during wartime, we wanted to accelerate innovation in the Manhattan Project and the development of radar. There was a time when Bell Labs took a very long-term view but they also, for example, wanted to accelerate innovation in getting rid of those vacuum tubes that kept on burning out on them, and so they entered into a program to develop a solid-state version of the vacuum tube. So what were the common denominators in all these aspects? They put scientists together with engineers. They said, we want a leadership team and so they are going to span the whole gamut. These are the scientific questions we have to answer, but we are not going to stop at answering scientific questions. We have to go all the way to delivering the goods, put radar on a ship or an airplane. We have to deliver the goods and so we want this team to be very dedicated. Or we are not going to fund the project. You didn't ask Oppenheimer and Fermi and all those people, well, give us your idea, we will decide whether it is good or not and then after a while we will decide if you want us to do something else, we will decide whether you want to go. No, we assembled the best team and said solve the problem, and you have got to solve it quickly. And be-

cause of that, these teams of scientists very actively managed, knew on a day-by-day, week-by-week basis what was going on, so they were much more intimately connected with what was going on than one can ever be in Washington. And it was the management team of people like Glenn Seaborg who was developing ways to separate plutonium chemically, that when you read his diaries, he was on top of what was happening every day and said OK, we can do this, and something happened. We couldn't get a detector, we are going to invent a detector; we can't wait for it to be developed by a commercial company. OK. So you can go lickety split, and that is the idea. You want to go lickety split, you want to go with a team that can actually—the top scientists who are actually participating but also great managers.

The selection of these Hubs in large part will be dependent on how dedicated and how good these managers will be, not how good as scientists but also how good as science managers they will be, and that is one of the keys. We want to replicate what did work in times of real national need before but now in the energy sector.

Mr. WU. Mr. Secretary, how do you calibrate the, if you will, divide, and perhaps “divide” is too strong a term, between the research side of the enterprise and the engineering/dissemination/economic development side of the equation?

Secretary CHU. Well, let me give you an example of a DOE hub, although it is not called a hub. In fact, this was also what was in my mind. It was in my old laboratory, Lawrence Berkeley Laboratory. It had to do with bioenergy. They came up with a breakthrough. The leaders of this hub were some of the world leaders in a new field of science called synthetic biology, and so they reprogrammed bacteria to, when fed simple sugars, produce a direct substitute for gasoline, not something that they later refined—you can almost put it in the tank—and to overproduce it. I learned about this. It was published in a very prestigious journal called *Nature*. I e-mailed my friend and director of the Laboratory, “this is great, what is the time scale, how good does it have to be to be commercially viable without subsidy, question number one? What's the timeline when you will get an up and down vote?” He said it is going to be within 90 percent of what we think is the theoretical maximum. Already, a company, LS9, is running with that, and the same team that did the basic research is making a little pilot. So those scientists are walking over and they are saying we are going to do this, and he said within two years we will have an up/down vote to see whether this flies both in the LS9 commercial work and from what we are doing.

So those scientists are actually part of delivering the goods, and that institute was founded on a more corporate structure, so it is not that a basic scientist hands off to an engineer that hands off to some development group. No, they are going to walk it. So that is exactly the type of thing I am looking for in the other hubs.

Mr. WU. Thank you very much, Mr. Secretary. As knowledgeable as you are, I think that what I find most appealing about your presentation is the passion which you are able to convey. Thank you.

Chairman GORDON. Comrade Rohrabacher.

FUNDING FOR NUCLEAR POWER

Mr. ROHRABACHER. Mr. Secretary, how much money have we been spending on research into nuclear power over the last few years and how much are you proposing that we spend this year?

Secretary CHU. I am going to have to go back and look at the exact number but it is on the scale of certainly tens of millions. You mean on the very research—

Mr. ROHRABACHER. Research.

Secretary CHU. I think on the scale of tens to perhaps 100 million. I have to—

Mr. ROHRABACHER. Annually?

Secretary CHU. Yes.

Mr. ROHRABACHER. OK. And—

Secretary CHU. I just reminded myself, the whole nuclear R&D, fiscal year 2011 is \$503 million, fiscal year 2011 request is \$500.

Mr. ROHRABACHER. Five hundred million?

Secretary CHU. Yes.

Mr. ROHRABACHER. And over the years is this an interest or this is about what we have been spending?

Secretary CHU. I have to plead ignorance on what the history is.

Mr. ROHRABACHER. OK. Fine. Well, Mr. Secretary, we have been spending considerable money on R&D research into nuclear energy over the years, and \$500 million is a sizable sum. The Administration just has announced that the President is behind this idea of moving forward, offering some sort of loan guarantees that will be available to build a new nuclear power plant for the first time in over two decades. Can you tell us how that—will there be pre-conditions that that power plant is different than the power plants that were built two decades ago before all of this money was spent on trying to research and come up with newer ways and better ways of producing nuclear energy?

Secretary CHU. OK. So certainly the power plant, the first loan, is a Westinghouse designed power plant. The engineers feel it is considerably safer than the older designs of the last generation.

Mr. ROHRABACHER. Is it a light water reactor?

Secretary CHU. It is a light water reactor.

Mr. ROHRABACHER. Mr. Secretary, they were building light water reactors 50 years ago.

Secretary CHU. Absolutely, so—

Mr. ROHRABACHER. Why is it that we are building a light reactor that still has leftover waste when there are several companies, very substantial companies who say they can build reactors that will basically not have that waste problem? General Atomics to be one, which is a high-temperature gas-cooled reactor which says they are going to actually take stuff out of Yucca Mountain rather than put it in.

Secretary CHU. So there is a difference between—let me take the questions one at a time. There is a difference with this light water reactor. It is much more passively safe. Instead of feedback, you know, backup after backup systems, you are storing water up high so that if something goes wrong, the water runs down due to gravity. It is much, much less likely to have any issue based on, oh, if something goes wrong, there is another system that backs it up,

and if that goes wrong, there is another system that backs it up. Because of that, people feel that it could be made much less expensively, much less investment and also much safer. The reactor you are talking about, the General Atomics one, that is part of our \$500 million that we are investing. The next-generation reactor after that would be called Gen 4, gas-cooled reactors. We want to support that as well.

But nuclear takes time and so even developing the next generation of light water, still safer reactors, while you are doing that, we also want to support these things like the General Atomics reactor.

Mr. ROHRABACHER. Mr. Secretary, I would suggest that we should not be basing our next generation of nuclear energy that now we are investing in with something that substantial is an old concept, they are steam engines, when we have some revolutionary ideas coming out and that should be our focus rather than spending money on the old stuff.

SOLAR ENERGY

Mr. Secretary, are you aware that the Bureau of Land Management has not given one permit for a solar energy project on Bureau of Land Management land? There are 105 of them that have been waiting five years. Are you aware of that?

Secretary CHU. No, I am not.

Mr. ROHRABACHER. OK. Well, I would hope that you would look into this. This is unconscionable. At a time when we are talking about developing alternative sources of energy, making us self-sufficient, and is it your understanding—I have got about 15 seconds left—that we can now build solar facilities in places like the desert that would be competitive with producing electricity with the coal-fired plants and oil-fired plants?

Secretary CHU. Getting there. In all honesty, not quite. They still need a little help. But let me return a little bit back to, there is a distinction between our \$500 million in research. We are not researching light water reactors of the type that are being—you know, like the Westinghouse AP-1000. We are researching the gas-cooled reactors of General Atomics. The loan guarantees which are scored—the Department of Energy is tasked to convince OMB that it will cost the taxpayer zero dollars and so I think this is not fully appreciated. So those loan guarantees are self-pay, you know, the assets of the company, the stability of the company, the fact that they are loan guaranteed for the first run, went to a consortium of companies that already had pre-purchased power agreements for the nuclear power, very, very different. That is to just get, you know, today's technology going again—it is actually not today's, it is tomorrow's in the sense that we don't have operating in the world an AP-1000. But in the meantime, the \$500 million are to look at much better reactors, much newer concepts, smaller modular reactors, things of that nature, and so that is what we are—

Mr. ROHRABACHER. We are capable of doing that. We should be building them rather than just research upon research.

Secretary CHU. I agree. I mean, the small modular reactors, Babcock and Wilcox wants to develop them. We will help to down-select which ones will apply for an NRC license.

Mr. ROHRABACHER. Thank you very much, Mr. Secretary.

Chairman GORDON. Thank you, Mr. Rohrabacher.
And Dr. Baird is recognized—excuse me. Mr. Luján is recognized.

COMMERCIALIZING TECHNOLOGIES

Mr. LUJÁN. Mr. Chairman, thank you very much. Mr. Chairman, thank you very much as well.

Secretary Chu, I want to commend you on a recent appointment that you made in appointing Karina Edmonds as National Technology Transfer Coordinator in the Office as well. I think this signals an important relationship going forward with our DOE laboratories and moving forward towards commercializing some of the technology that is being developed by some of the brightest that we have in the country. Your emphasis in your statements around innovation, that there that will be breakthroughs and better technologies to meet our long-term goals, these efforts that were highlighted by the President as well and as reflected in the budget with innovation, investments in science, discovery and innovation, to provide solutions to pressing energy challenges. And Mr. Secretary, as we talk about these programs and completely understanding how we can create more jobs, we can do a better job of commercializing some of these big ideas and finding ways to get them to the marketplace so that we engage in manufacturing domestically, so that is something that I am anxious to see more of.

Two weeks ago, I had a visit to Los Alamos National Laboratories and talked to them about a program that is supported by corporate funding called North New Mexico Connect, which supports opportunities for small businesses and for some of our scientists, physicists, engineers to use entrepreneurialship to commercialize these ideas and to take part in these projects, but I was discouraged that there didn't seem to be a serious investment coming from DOE itself as opposed to the partnership that was put together with the corporate funding, and so Mr. Secretary, I would ask for you to comment on what you feel the role of DOE is, what can we expect from a funding perspective to support efforts like that within our DOE laboratories, specifically at NNSA DOE laboratories, to help engage in promoting some of these big ideas, creating the jobs which will lead to some commercialization manufacturing domestically?

Secretary CHU. Well, first, thank you for recognizing that appointment. I think she is wonderful, and it is something—when I walked into the—before I walked into the job, when I walked into the job of laboratory director of the Lawrence Berkeley Lab, one of the first things I did was to get the person in charge of technology licensing from Stanford, which has a very good reputation and a truly outstanding reputation nationwide, worldwide, for taking discoveries out of the laboratory and getting them into the commercial sector. And so this person as a favor to me came over and spent a day to say how we can improve things. Probably the most important thing I did when I was director is—you know, every year there is a merit review. There is no salary adjustment of our scientists and engineers. So every year there is a merit review, and there were many criteria, about 12, 15. I lowered it to four or five. Number two after quality of papers, was patents and disclosures. It wasn't listed before. And a remarkable thing happened. The num-

ber of patents and disclosures all of a sudden started to pick up just by that single stroke of the pen; you know, you are going to be judged on how many patents and disclosures you produce.

And so there are many things that actually can be done for free. We want to do this now Department-wide. There is a reason why—I mean, we in the Department of Energy feel that we are going to be responsible for the entire innovation chain from the basic research all the way to not only the applied research, development, piloting, getting it out to deployment, but also deployment to scale, and so we—and the entire energy sector because we feel that the energy sector, since it reaches every part of U.S. life, will be a key future to our future prosperity. So we want very much for the private sector to be picking up these things because of the fact that we fund the most physical science in the United States, you know, the national lab assets, the people in universities are some of the best things we have in the United States. That is our competitive edge. And so we are going to be very focused on that.

Mr. LUJÁN. Well, I appreciate that very much, Mr. Secretary, and would ask for your consideration on how we could tie fees with our laboratories to exactly what you saw from behavior with getting more patents out and things of that nature.

And lastly, Mr. Secretary, I just want to tell you that I anxiously await the announcement for consideration for an individual to fill the Administrator position for Defense Nuclear Nonproliferation as we talk about the concerns and what has been highlighted by this Administration to make sure we bring attention to securing loose nuclear materials in addition to everything else associated with it. I very much appreciate that.

Thank you very much for my time today, Mr. Chairman.

Chairman GORDON. Dr. Bartlett is recognized for five minutes.

Mr. BARTLETT. Thank you.

THE MIX OF DOMESTIC ENERGY SOURCES

Mr. Secretary, I would like to ask a couple of questions to kind of put our energy challenge in perspective. France gets, what, 75, 80 percent of its electricity from nuclear. Are you pretty sanguine about our and the world's electricity energy future with more nuclear, with wind, with solar, with microhydro, with true geothermal where we are tapping into the molten core of the earth?

Secretary CHU. I think we are going to need all those things as well as much improved generation of conventional sources to use our fossil fuel sources in a much cleaner way. For example, as you well know, we are deeply committed to developing the technologies in carbon capture and sequestration so we can continue to use coal in the United States but in an environmentally responsible way. So we need all these things.

Mr. BARTLETT. Is not the liquid fuels energy future a bit more challenging? I understand that the world is now pumping and using about 84 million barrels of oil a day. That is correct?

Secretary CHU. I agree with you. The liquid fuels part is the most challenging. So the strategy, if you will bear with me for 30 seconds, it has to be multifaceted. Number one, we are investing in trying to electrify personal vehicle transportation for short range, 50 miles to a couple hundred miles. That would offload some

of it. We are investing in next-generation biofuels that will give you much less fossil fuel investment in order to get per liter of fuel. We quite frankly see ethanol as a transition fuel. It is fine for now but we would like to, like that experiment I just told you about—

Mr. BARTLETT. May I ask you a question about liquid fuels future? The world uses about 84 million barrels of oil a day. We use a fourth of that. We are going to find more oil but we would like to use more oil because we like our economy to grow. The industrialized world would like to use more oil. The developing world, like India and China, would like to use a lot more oil. Would you agree that the more oil that we all like to use, that we will be kind of lucky if we can find that much more oil in the world?

Secretary CHU. I actually think, so what is happening now is, there is conventional oil and then there is what is called non-conventional oil or deep offshore oil and so as the demand grows, especially in the developing countries, the overall world demand is projected by IEA [International Energy Agency], the EIA [Energy Information Administration], all these—to actually grow, the OECD countries probably to plateau but because of China, India and other developing countries, the overall demand will grow. But I see a transition already happening now from conventional oil on shore to offshore to harder-to-get oil to things of that nature.

Mr. BARTLETT. That is true, sir. The more expensive oil is, the more oil we are going to be able to pump because the new oil we are finding is more difficult to get. We use 84 million barrels of oil a day. That means in roughly 12 days we use a billion barrels of oil, correct? It is pretty simple arithmetic.

Secretary CHU. Yes. I will trust you.

Mr. BARTLETT. Eighty-four million barrels of oil a day. That means in 12 days we use a billion barrels of oil. So when somebody talks about that we found 10 billion barrels of oil, that is going to last us 120 days.

Secretary CHU. That is right.

Mr. BARTLETT. Big deal.

Secretary CHU. Well—

Mr. BARTLETT. I use the numbers from your Department, the reserves that Saudi Arabia has, the reserves that Russia has and the percentage of the world's oil. They have roughly the same figure when I use those, when I compute from those.

The world has today about 1.2, 1.3 trillion barrels of oil. I think there is general agreement. There has been general agreement on that for about a decade now, that that is the amount of oil we find. Sir, if I divide into that, you know, every 12 days we use a billion barrels of oil, we have enough oil at the rate we are now using it to last 40 years. That is all. Now, it is not going to be 40 years like we are using it now and then fall off a cliff. It is going to be ever harder and harder to get, more and more expensive.

Sir, I don't see this budget anywhere near recognizing the urgency that we need to have to address that. You agreed that the amount of oil that we are likely to find, we are going to be more than lucky if the more oil we find is equal to the more oil that we would like to use and the developing world would like to use. So with almost seven billion people facing 40 years of oil, don't you think we ought to have more urgency about substitutes?

Secretary CHU. We are working very hard on that, but let me also remind you that the oil recovery is getting better and better. Before—you know, you stick a hole in the ground, you get five percent out. You start pumping water through it, you get more out. Now the average oil recovery is around 30, 35 percent of the oil in the ground and those reservoirs can actually be pumped up, moving to 50 percent, so a lot of things are happening that enable you to recover more oil in your proven reservoirs. Saudi Arabia is now talking 50 percent recovery average of their reservoirs and they think they can get to 70 percent. So I would say it is not clear to me that we will run out of oil in 40 years based on these trends, and based on the fact that we are learning how to recover what we used to think were inaccessible forms of oil. But let me also say that there is an urgency, I feel an urgency for—transportation fuel is the hardest. If you look at the energy density in jet plane fuel and diesel fuel, it is astoundingly high. To replace an airplane or a long-haul truck or a boat with something else aside from liquid fuel is difficult and so we are looking towards ways of getting substitutes. You know, the Secretary of the Navy wants, I think by 2030, to decrease fossil fuel use in the Navy, to get substitutes which include efficiency and also biofuels, to decrease fossil fuel use by 50 percent. So there are plans out there. You know, I hope we can get there. There are plans out there that we want to look at this very aggressively and so there is a sense of urgency because it will take time to deploy these things to scale, but also we want to clean up our oil supply as well because there is a carbon issue. That is why electrification of personal vehicles is something I think we can do and so there is urgency there. We do want to decrease our imports of foreign oil.

Chairman GORDON. Dr. Chu, I suggest that you recommend Dr. Bartlett for a position in OMB. I think that would improve your budget much.

Dr. Baird is recognized.

POTENTIAL ENERGY EFFICIENCY STRATEGIES

Mr. BAIRD. Thank you, Dr. Chu. Good to see you. Having had the privilege of spending most of the day yesterday at the ARPA-E summit and the day before and then much of this morning there, I want to commend you and Dr. Majumdar for the success and also Chairman Gordon for writing the legislation that created this. My wife and I were talking this weekend about some of the many challenges the country faces, and she said what are we doing right? And I said I think the Department of Energy and ARPA-E but I also want to acknowledge the national labs in addition for their ongoing work which has done so much over the years, so well done on that.

As we look at meeting energy needs, my own belief is that the problem is urgent, as Dr. Bartlett has said many times in this Committee. I think we can save 20 percent of our energy budget in 20 weeks, I don't think we have to wait, through fairly simple behavioral adaptations, and I don't mean some voodoo social science stuff, I mean just making the right decisions like inflating your tires, et cetera, which have been subject to derision but are actually legitimate measures. If we just drove the bloody speed

limit, we would save a fair amount. We don't have to lower the speed limit, just drive it.

There are some other things I think we can do. The President rolled out the HOMESTAR program yesterday, I understand, and let me give you just a couple of examples of things we have kicked around. When you buy a house in this country, you get information about what the kind of heating or air conditioning is but you get no useable cost information. If we just put MLS listings required in some fashion that when you buy a house, you get the annual energy budget, the actual expenditures month by month, two houses that look like the same purchase price but one has \$150 greater monthly output for energy is a much more expensive house over time, vastly more expensive, and you now reward people who make the investments both in behavior change and technology just by listing it, no costly audits, no intrusive anything, just list the energy price for the year.

Secondly, transportation audits that just give people information. You could use Google Earth to do this and say what is the real cost of this home you are buying? Because it is cheaper in the 'burbs but you can spend an hour and a half commuting into Washington, D.C., what is the real cost in terms of your time value and the energy transportation cost? Again, it is free but gives people information they can make a decision with.

Regarding the HOMESTAR program, the best time to make an energy investment in your home is at point of purchase for two reasons: the cost of the borrowing, if you are borrowing \$200,000 for a home, another \$20,000 to energy retrofit is additional but small relative to the base cost, but secondly, you are not in the home. You don't have a bunch of people trooping through with insulation or new windows. Some way, finding a way to incentivize point-of-purchase retrofits, seems to me to be a really major investment with buildings consuming 40 percent of our energy.

Finally, a question. I am very concerned. You know, my state had—the last major nuclear investment in this country was in my state. We call it “WPPSS”, the Washington Public Power Supply System. The assumption—and by the way, those are bankrupt and never completed with one sole exception but the rest of the towers standing there. They make great echo chambers. Some rock band is going to discover them, but it is not their original purpose. But this business that we are making loan guarantees, my belief is, we are investing, whether it is CCS in major coal plants or major nuclear plants, I think we are investing in antiquated computers, to be perfectly honest. When you go to the ARPA-E and other places around the world as I have had the privilege of doing, I think a distributed energy scientist like Daniel Serra or some other bright person working on it is going to obviate a lot of this. And so what we are doing is making this big loan guarantee and investment for something that may not be necessary. If we cut consumption by 20 percent behaviorally, right there we obviate a whole lot of nukes. If we invest distributed energy technology, we further do it. What is your thought on that? I worry we are putting a lot of money in antiquated technology.

Secretary CHU. Well, actually, I agree with you 100 percent on the gains on energy efficiency. Many of the things you had sug-

gested I like so much that we actually started the ball rolling on them about half a year ago. So we are starting to talk with HUD, is it possible to try to get the FHA to ask for a year's energy bill? You know, motivate homeowners to putting those energy retrofits and, you know, here is the zip code, this is the energy use in this home, this is the energy use for this square footage in this entire region, so it is like a refrigerator label. We are also recognizing that, you know, people live differently. Some people like it very warm at 78, not 70, or I happen to keep our house at 65 but I don't think many people like to do that.

Mr. BAIRD. My wife and I have the same discussion.

Secretary CHU. So we are also trying to develop a mechanism within the Department of Energy, a means of rating the home itself so you have what the real usage is, you know, like an EPA mileage of the house. So we are doing all those things. In terms of the best time to do the home is during a turnover, I absolutely agree with that. So HUD has energy mortgages but only like 1,000 a year so we are trying to figure out how to get it so it is tens of thousands or hundreds of thousands a year. You know, we have 130 million homes. Average turnaround time is seven years. So if we can start doing major retrofits, you can start to turn over the stock of homes in a major way but you have to make it very painless to the homeowner that they have confidence, that the added little bit more you put in your mortgage, which is a nice long-term loan, low interest rate, you will recover in energy savings on a monthly basis so you are not out of pocket and in fact you are making money. And so these are many of the programs we want to do. Gas mileage, higher mileage standards is another thing. So the only thing I disagree with you is, I don't think it is 20 percent, I think it can be 50 percent.

Mr. BAIRD. I would agree. I am thinking 20 percent in 20 weeks.

Secretary CHU. Oh, well, OK.

Mr. BAIRD. Thank you.

Chairman GORDON. Dr. Broun is recognized for five minutes. Oh, Ms. Biggert. Excuse me. Ms. Biggert is recognized for five minutes.

HIGH-PERFORMANCE COMPUTING AT DOE

Ms. BIGGERT. Thank you, Mr. Chairman, and welcome, Secretary Chu.

As a long supporter of the Department of Energy's Office of Science, I commend your efforts to increase the funding by 4.4 percent, which is consistent with the COMPETES Act, and of the program increases, I am glad to see the Advanced Scientific Computing Research receive a boost, and considering the importance of that to DOE and the research community, do you have plans for a sustained investment in our leadership-class computing facilities, and more specifically, will the Department consider utilizing the advanced computing infrastructure across the programs in DOE to meet many of our energy challenges?

Secretary CHU. The short answer is yes, we see a sustained program. We are finding out as the computers get more powerful, as the algorithms get more powerful, we can begin to simulate design in a real way, complex designs spanning the gamut between combustion in a diesel engine so you don't have to build another proto-

type and see what happens. The poster child of that is a collaboration with Cummins Diesel Engine and Sandia National Labs; they skipped the prototype part. They designed it on a computer. They do measurements on that and it worked according to the computer simulation. These are very complex simulations.

Ms. BIGGERT. Do you see a role for the computing as facilitating solutions—

Secretary CHU. Yes.

Ms. BIGGERT. —to grid modernization or—

Secretary CHU. Oh, well, the computer—

Ms. BIGGERT. —fuel cycle?

Secretary CHU. Everything. The grid modernization will absolutely require a very, very—the so-called smart grid will require a very deeply intelligent computer system so, you know, when the wind stops blowing, the sun stops shining, it will add to the robustness of our energy supply. It has to manage two-way flows. I mean, right now in the United States distribution system, there are these regional sections, and if you want to go across, someone calls up the line and says hey, can you send me a little more juice? It is just like in the old-time movies, you know, the ship captain says all ahead, full steam. He goes down to the engine room and they start shoveling coal. We can't use that anymore going forward, computers will be an integral part of the distribution.

Ms. BIGGERT. Thank you, and I have got a couple more questions so I have to rush, I guess.

Secretary CHU. OK. Sorry.

Ms. BIGGERT. In your testimony in 2006 before this Committee talking about funding ARPA-E—and I do congratulate the Chairman for the success of ARPA-E, and I am not going to eat crow. But it is critical—you said that it is critical that the funding not jeopardize the basic research supported by the Office of Science, and I am not sure from looking at the budget, is the \$300 million for ARPA-E taken out of the Office of Science budget?

Secretary CHU. No.

Ms. BIGGERT. So that is a separate—

Secretary CHU. The Office of Science budget is on a path to doubling the budget of the Office of Science and, you know, in this respect I believe in the old tradition, in the words “do no harm.” The Office of Science is a great part of the Department of Energy, and you want to keep it on a path of budget doubling.

Ms. BIGGERT. And I congratulate you. Doubling that budget I think is very important.

SPENT NUCLEAR FUEL RECYCLING

And could you just talk a little bit about the evolution of DOE's R&D work on used fuel recycling over the past year and what is going to happen?

Secretary CHU. Well, thank you for that question. There are two goals. Right now the fuel reprocessing technologies that exist today, for example, the one that Areva has, we believe is not economically viable as witnessed by the huge cost overruns in the recycling plant in Japan—almost a factor of three from \$6 billion to over \$20 billion. It is not proliferation resistant. And so these are real problems. You know, it doesn't make financial sense and it doesn't

make nonproliferation sense. So we want to do research to see if we can get to a place where it makes both of those things. In addition to that, we are also looking at reactors in this \$400 or \$500 million range where right now you dig uranium out of the ground, you use less than one percent, it is like half a percent of the energy content of that mined ore and the rest becomes spent fuel, possibly waste. Wouldn't it be lovely if we could use 20 percent, you know, once-through cycle? If you do that, you go from one percent to 20 percent. Then you have just reduced the waste by a factor of 20. But in addition to that, we also want to do research in fast neutron reactors designed to burn down the long-lived radioactive waste to reduce the lifetime. All these things will be factored into what the Blue Ribbon commission is being charged to anticipate what might happen in the next 50 years. That will totally rewrite what we are going to do with the back end of the fuel cycle. So there are all of these possibilities. It will take time because anything having to do with nuclear, because of the safety concerns, does take time, but we do have time and we have at least a half a century to do this. And so I feel very committed. Here is an opportunity to go forward. And by the way, like with small modular reactors, here is an opportunity to recapture an industry the United States started. The first nuclear reactor was built in the United States and it has now gone abroad. You know, France and Japan and Korea have more nuclear production capabilities for reactors than we do. So, you know, we want to bring that high-tech manufacturing back to the United States as well. We again want to be a leader in that for our prosperity as well as clean energy.

Ms. BIGGERT. Thank you. I yield back.

Chairman GORDON. Mr. Matheson is recognized.

MORE ON YUCCA MOUNTAIN AND NUCLEAR WASTE STORAGE

Mr. MATHESON. Thank you, Mr. Chairman, and Dr. Chu, welcome to the Committee.

You mentioned in your opening statement, or actually, I think it was in response to the Chairman's question in your discussion about high-level nuclear waste disposal and the decision to move away from Yucca. I actually agree with that decision to move away from Yucca. And when you were talking about it, you mentioned that as an interim measure with dry cask storage technology we have available onsite at operating power plants. To your knowledge, are there any space limitations for that type of onsite storage?

Secretary CHU. To the best of my knowledge, no.

Mr. MATHESON. And you also mentioned that when the Congress passed the *Nuclear Waste Policy Act* back in the 1980s that we knew a lot less than we now know. Is it your understanding that dry cask storage in terms of the capability for doing that was not very well understood back in the mid-1980s? Is that one example of where we have learned more since then?

Secretary CHU. That is one example, but it goes much deeper than that. I think given, for example, in the proposed repository at Yucca Mountain, first it was for 10,000 years, then there was a Supreme Court ruling that says no, it is whatever—well, it turns out

I knew the scientists doing a lot of the simulations for the water flows in Yucca Mountain, and the maximum leak out would be at a half a million years. Well, quite frankly, we haven't built—humans haven't built anything that has lasted a half a million years. Roman aqueducts come to mind, 2,000 years. And so what you really want to do is, you want to do something that is inherently natural deposit safe. So there are other geological repositories in that case. And also if you don't want to ever have access to it, for example, you might want to consider over the next few hundred years we could put it somewhere in some places where you want to have access but when the economic value is really spent down, then you can say, you know, we don't think we will ever have any more economic value and you reduce the amount of waste. Then you want to put it in a place that guess what, you never want it back. So we know of geological sites, for example, in salt domes, you put it in the salt dome. The salt oozes around it and you can't get—those things were rejected because maybe we need to get it back. Well, no, in this case we might not ever want to get it back. The beauty of those things is, they are radioactively dated and they have been around for tens of millions of years. So imagine the continents of the world drifting around, but this thing has been safe for ten million years. That is good. So again, we know a lot more. So it goes much deeper than—we can take a fresh look at this.

Mr. MATHESON. Right. I appreciate that. And I assume you will be engaged with this bipartisan commission in their discussion?

Secretary CHU. Well, I mean, they are a very "blue ribbon" committee, and we stand by to offer them information but they are going to make recommendations to me, to the President and to Congress and they can form little subcommittees for points of technical information, but we really want their best advice.

Mr. MATHESON. Another question I wanted to ask you about, in terms of the NNSA's stockpile stewardship rule, over the past few years there was talk about coming up with a new generation of weapons. There was the Reliable Replacement Warhead program. And yet I believe it was just in the past year with the most recent JASON analysis of the existing stockpile and its projected life or longevity or viability, there was a certain confidence that this existing stockpile could be maintained for, in my opinion, a reasonably long amount of time. What is your view right now of the need to develop a next generation? Or do you think the existing stockpile stewardship program with the existing stockpile satisfies our needs for the next, I don't know, few decades?

Secretary CHU. Well, first there is going to be a nuclear repository review that will be coming out hopefully in the next couple of weeks and that sets a tone for what we in the Department of Energy need to do. The JASON part I am aware of had to do with the pits—

Mr. MATHESON. Yeah, the pits.

Secretary CHU. —the core of the nuclear device, the thing that starts it off, and in their view, the pits—themselves for a long period of time. Now, having said that, many of these devices were designed with vacuum tubes, and you can't even buy the vacuum tubes anymore. So merely by replacing vacuum tubes with integrated circuits, things of that nature that don't, in my mind, con-

stitute a new weapon at all, it is just hey, you can't buy this stuff and replace it with something, modern electronics. It doesn't enhance any capability. I think those things need to be done and so you differentiate that from the pits. So what we are going to be doing is, we are going to be looking at these very complex issues and certainly wanting very much—recognizing what the President said in his speech, where we want to go towards eventual elimination of nuclear warheads around the world, but as long as other countries have them, we are going to have them, but so far from my knowledge from where we are today, we can extend the lifetime of these weapons.

Mr. MATHESON. Thank you. I appreciate that.

Chairman GORDON. Dr. Broun is recognized for five minutes.

Mr. BROUN. Thank you, Mr. Chairman.

MORE ON NUCLEAR WASTE

Mr. Secretary, my comments and questions today focus on how the Department makes its decisions and whether or not the American people trust those decisions. To be candid, recent decisions have me befuddled. Case in point, the record is fairly clear that you have supported unilaterally disarming our Nation's economy by advocating a carbon tax and a carbon tariff. Your rationale for this irresponsible policy is based on the claimed scientific consensus regarding the severity and impacts of anthropogenic climate change. As evidence of this consensus, you specifically cited the National Academy of Sciences. Setting aside the recent issues revealed by the Climate Research Unit's leaked e-mails, the almost daily revelations of errors in IPCC reports and the numerous investigations related to the process by which that consensus was reached, I am a little confused by why you selectively embraced findings from these scientific bodies, why you embraced the consensus surrounding climate change.

You ignore a report from the National Research Council on Yucca Mountain which states, "There is a strong worldwide consensus that the best, safest, long-term option for dealing with high-level waste, HLW, is geologic isolation." One of the first acts of our Department was to essentially shutter the doors of Yucca Mountain, our Nation's only option for dealing with high-level waste, despite clear legal obligations after over 25 years of scientific study with billions of dollars at risk and no plan going forward. Georgia ratepayers have already paid into the Nuclear Waste Fund over \$708.9 million. While two nuclear reactors are going to be built in Georgia, it has been three decades since a new nuclear plant has been built. Yet DOE terminates the license application for Yucca Mountain. You initiated a blue ribbon commission to look into storage options but their report won't be completed until the end of this Administration's term and after a certain Senator's reelection bid. Why not keep the program on track until you receive those recommendations, or why not spend the collection fees for the Nuclear Waste Fund—suspend the collection for the Nuclear Waste Fund until a storage solution is agreed to? How can you justify continuing the collections of hundreds of millions of dollars in fees from electricity consumers in these tough economic times? It is just not right. Right now, you are essentially kicking the can down the road all the

while you defend our Nation's only existing storage option, a decision that appears to be politically motivated, not based on science.

In order to understand the rationale behind these decisions, Ranking Member Hall and I along with Ranking Members Barton and Walden wrote to you last May with over 12 specific questions. Your response to the committees of jurisdiction was frankly laughable. In fact, Mr. Chairman, I would like to ask unanimous consent to enter the letters into the record from me and the Ranking Member as well as the response from Secretary Chu.

[The information follows:]

BART GORDON, TENNESSEE
CHAIRMAN

RALPH M. HALL, TEXAS
RANKING MEMBER

U.S. HOUSE OF REPRESENTATIVES
COMMITTEE ON SCIENCE AND TECHNOLOGY

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February 3, 2010

The Honorable Steven Chu
Secretary
Department of Energy
1000 Independence Avenue, S.W.
Washington, DC 20585

Dear Secretary Chu:

We write to you once again to seek further explanation and documentation regarding the Administration's decision to abandon the development of the Yucca Mountain site as a nuclear waste repository. Despite a nearly \$10 billion investment, clear congressional direction and legal obligation, and robust scientific study and oversight, the Administration continues to take unexplained actions that could ultimately sacrifice the project.

In May 2009, we wrote you to reconcile your statements in support for "restarting" nuclear power with Administration actions that risk materially delaying the expansion of nuclear energy in the United States.¹ On June 1, 2009 you responded with a brief letter noting your plan to establish a blue ribbon commission on nuclear waste storage but failing to address any of the issues or questions that we raised.²

Follow up discussion between Committee staff and Department staff confirmed that you consider this letter to be responsive and that the Department does not possess documents related to the decision or our inquiry. If this is indeed true, we find it alarming that your Department made an important decision that could have significant adverse consequences for the nation and the American taxpayer without conducting a comprehensive analysis.

The recent announcement of the Blue Ribbon Commission raises more questions than it answers, as you have declined to comment on the nature of the commission's charter.³

¹ Letter from Reps. Ralph Hall, Joe Barton, Paul Broun, and Greg Walden to Secretary Chu, May 7, 2009 (copy attached).

² Letter from Secretary Chu to Reps. Ralph Hall, Joe Barton, Paul Broun, and Greg Walden, June 1, 2009 (copy attached).

³ Peter Behr, "The Administration puts its own stamp on a possible nuclear revival," *ClimateWire*, Energy and Environment Publishing, February 2, 2010.

The Honorable Stephen Chu
 Page two
 February 3, 2009

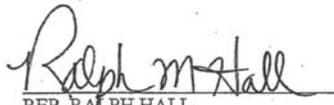
According to the Department's own timeline, the commission won't even issue recommendations until near the end of the Administration's term. This process and timeline highlights the highly illogical nature of terminating the only existing option before assessing potential alternative options, and suggests that political decisions have overridden the need for a systematic and scientific review of all options. Further, the decision to withdraw the Department's Nuclear Regulatory Commission's license application for Yucca Mountain and its concurrent budget proposal to cancel funding for the Office of Civilian Radioactive Waste Management (OCRWM) raises important questions about the legality of these actions with respect to the Nuclear Waste Policy Act (NWPA) of 1982.

While I was pleased to hear that the Administration chose to increase the Department's contribution to the loan guarantee program, the uncertainty surrounding the Blue Ribbon Commission, combined with the Administration's growing record of mixed signals on other aspects of nuclear energy, raises serious questions about the credibility of the Administration's rhetorical support of this nuclear energy. As Secretary of Energy, you have an opportunity to set the record straight and work with Congress to ensure the resurgence of the only energy source capable of providing significant quantities of affordable, safe, carbon-free electricity.

Accordingly, we ask that you provide all documents responsive to our May 7, 2009 letter, as well as respond to the questions we posed at that time. Additionally, please provide an explanation for, and all documents (see attachment) related to, the establishment of the blue ribbon commission on nuclear waste storage. Last, please explain how the administration proposal to cancel funding for OCRWM is consistent with its statutory obligation to provide for radioactive waste storage under the NWPA. Please provide your response by February 16, 2010.

If you or your staff have any questions or need additional information, please contact either Mr. Tom Hammond or Mr. Dan Byers with the Science and Technology Committee minority staff at (202) 225-6371.

Sincerely,


 REP. RALPH HALL
 Ranking Member
 Committee on Science and Technology


 REP. PAUL BROUN, M.D.
 Ranking Member
 Subcommittee on Investigations
 and Oversight
 Committee on Science and Technology

Enclosures

cc: The Honorable Bart Gordon, Chairman
Committee on Science and Technology

The Honorable Brad Miller, Chairman
Subcommittee on Investigations and Oversight
Committee on Science and Technology

ATTACHMENT

1. The term "records" is to be construed in the broadest sense and shall mean any written or graphic material, however produced or reproduced, of any kind or description, consisting of the original and any non-identical copy (whether different from the original because of notes made on or attached to such copy or otherwise) and drafts and both sides thereof, whether printed or recorded electronically or magnetically or stored in any type of data bank, including, but not limited to, the following: correspondence, memoranda, records, summaries of personal conversations or interviews, minutes or records of meetings or conferences, opinions or reports of consultants, projections, statistical statements, drafts, contracts, agreements, purchase orders, invoices, confirmations, telegraphs, telexes, agendas, books, notes, pamphlets, periodicals, reports, studies, evaluations, opinions, logs, diaries, desk calendars, appointment books, tape recordings, video recordings, e-mails, voice mails, computer tapes, or other computer stored matter, magnetic tapes, microfilm, microfiche, punch cards, all other records kept by electronic, photographic, or mechanical means, charts, photographs, notebooks, drawings, plans, inter-office communications, intra-office and intra-departmental communications, transcripts, checks and canceled checks, bank statements, ledgers, books, records or statements of accounts, and papers and things similar to any of the foregoing, however denominated.
2. The terms "relating," "relate," or "regarding" as to any given subject means anything that constitutes, contains, embodies, identifies, deals with, or is in any manner whatsoever pertinent to that subject, including but not limited to records concerning the preparation of other records.



The Secretary of Energy

Washington, D.C. 20585

June 1, 2009

The Honorable Ralph M. Hall
 Ranking Member
 Committee on Science and Technology
 U.S. House of Representatives
 Washington, DC 20515

Dear Congressman Hall:

Thank you for your May 7, 2009, letter regarding Yucca Mountain.

As you note in your letter, the Administration is committed to pursuing alternatives to Yucca Mountain. However, we remain committed to meeting our obligations for managing and ultimately disposing of spent nuclear fuel and high-level radioactive waste.

Your letter raises a range of complex questions about Yucca Mountain and the Administration's plans to develop alternatives. I believe that we need to proceed with the development of alternatives in a deliberate and thorough fashion that takes into account these complexities – which include technical, safety, legal, economic and other factors.

To that end, the Administration intends to convene a "blue-ribbon" panel of experts to evaluate alternative approaches for meeting the Federal responsibility to manage and ultimately dispose of spent nuclear fuel and high-level radioactive waste from both commercial and defense activities. This panel will provide the opportunity for a full public dialogue on how best to address this challenging issue and will provide recommendations that may form the basis for working with Congress to revise the statutory framework for managing and disposing of spent nuclear fuel and high-level radioactive waste.

As we begin to restart the nuclear industry in the United States, the time is right to reexamine our options and plans for managing the back end of the fuel cycle. Options for storage, recycling, and geologic disposal of spent nuclear fuel and high-level radioactive waste all deserve careful consideration, with an eye towards development of an updated management framework. The Administration looks forward to ongoing dialogue with members of Congress, interested stakeholders, and others as we review options for alternatives to Yucca Mountain in the months ahead.

If you have any questions, please contact me or Ms. Betty A. Nolan, Senior Advisor, Office of Congressional and Intergovernmental Affairs, at (202) 586-5450.

Sincerely,

Steven Chu



Printed with soy ink on recycled paper

Congress of the United States
House of Representatives
Washington, D.C. 20515

May 7, 2009

The Honorable Steven Chu
Secretary
Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585

Dear Secretary Chu:

On April 22, 2009, you testified before the House Committee on Energy and Commerce in connection with its legislative hearings on the American Clean Energy and Security Act of 2009. During your testimony, you stated that the Administration would support a nuclear title in the climate legislation and that the Administration believes that nuclear power has to be "restarted" and must be part of the future energy mix in this country.

Yet you and the Administration are on record as seeking to abandon construction of a deep-underground repository for the nation's nuclear waste at Yucca Mountain, Nevada. This repository, designated by statute to be located at the Yucca Mountain site and to be the nation's first permanent nuclear waste repository, is essential for the revitalization and expansion of nuclear power in the United States. And after over 25 years of scientific and technical study and Congressional review, there are no other alternative sites provided for under the law.

According to your press spokesperson, you believe "nuclear waste storage at Yucca Mountain is not an option, period." At a House Science and Technology Committee hearing in March, you stated that "conditions changed" with regard to Yucca Mountain and that DOE independently is seeking a blue-ribbon panel to take a "fresh look" at nuclear waste and disposal. And your opposition has been reinforced by the Administration's just released FY 2010 Budget, which states that all Department of Energy (DOE) funding for Yucca Mountain development "has been eliminated," except to allow DOE to respond to the Nuclear Regulatory Commission's (NRC) technical questions related to its current review of the DOE Yucca Mountain license application.

Turning away from Yucca Mountain may have significant adverse consequences for the nation and the American taxpayer. For example, the Federal government's total potential liability from delays in accepting used fuel and nuclear waste could be significantly higher than the past estimates of \$11 billion if Yucca Mountain is no longer an option. The Administration's position that Yucca Mountain is not an option also raises significant regulatory and legal issues that may not only adversely affect the licensing and development of new nuclear plants, but also

Letter to the Honorable Steven Chu
Page 2

may impact existing operating nuclear plants. The position also raises significant issues for the U.S. Navy and DOE sites, including for the Hanford, Savannah River, Idaho and other DOE sites where spent nuclear fuel and/or high-level radioactive waste is currently being stored pending permanent disposal.

We write to reconcile your testimony in support of "restarting" nuclear power in connection with clean energy policy with the Administration's actions that risk materially delaying the expansion of nuclear energy in this nation. In light of current climate policy debates, it is critical that we understand the Administration's actual plans in this regard. We would appreciate your providing responses to the following:

1. What is the scientific or technical basis, if any, for your decision that the proposed Yucca Mountain repository is "not an option"?
2. How does your decision comport with the Department of Energy's (DOE) statutory obligations under the Nuclear Waste Policy Act of 1982, as amended?
3. Under what legal authority would a blue ribbon panel re-evaluate options for nuclear waste disposal be established?
4. With regard to the proposed blue ribbon panel:
 - a. How would the panel be established?
 - b. What would be the process for appointing persons to serve on the panel?
 - c. What would be the composition of the panel?
 - d. What would be the scope of its review?
5. Prior to your public statements that Yucca Mountain repository is "not an option," was any analysis performed of the potential taxpayer liabilities associated with such a decision?
6. Please provide all documents relating to any legal, technical, or scientific analyses that formed the basis for your decision to re-evaluate nuclear waste disposal alternatives to the proposed Yucca Mountain repository, including, but not limited to, evaluations and recommendations that led you to determine that Yucca Mountain was "not an option."
7. What was the process for making your decision that Yucca Mountain repository is "not an option"? Please describe and identify when and with whom you consulted, including, but not limited to, a description and identification of attendees at any public meetings, any Administration meetings, and any consultations with States affected by the decision.
8. In reaching your determination that the Yucca Mountain repository is no longer an option, did you consult with or receive any briefings from the Nuclear Waste Technical Review Board, DOE laboratory directors or personnel, or any DOE scientists or technical personnel who performed work on the Yucca Mountain project? Please describe when

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and with whom you consulted, including, but not limited to, a description and identification of attendees at any meetings.

9. Have you shared your rationale for determining that the Yucca Mountain repository is "not an option" with the Nuclear Waste Technical Review Board or the Nuclear Regulatory Commission?
10. Have you or your staff prepared any analyses of the potential impact that failing to pursue the Yucca Mountain repository may have on the construction of new nuclear plants, which are essential to providing clean and reliable energy in the future? If so, please provide any such analyses.
11. How do you believe the Administration's decision to scale back the Yucca Mountain project will affect DOE's responsibility to develop, construct, and operate repositories for disposal of spent nuclear fuel and high-level radioactive waste under the Nuclear Waste Policy Act of 1982, the Nuclear Waste Policy Amendments Act of 1987, and the Energy Policy Act of 1992?
12. If a repository at Yucca Mountain is not pursued, what does the Administration propose to do with the billions of dollars that have been collected from ratepayers for the Nuclear Waste Fund?

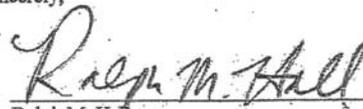
Please provide the written responses and documents requested by no later than two weeks from the date of this letter. We would respectfully request, if the Department withholds any documents or information in response to this letter, that a Vaughn Index or log of the withheld items be attached to the response. The index should list the applicable question number, a description of the withheld item (including date of the item), the nature of the privilege or legal basis for the withholding, and a legal citation for the withholding claim.

Should you have any questions please contact Mr. Peter Spencer of the Minority Energy and Commerce Committee staff at (202) 225-3641, and Ms. Elizabeth Chapel or Mr. Tom Hammond of the Minority Science and Technology Committee staff at (202) 225-6371.

Sincerely,



Joe Barton
Ranking Member
Committee on Energy and Commerce

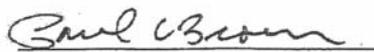


Ralph M. Hall
Ranking Member
Committee on Science and Technology

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Greg Walden
Ranking Member
Subcommittee on Oversight
and Investigations
Committee on Energy and Commerce



Paul C. Broun
Ranking Member
Subcommittee on Investigations
and Oversight
Committee on Science and Technology

Enclosure

cc: The Honorable Henry Waxman, Chairman
Committee on Energy and Commerce

The Honorable Bart Stupak, Chairman
Subcommittee on Oversight and Investigations
Committee on Energy and Commerce

The Honorable Bart Gordon, Chairman
Committee on Science and Technology

The Honorable Brad Miller, Chairman
Subcommittee on Investigations and Oversight
Committee on Science and Technology

Chairman GORDON. With no exception, so ordered.

Mr. BROUN. I once again wrote to you last month restating my concerns and questions, and also seeking information regarding the establishment of this so-called Blue Ribbon Commission. I have yet to hear back. Mr. Secretary, this Committee is an important responsibility to oversee your Department. I hope you will take our current request seriously and be more responsive to future inquiries.

During the President's inaugural address, he stated his intention to "restore science to its rightful place." Unfortunately, all we have seen from this Administration is rewarding of political allies, cherry picking scientific recommendations and obfuscation. The American people deserve more than empty rhetoric when it comes to scientific integrity and they deserve more than arrogance, ignorance and incompetence when it comes to making decisions.

Mr. Chairman—I mean Secretary Chu, I would like to ask, what is the factual basis for seeking to withdraw the application on Yucca Mountain from the NRC?

Secretary CHU. I would be glad to go into this, but in the limited time, I do believe we have much better options. There is no disagreement with the National Academy study that says geologic storage sites are the best option. The salt dome I was talking about was a geological storage site. If you have been to Yucca Mountain, there are issues with it. Its repository nature depends a lot on the assumed precipitation at that site over a million-year period. And so there are many issues like that. In terms of the BRC and the timing of the report, the time scale that is listed officially, both General Scowcroft and Congressman Hamilton actually want a

much more accelerated time, and I am all in favor of that. Ideally, quite frankly, I don't want to box them in a corner, but they are targeting this year to get this first draft out. So there is no desire to kick any can down the road regarding the Blue Ribbon Commission.

With regard to climate data and the understanding, I still believe very strongly that the overwhelming body of evidence—well, let me stand back and say that the overwhelming body of evidence still is that the climate is changing, it is caused by humans, and although the uncertainties on what happens going forward are large, it is not an uncertainty as to whether it is happening or whether it is caused by humans, it is to the degree. The way science works is, sometimes there are occasionally bumps and warts, and what happens is, science investigates itself and tries to find out, and that is exactly what is happening, but as far as I know, there is a overwhelming body of evidence that still says—in fact, the more recent, especially the satellite data as it gets better and better is putting to rest concerns that we might have had 10 to 20 years ago.

Chairman GORDON. Thank you, Dr. Chu.

Dr. Broun's views aren't unanimous but he certainly needs to have his letters responded to.

[Additional material submitted for the record follows:]

PREPARED RESPONSE OF SECRETARY CHU

I appreciate your interest, as expressed in your February 3, 2010, letter, in the decision regarding the Yucca Mountain project and the convening of the Blue Ribbon Commission. Expanding our Nation's capacity to generate clean nuclear energy is crucial to our ability to combat climate change, enhance energy security, and increase economic prosperity.

An important part of a sound, comprehensive, and long-term domestic nuclear energy strategy is a well-considered policy for managing used nuclear fuel and other aspects of the back end of the nuclear fuel cycle. Yet the Nation's approach, developed more than 20 years ago, to manage spent nuclear fuel and high-level waste has proven ineffective. Fortunately, over the past two decades scientists and engineers in our country and abroad have learned a great deal about effective strategies for managing the back end of the fuel cycle.

The Administration has decided that Yucca Mountain is not a workable solution. As a result, President Obama requested that I establish the Blue Ribbon Commission on America's Nuclear Future. The Commission will consider a broad range of technological and policy alternatives as well as the scientific, environmental, budgetary, economic, financial, and management issues surrounding each alternative it considers. The Administration remains fully committed to meeting its obligations for disposition of the nation's civilian and defense nuclear waste.

Secretary CHU. I will do that.

Chairman GORDON. Thank you.

Mr. BROUN. Thank you, Mr. Chairman.

Chairman GORDON. Dr. Lipinski is recognized.

Mr. LIPINSKI. Thank you, Mr. Chairman.

DOE RESEARCH INFRASTRUCTURE

Mr. Secretary, thank you for your contributions now to our Nation, what you are doing as Secretary. I was just out at Emeryville at JBEI, and they were speaking very highly of all that you did to help get JBEI started out there. The collaborative work, research and attempts to develop biofuels are very encouraging out there, and I think that was a great example of pulling together different institutions to do some really important work and a good example

of what you have tried to do, and what you are trying to do right now, as Secretary. So I congratulate you and thank you for doing that.

I am concerned to some degree about the—that many of our research facilities in this country are suffering from chronic underinvestment in deferred maintenance. As I am sure you know, the NSF's last survey of science and engineering facilities documented a problem at academic research facilities, a \$3.6 billion backlog in deferred repair and renovation, and I have heard anecdotally of problems at the national labs as well. And this concerns me in that we clearly understand we cannot lose our leadership in science and engineering, and I am concerned that we may not be able to lead and we might be having inefficient use of research dollars if we don't have the infrastructure that we need. So I wanted to ask you what your current—what is your impression of the current state of DOE facilities, especially the national labs? And I was intrigued in your statement, you had talked about \$7 billion requested for upgrade of infrastructure, and if you could be—expound a little bit on what that is going to be for.

Secretary CHU. Well, regarding the infrastructure in the national laboratories, it is uneven. There are some that are—especially the new national laboratories I think are in a little bit better condition. Recovery Act money has been invested in a lot of that delayed maintenance, but going further than that, actually replacing the buildings. Once the laboratory buildings get to be 50, 60, 70 years old, it is hard to keep them going. It is better to start anew. It is more economical, in fact to start anew. And so that is an issue. Again, in my old laboratory, the oldest national laboratory in the complex, we had a fair fraction, I forget the exact number, but it was something like 40, 50 percent were over 50 years old. There is a section of old buildings, wooden buildings called Old Town. It was called Old Town when I was a graduate student there in 1970. It is still there. So at least there are plans to knock it down through Recovery Act money and it won't be done probably for another two or three, five years but—so yes, to your point, it is an issue.

The infrastructure having to do with the NNSA labs are the fact that because of many budget stresses and other issues over a period of perhaps a decade, maybe a little longer but certainly over a period of a decade the amount of—the fraction of money spent for science and technology, and the infrastructure more important than anything else. It also includes the total assets of the lab, including the people, have been declining. The fraction of money spent on science and technology in those laboratories was going down steadily so that over a 10-year period it would have been cut in half and we were entering the ninth year of that 10-year period. So—

PUBLIC ACCESS OF HIGH-PERFORMANCE COMPUTERS

Mr. LIPINSKI. If I can—sorry to interrupt you. I want to get something else in before my time runs out. I would like to continue the discussion about what may be done about helping with improving the infrastructure at our national labs. The other thing following on what Ms. Biggert said, I am very happy to see the lead-

ership computing facility at Argonne, the increase in funding requested. I am a little bit concerned about with high-performance computing that some of this has not been available, have not reached small manufacturers. They have not had the ability to take advantage of that. I was at Sandia also and what you were talking about earlier about what they are doing with Cummins. I saw that and was told about that. What are some ways that you look to helping, especially small manufacturers, but even Boeing, some of the supply chain for Boeing is having trouble being able to access and use—be able to use high-performance computers?

Secretary CHU. Well, I think the major issue in very high-performance computing is they have many, many processors, tens of thousands, going now up to 50,000, 100,000 processors. In order to use them all concurrently, efficiently, you have to have very, very skilled programming. So there is a program at DOE called INCITE which teams up applied mathematicians, computer scientists with the scientists because as you go to these very complex machines, most scientists don't have the technical expertise. You know, after you have ganged up 1,000 of them, going from 1,000 to 10,000, it doesn't get 10 times better. And so it begins to waste a resource. So in the very highest leadership computing, we actually have these teams of scientists but the average small company doesn't have that expertise. One of the things that I am very interested in doing is developing what I would call automatic parallelization. You write some code in Fortran or C++ and it begins to automatically allow you to use thousands of processors. We don't have that yet, and that is what is the next logical step in order to bring high-performance computing to the average engineer, the average scientist.

Chairman GORDON. Dr. Chu, I am afraid you are a victim of your own knowledge. We are getting close to votes, and I don't want to have to hold you. So I think Dr. Broun has a unanimous consent request.

Mr. BROUN. Thank you, Mr. Chairman. I would like to ask unanimous consent to insert a document at the end of my questioning period of Secretary Chu. It is called a Sustainable Energy Future: Essential Role of Nuclear Energy, dated August 2008, and pay particular attention to the third bullet point here which says "employing integrated approach"—

[The information follows:]

A Sustainable Energy Future: The Essential Role of Nuclear Energy

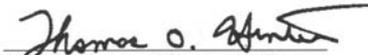
August 2008


Michael Anastasio, Director, LANL

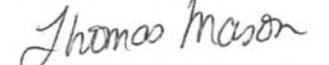

Samuel Aronson, Director, BNL

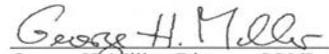

Steven Chu, Director, LBNL


John Grossenbacher, Director, INL


Thomas Hunter, Director, SNL


Michael Kluse, Director, PNNL


Thom Mason, Director, ORNL


George H. Miller, Director, LLNL


Robert Rosner, Director, ANL


Sam Bhattacharyya, Director, SRNL

A Sustainable Energy Future: The Essential Role of Nuclear Energy

The Directors of the Department of Energy (DOE) national laboratories strongly believe that nuclear energy must play a significant and growing role in our nation's — and the world's — energy portfolio. This conclusion is based on an analysis of national and international energy needs in the context of broader global energy, environmental, and security issues. This paper provides details regarding our position in relation to nuclear energy. It is intended to be used as a basis for further discussion with stakeholders to help in developing specific near-term actions as well as a coherent long-term strategy incorporating the items listed below:

- Make maximum use of the current 'fleet' of operating light-water reactors, including plant life extensions, extended fuel burnup, and power uprates.
- Establish a national priority to immediately deploy advanced light-water reactors to meet our nation's increasing energy demand, while limiting greenhouse gas emissions and continuing to provide critical support to the Nuclear Regulatory Commission (NRC).
- Employ an integrated approach to manage used nuclear fuel and high-level waste, including interim storage, licensing of the Yucca Mountain Repository as a long-term resource, and exploration of optimal future waste management options.
- Implement an aggressive research and development (R&D) program on advanced reactors, reprocessing, waste management, and fuel fabrication concepts to enable timely identification of the technological options for a sustainable closed fuel cycle.
- Pursue partnering with other countries and implementation of an international regime that discourages the spread of enrichment and reprocessing capabilities and promotes the assurance of worldwide fuel supply and effective waste management.
- Strengthen international safeguards through aggressive R&D, thereby revitalizing U.S. safeguards technology and human capital and providing for U.S. leadership to help in assuring achievement of international security objectives and nonproliferation goals.
- Form a robust public-private partnership to ensure that (1) nuclear energy plays a more significant role in energy independence and environmental health, and (2) human infrastructure is rebuilt across industry, government, and academia.
- Incorporate independent and authoritative guidance and peer review from government and nongovernment entities to ensure that the U.S. nuclear energy agenda is responsive to current and future national needs and international conditions.

BROAD ENERGY CONTEXT

Energy is vital to human civilization and underpins national security, economic prosperity, and global stability. Worldwide demand for energy is rapidly increasing and could double by 2050. At the same time, the evidence is clear that CO₂ emissions must be reduced globally. Abundant, affordable, and environmentally responsible energy must be developed, both domestically and internationally, to meet that demand.

Reducing U.S. dependence on foreign oil will provide economic and national security benefits, including both industrial competitiveness and international trade. Crude oil expenditures represent the largest deficit item to our balance of trade. To reverse the trend on energy imports, while at the same time meeting required reductions in CO₂ emissions, the United States must use energy more efficiently. Furthermore, our nation must develop and deploy multiple energy sources in the context of a strategic and comprehensive energy plan. A broad mix of energy technologies is essential to meet the growing demand.

BENEFITS OF NUCLEAR ENERGY

Today, nuclear energy provides 16 percent of the world's electricity and offers unique benefits. It is the only existing technology with capability for major expansion that can simultaneously provide stability for base-load electricity, security through reliable fuel supply, and environmental stewardship by avoiding emissions of greenhouse gases and other pollutants. Furthermore, it has proven reliability (greater than 90 percent capacity factor), exemplary safety, and operational economy through improved performance.

We believe that nuclear energy must play a significant role in our nation's — and the world's — electricity portfolio for the next 100+ years. Nuclear energy has great potential for contributing more to our broader energy needs, however. For example, nuclear energy could supplement or even supplant fossil fuels by providing the electricity for electric-powered vehicles, or it could be used to generate hydrogen for vehicles that utilize hydrogen fuel cells. Nuclear energy could also help to generate high-temperature process heat, provide a valuable input for feedstock to chemical production and aid in the production of freshwater from seawater and contaminated surface and groundwater sources.

FOCUS EFFORTS AND INVESTMENTS: WHY NOW?

There are many reasons to focus on and invest in the expansion of nuclear energy. First, time-critical clean energy needs can be met through reactor life-time extensions, higher fuel burnup, power uprates, and additional deployment of existing light-water reactor technology. Second, to maximize the benefits of nuclear energy domestically, advanced fuel cycles that cost-effectively optimize energy utilization and waste management are needed; however, there is a long lead time for developing the required technologies. Third, the United States now has a window of opportunity to influence global directions in safety, security, and nonproliferation throughout the nuclear fuel cycle. A strong, sustained, integrated effort across all three areas must begin now.

SUCCESSFUL PATH FORWARD

The directors of the DOE national laboratories remain committed to U.S. energy security and the important role that an increased nuclear energy component can and should play in strengthening our energy security. Essentials for success are a strategy that integrates across DOE as well as other federal agencies; a concentrated effort to rebuild the necessary nuclear enterprise, including a broad-based R&D effort; and engagement with industry and the international community. Key to ensuring a successful effort is decisive leadership and a strong public-private sector partnership.

Strategy and Policy Development

To facilitate that leadership, all stakeholders must work together to develop a comprehensive strategic plan that has broad, bipartisan support and clear, consistent communications among government, researchers, the international community, industrial stakeholders, and the public. The development and implementation of a strategic plan should include:

- A clear statement of national energy policies. The full range of benefits and risks involved in nuclear energy create an inextricable link between government and industry. Furthermore, government policies and programs should be harmonized with those of the private sector. This relationship must be a partnership.
- A clear differentiation between short- and long-term goals. Private sector providers of nuclear power have expressed their priorities, but they are inevitably short term in nature and may not necessarily include long-term, national priorities.
- A sustainable approach to used fuel disposition and waste management. Confidence must exist in the ability to manage nuclear fuel and to dispose of nuclear waste safely so as to enable the sustainable expansion of nuclear energy.
- A clear focus on strengthening the nonproliferation regime. Enhanced safeguards and physical security, international fuel service arrangements, and new nuclear fuel cycle technologies can advance our nonproliferation objectives.
- A mechanism for review by the stakeholders to ensure that the strategy remains relevant to current and future national needs and international conditions.

Rebuilding of the Nuclear Enterprise

The nuclear sector stakeholders must address three key areas: manufacturing base, science and technology infrastructure, and human capital. Expansion of nuclear energy will create stresses on the industrial resources needed to build and operate nuclear power plants. Nuclear power plants require a large forged pressure vessel and head, huge civil works, a myriad of pumps and valves, miles of piping and wiring, and robust process and system controls that must be “N-stamp qualified.” To have substantial growth in nuclear energy, more suppliers are needed. The worldwide forging capacity is very limited, and

none of it resides in the United States. This example illustrates one of the many choke points in the supply chain. Transport of material, support for construction, and enrichment of uranium for the fuel supply all must be considered. Moreover, financial institutions need to have confidence that a reliable supply chain exists before they will invest in new plant construction.

The science and technology infrastructure must include modern capabilities such as irradiation systems for testing new fuels and structural materials; chemical separations and characterization capabilities; and physics facilities for radiation transport, thermo-hydraulics, cross-sections, and criticality science. These and other capabilities require modern facilities; however, our current R&D infrastructure, which was built during the Cold War, has atrophied and is obsolete. Modeling and simulation technologies have made tremendous advances since the design of the existing facilities. The design of the next-generation facilities must incorporate state-of-the-art testing and diagnostics tools and be guided by the data requirements for advancing the realism and accuracy of high-performance simulation tools and approaches.

In addition, training the next generation of engineers and scientists must be an integral part of a robust nuclear program. A recent industry study pointed out that over the next five years, half of the nation's nuclear utility workforce will need to be replaced. To satisfy the need for both professional and crafts workers, government and industry must both play important roles to stimulate workforce development for construction, operations, and R&D by providing an environment that is exciting and thriving. Industrial and federal government commitment will be required to invigorate university and trade school programs. For example, the government should establish and fund a nuclear energy workforce development program at universities and colleges to meet the expected need.

Research and Development

To reduce cost, ensure sustainability, and improve efficiency, safety, and security, investments in a sustained nuclear science and technology R&D program are needed. Such a program must effectively support and integrate both basic and applied research and use, to the extent possible, modeling and simulation capabilities to address both near-term, evolutionary activities (e.g., life extensions of the current fleet) and long-term solutions (e.g., advanced reactors and fuel-cycle facilities). Industry will pursue evolutionary R&D to further improve efficiencies along each step of the current fuel cycle. It is incumbent upon the government, however, to implement long-term R&D programs for developing transformational technologies and options for advanced nuclear fuel cycles. Including regulators in the research and evaluation of results will facilitate the development of licensing and regulation of future nuclear facilities and technologies. Review of research plans and results by expert peer reviewers and open availability of the results will strengthen these efforts.

International Engagement

Thirty countries currently operate nuclear power reactors, and approximately thirty-five reactors are under construction outside the U.S. An additional two dozen countries

that have never used nuclear power to generate electricity (e.g., Egypt, Indonesia, Turkey, Vietnam) are now expressing serious interest in the technology, citing stability, security, sustainability, and environmental stewardship as key drivers. As a result, the amount and types of nuclear material in the world will grow, commerce in nuclear technology and materials will increase, and there will be interest in assuring a reliable supply of nuclear fuel. Ongoing bilateral and multilateral engagement will provide opportunities for improving our understanding of the needs, plans, and initiatives of other countries; the potential benefits and risks of these initiatives; and ways to positively impact technological development and choices. The R&D of viable technical options for the United States will also maximize our ability to influence the expanding global commercial enterprise.

CHALLENGES AND OPPORTUNITIES

Important challenges and opportunities are on the horizon: near-term expansion, used nuclear fuel disposition, a sustainable “closed” fuel cycle, and nonproliferation and security. These are discussed below.

Near-term Expansion

An urgent need exists to extend the life of our existing nuclear plants; to begin building new plants, including addressing the financial constraints; and to implement further cost improvements. Relicensing for 60 years has already occurred for many existing reactors and is being aggressively sought for the remaining plants. In parallel, R&D activities that explore the technical feasibility and path forward for long-term operations to 80 years should also be pursued.

Capital investments required for construction of nuclear plants are substantial, and private sector investment decisions must seriously consider risks over a long planning horizon, including the ability to recover capital costs through the rate base. Since new nuclear power deployments are in the national interest, the private sector and government share the responsibility for undertaking the activities needed to ensure that the investment risk associated with constructing, licensing, and operating new light-water reactors is reduced sufficiently to enable commercial investment and deployment. The Energy Policy Act of 2005 provides important loan guarantees, standby support, and tax credits to mitigate financial and regulatory risks that need to be implemented: the financial community and rate regulators must be engaged to enable nuclear energy expansion. Finally, critical support of the NRC for license review and approval also needs to continue to ensure timely review of new license applications.

Further cost-effective technical improvements to light-water reactors are feasible. In addition to simplified reactor and ancillary systems, areas of emphasis include the development of sensing capabilities, robust communication systems, and development of advanced approaches to safeguards and physical protection. The achievement of a simplified safe and secure plant will also require systematic consideration of human factors as a major contributor to a plant’s economics, safety, security, and operational performance. Many of these advances can also provide cost-efficient operations and maintenance of existing plants.

Used Nuclear Fuel Disposition

The disposition of used nuclear fuel must be considered from both a short- and long-term perspective. Confidence regarding the disposal of waste is needed before the NRC will grant a license for a new plant and before private investors will accept the financial risk of ordering new nuclear plants. In the short term, this confidence can be achieved by continuing the licensing of a geologic repository at Yucca Mountain and enabling the continued interim storage of used nuclear fuel in dry casks and fuel pools.

Dry cask storage is a safe and secure interim solution, either at existing reactor sites or consolidated regionally if future circumstances dictate. Through policy and investment actions, government can make it clear that interim storage is not intended to push the burden of an ultimate solution to a future generation, but rather to keep waste management options open, pending the results of continued R&D investments. The use of dry casks incorporates proven technologies and regulatory regimes to protect the public from hazards during handling, transport, and storage.

The design and operation of the repository may evolve as knowledge advances. Yucca Mountain Repository was envisioned at a time when the country did not have plans for significant nuclear energy expansion. At that time, used reactor fuel was considered “waste”; thus, direct disposal was chosen as the approach. In the long term, given the envisioned expanded use of nuclear energy, it is both appropriate and timely to reconsider the sustainability of the fuel cycle and to recognize that even with recycling, a geologic repository will be required. In our opinion, R&D must be conducted, and a comprehensive evaluation of disposition pathways must be performed.

Sustainable “Closed” Fuel Cycle

As nuclear energy expands, the traditional once-through fuel cycle will not be sustainable. To maximize the benefits of nuclear energy in an expanding *nuclear energy future*, “closing” the fuel cycle will ultimately be necessary. Simultaneously addressing such issues as the full utilization of the fuel’s stored energy content, waste minimization, and strengthening of the nonproliferation regime is essential and will require systems and economic analysis; and investigation of new technologies. Thus, the immediate urgency of our efforts should be directed toward conducting broad-based R&D to support an informed decision on how to proceed. The results of these investments will yield a deeper understanding of the above issues, and will provide the basis and timing for closing the fuel cycle. We believe that the decades-long hiatus in U.S. investment provides an opportunity and an advantage to avoid reliance on a dated recycling infrastructure. As a result, our nation has the opportunity, through new technologies and business models, to determine the best path forward.

An evaluation for light-water reactor recycling in the near-term must consider the increased efficiency in the use of fissile resources, the alteration of waste forms and reductions in overall waste burden, the anticipated need for plutonium/actinides to fuel fast reactors for burning or breeding, and U.S. nonproliferation objectives. Other considerations include establishing a credible U.S. role in an international fuel supply regime, getting our nation back into industrial-scale reprocessing, and demonstrating U.S.

leadership in providing nuclear safety, safeguards and other essential disciplines in the global nuclear renaissance. Integrated analyses of the factors above have not provided sufficient direct evidence to date to support substantial Federal Government investments to deploy existing technology for commercial scale recycling in light-water reactors. It is incumbent upon the Federal Government to establish the policy framework and working with industry ensure that technologies are available for deployment that satisfy that framework, including the non-proliferation and waste management considerations discussed in this paper, while the marketplace will ultimately determine the need for implementation within that framework.

Nonproliferation and Security

Strengthening the nuclear nonproliferation regime in the context of the global expansion of nuclear energy will require a multipronged approach. While the nonproliferation regime and other institutional measures will continue to provide the primary framework to ensure that the growth of nuclear power does not increase proliferation and terrorism risks, there should be a strong emphasis on limiting the spread of enrichment and reprocessing capabilities and enhancing our ability to track, control, and protect nuclear materials.

Three key areas will help to accomplish this focus: an assured fuel cycle service system with incentives for foregoing enrichment and reprocessing capability, improved safeguards technologies and transparency, and “safeguards by design” (i.e., designing safeguards technologies and methodologies into new facilities or systems). These key areas should be tightly integrated with other nuclear fuel cycle R&D and be informed by a risk assessment methodology. This methodology will enhance our ability to understand the benefits and risks of fuel cycle choices in the context of the overall fuel cycle system. These choices include technology options, framework options, and policy options. As an example, formulating international frameworks that support U.S. nonproliferation policy objectives will require understanding the energy goals and objectives of other countries, options for meeting these objectives, and a clear understanding of any specific trade-offs.

COMMITMENT OF THE NATIONAL LABORATORIES

Our nation is facing urgent problems in energy, environment, and national security. Nuclear energy can play a vital role in meeting our future energy needs, reducing our dependence on foreign oil, and protecting our environment. However, a clear national strategy with bipartisan support and strong U.S. leadership is necessary. The national laboratories, working in collaboration with industry, academia, and the international community, are committed to leading and providing the research and technologies required to support the global expansion of nuclear energy.

Chairman GORDON. Without objection, we will make that a part of the record.

Mr. BROUN. Thank you, and I want to note that Secretary Chu signed this document.

Chairman GORDON. Let me real quickly, I want to let you know the policy of the Chairman in terms of adding to the record. We want to keep a complete record, but if we have something that is 1,000 pages, we probably will not put it in the record but refer to it in the record and have it kept here. That is perfectly fine. But I don't want to surprise you at a later date if somebody has a thousand-page document. Part of it is just the expense of doing it.

Mr. BROUN. Thank you, Mr. Chairman.

Chairman GORDON. Mr. Bilbray is recognized, and I think you all are going to try to work things out so we will all be—

Secretary CHU. I will be very brief.

Chairman GORDON. OK.

THE GOVERNMENT TOOLS FOR REDUCING ENERGY USE

Mr. BILBRAY. Mr. Chu, again I want to say I was excited the President chose you. My biggest concern is making sure that your science does not get blocked by Washington's politics.

We talk a lot around here about how people need to change their lifestyles and to reduce their emissions and conserve energy. Business has to change its operations. But the one thing we don't see talked about much is how government needs to change. We are right now burning dirty coal to generate electricity for this place, and, you know, we are talking about all these lofty ideas but the reform aspect—in fact, I think the term we always talk about energy is, we need a Manhattan Project. The fact is, Mr. Secretary, the Manhattan Project could not legally be done today. It would be illegal to do it because of regulations. Are we looking at—are there any studies being done in your department of what we need to do to change government regulations to make energy more efficient? I will give you an example. We talk about conservation of individuals but government control of traffic could reduce emissions and consumption by almost 22 percent. You know, Mr. Baird talked about slowing down. Nobody even talks about the fact that the problem is the fact that the law isn't enforced? Is there any study or any proposal to do a study to look at what government and governments can do to reduce the energy dependency and to clean up the environment?

Secretary CHU. Specifically to your point, there probably are. I can't name the things, but let me just say very quickly, the Department of Energy does have a slight regulatory role. We do appliance standards, and those appliance standards have saved the country many billions of dollars. We are expanding those appliance standards because sometimes there is no price that will give it—oh, this is the best part. For the first time in history, the Department of Energy, we are enforcing them.

Mr. BILBRAY. I appreciate that, and I serve over the government reform, but my problem I have is that we—don't you believe that somebody who is looking at the scientific side of it needs—it needs to be from that perspective that we look at the government obstruction and barriers to get—a good example. I drove a natural gas car

in the 1990s but most public utility commissions will not allow public utilities to rate base you home dispensing of clean gas for cars. It is a technology we have but the government regulation keeps you from doing that. We don't allow—the building code doesn't allow the use of a lot of renewable resources because of obstruction. Don't you agree that it is time that as scientists look at this and say look, we would love—these are barriers that we have. A good example, let me just say, the algae fuels discoveries in California, I met with the governor and pointed out our environmental regulations in California stopped the production of algae fuel in California for the next decade where the scientists at Scripps have to go to New Mexico to do it. Don't you think that it is time that we have scientists take a look at—you know, start speaking out and be able to have some voice to be able to say these barriers must be eliminated?

Secretary CHU. Well, I think we are actually doing studies—there are many weatherization state energy grants. There are things like energy efficiency conservation block grants. There are NEPA requirements mandated by Congress. We are working through those things so that we can get—so we are trying to—

Mr. BILBRAY. I don't understand. We talk about spending money but we are not talking about asking government to do what we are asking business and individuals to do: change your operation, change your mindsets. And we are not doing that. You know, I take a look every time I stop at a stop sign. It could be a yield sign. It is five times more polluting than not having that sign there. But nobody calls the government down for that kind of emissions. It is out of sight and out of mind. Don't you think from a scientific point of view, especially when we talk about nuke, we talk about all these things, and government is in the way. The government answer is always, well, we will spend more money, and that is the big challenge I have there, and I appreciate. I am just raising this to please take a look at this. I look forward to working with your Department. I hope that we can do with nuclear power what we did with the interstate system and have your Department do more than just look at it and participate, but be the lead agency that is siting it. We couldn't build freeways and the interstate system in this country if we approached the transportation system the way we have approached our energy system. We would still be driving on two-lane roads. The private sector doesn't ask for a grant to site a freeway, to permit it. The government does that, and then we put it out to contract to the private. I would like to see us work together to be able to create that same dynamic when it comes to energy independence.

Chairman GORDON. Thank you, Mr. Bilbray.

Mr. Wilson is recognized.

COAL AND THE DOE

Mr. WILSON. Thank you, Mr. Chairman. Welcome back, Mr. Secretary.

The Department of Energy has a longstanding policy of refusing to provide loan guarantees to companies that are in litigation. What is frustrating to me is that environmental groups have taken advantage of this policy, filing thousands of frivolous lawsuits

against the coal-related projects and holding them up in courts indefinitely. Companies with viable projects are unable to proceed on a basic level because they can't get loan guarantees from the Department. I know that Ohio Governor Strickland has been in contact with the Administration about this as well, and therefore I ask you, will you be considering reexamining your Department's policy in certain situations for coal?

Secretary CHU. Well, in terms of loan guarantees, I don't think, to be quite candid, we can say we can give a loan guarantee to a company that is in litigation because we have a responsibility to taxpayers and sometimes the litigation puts the company at some uncertainty and financial risk. And so we have to certify again, ultimately, to the OMB that taxpayer dollars are protected. So when there is litigation, we have to say well, wait a minute, we can't do this until that is settled. So unfortunately, I think because of the constraints of the loan guarantee program, we can't do much about that.

Mr. WILSON. It is unfortunate. Let me go on to my second question. Ohio coal supplies 87 percent of the electricity, and most importantly, a lot of jobs in our area of Ohio. To me and my constituents, it would appear that the Administration has declared a war on coal with the hopes of eliminating its use entirely. Yet I see no way that this country's energy needs can be met without coal. How does the Department of Energy intend to bridge the gap both in terms of energy needs and jobs between now and 10 years from now if the pursuit to end coal usage were to be successful?

Secretary CHU. Well, we are investing quite a bit of money into learning how to use coal in a clean way so that we can continue to use it. As an example, through our programs and the Recovery Act, over \$4 billion of Federal funds have been invested in clean coal technologies over the last several years. That is actually matched by industry of something like \$6 billion or \$7 billion. And so there is a very healthy partnership going on to develop better and better ways, economically viable ways, to capture the carbon and to prove that it is safe in geological sites in, I believe, six or seven sites around the country. So are very heavily invested in that.

Mr. WILSON. And all due respect, Mr. Secretary, it looks like the Administration is saying one thing and then doing something entirely different. For example, on February 3rd, the President announced an Interagency Task Force on Carbon Capture and Storage. However, only two days earlier, the President revealed a budget with \$85 million cut to fossil fuel research and development. Can you address this perception in a way that sheds light on the future for coal within the Department of Energy?

Secretary CHU. Sure. Because of the investments we have been making in the Recovery Act, as I said, \$4 billion over a couple years is not chicken liver, to use an old Chinese expression. So we have a lot of investments out there, and the Clean Coal Power Initiative is being led by the Department of Energy's Jim Markowsky, a super guy. I don't think they are mixed signals. If you look at the amount of investment that we have been making over the last couple of years, our goal is to develop this technology so it can be deployed routinely in 10 years.

Mr. WILSON. Can I ask then, what steps are being taken by the Department of Energy this year in regard to the stated goal of having five to ten carbon capture and sequestration demonstration projects by 2016?

Secretary CHU. I would be glad to give you a detailed list of the projects we have invested in so you can see for yourself.

[Additional material submitted for the record follows:]

PREPARED RESPONSE OF SECRETARY CHU

Over \$3.3B of the \$3.4B the Office of Fossil Energy received in the *American Recovery and Reinvestment Act* and over \$600M in appropriated Clean Coal Power Initiative funds will go toward demonstration projects. These projects will count toward meeting the President's goal of five to ten carbon capture and storage (CCS) demonstration projects by 2016. Additionally, on February 3, 2010, the President issued a memorandum establishing an interagency Carbon Capture and Storage Task Force to identify barriers to widespread CCS deployment. One of the topics the task force will investigate is the adequacy of the currently planned demonstration projects.

Following is a list of projects currently underway or planned:

Currently underway:

FutureGen

HECA—Hydrogen Energy California IGCC project

Summit—Texas Clean Energy IGCC project

Southern—Kemper County IGCC project

Excelsior—Mesaba IGCC project

AEP—American Electric Power Mountaineer Post Combustion with Carbon Capture and Storage (CCS) project

NRG—Post Combustion with CCS project

Basin—Post Combustion with CCS project

Neuco—Pegasus Software project

Planned: 5 or 6 Industrial Carbon Capture and Storage (ICCS) projects (down-select coming in June, 2010)

Mr. WILSON. I would appreciate that. Thank you, Mr. Secretary. Chairman GORDON. Mr. Smith is recognized.

SMART GRID AND WIND ENERGY TRANSMISSION

Mr. SMITH. Thank you, Mr. Chairman. In the interests of time, Nebraska wind transmission capacity—you know where I am going, the President's request for \$144 million to research and develop smart grid technology. How might you think we would be able to capitalize on the wind resources of middle America and yet still lack the transmission capacity?

Secretary CHU. I think we need both simultaneously. It is a very complex problem, as you well know. It goes across jurisdiction, FERC plus the Department of Energy. We need the cooperation of the states. The siting problem is the most vexing problem, siting and costing.

Mr. SMITH. Siting of turbines or—

Secretary CHU. Sorry, the siting of the transmission lines. The turbines—

Mr. SMITH. What do you see as the primary obstacle to those?

Secretary CHU. I think people don't like to see high-voltage transmission lines in their backyard. They think, you know, bringing electricity to people is just fine, just don't put it in my backyard.

Mr. SMITH. And do you feel that that is a local issue or is it sometimes some outside groups who want to determine where something like that should go or shouldn't exist?

Secretary CHU. I think it is both, but to be frank, I think there are a lot of people who really don't want these very high towers in their backyard. So we have to think of mechanisms in order to make that happen. But we don't have the answer now. The Green Cabinet has been meeting on this issue because we know it is a problem, but I have to say quite frankly, we don't have the clear solution yet.

CAP AND TRADE

Mr. SMITH. Shifting gears just a bit, on the cap and trade, I know that I have been contacted by numerous folks. One person suggested when I raised concerns about the rail industry, particularly in my district, she suggested that hauling wind turbines could replace hauling coal. Is that feasible? And if not, do you see it on the horizon?

Secretary CHU. Well, I think you want to haul wind turbines, put them up and then I think there could be coal by wire if you—there are many, many opportunities. You don't haul, you generate the electricity, you can sequester the carbon where you mine it and then you transmit the electricity but, it depends on the commercial viability and those things. And so one is looking at all these ways of doing this.

Mr. SMITH. Thank you. And when it comes to the Energy Information Administration estimating how much energy prices might skyrocket under cap and trade, and to use someone else's words and description there, given their mission to analyze the information to promote sound policymaking and our responsibility to make sound policy decisions, can you comment on what that agency has done in terms of estimating the cost to the public?

Secretary CHU. Sure. I don't remember the exact number but it is—you take the average family of four in a household, an average household. There was a range. I seem to remember it is somewhere between 30 and 45 cents per day, so multiplied by 365 days, we are talking a couple hundred dollars a year added energy expense. Let me add, though, that if one simultaneously—which, you know, to some, that is significant, to others, it is not, but if you simultaneously develop programs to help the American homeowners weatherize their homes, make their homes tighter, more efficient, the bills could actually go down.

Mr. SMITH. OK. I know it sounds cliché in this town to thank you for your service but I am grateful for your service. Thank you.

Chairman GORDON. Mr. Hall is recognized for just a few seconds.
Mr. HALL. Thank you.

MORE ON THE ULTRA-DEEPWATER PROGRAM

Mr. Secretary, if you ever get around to answering all of Dr. Broun's questions, I hope you will come back to the one the I asked you about, section 999 of the Energy Policy Act of 2005. It has been working, and you have a program to eliminate the Ultra-Deep program, how can you justify eliminating that. But loaning, whether

it is the government or an entity, \$2 billion to Brazil to finance offshore deepwater Santos base in Rio de Janeiro. Try to find that for me. Thank you, sir, and I yield back my time.¹

Chairman GORDON. The geographically flexible Mr. Diaz-Balart is recognized.

Mr. DIAZ-BALART. Thank you, Mr. Chairman. Very well put.

Thank you, Mr. Secretary. Thank you for your service. I have two questions. Really, one should be relatively quick. Yucca Mountain, specifically what scientific analysis was used to determine that scientifically that was no longer the place to do it and where is it? In other words, was there a deep scientific analysis, a group of scientists got together, they did a report, a study, where is it, who did it?

Secretary CHU. No, I believe there was no—sorry. Let me rephrase that. I believe there is no scientific group that got together and did that.

Mr. DIAZ-BALART. There was no scientific analysis to determine that?

Secretary CHU. No, there is scientific analysis, but specific to your question, there was no group that was formed that did that.

Mr. DIAZ-BALART. Well, what scientific analysis? Who made the—who did the scientific analysis to determine that and where is that analysis or was it—how was that decision made scientifically? I am talking about, what was the scientific analysis behind the decision? Remember, the President said he wanted to bring science into its rightful place, and I am paraphrasing. Where is the scientific analysis and who made it?

Secretary CHU. Well, there are a number of things. As the project unfolded over the 25 years, there was growing realization that there were issues. The original design, for example, there was a realization—so bits of information were coming along at the time and so, for example, there was a realization that the natural geography wasn't enough, you needed a titanium shield that would be many, many billions of dollars more in order to protect the water influx into it. So these were things—so to the best of my knowledge, more and more mounting issues were growing.

Mr. DIAZ-BALART. Mr. Secretary, and again I apologize. I do have to rush because we are running out of time. I apologize. But here is the issue. I mean, look, there was a decision made to withdraw that application so where was the scientific analysis that determined that? Where is it? In other words, we know there are a million issues in all this stuff. There are a million issues on both sides. But there was a decision made to withdraw the application. Where is the scientific analysis to do that?

Secretary CHU. I would be glad to give you some of the things over the period of years that were growing concerns, but in the end, as I said, let us look forward. There are, I believe, much better options today.

Mr. DIAZ-BALART. I understand that, but a decision was made, and what I am hearing from you, sir, is that there was no scientific analysis made, that things had been heard in the past and there-

¹ See additional material submitted for the record in Discussion chapter "The Ultra-Deepwater Program".

fore hey, let us just do it. There was no specific scientific analysis made to make this decision is what I am hearing.

Secretary CHU. Well, no. What you asked is, was there a—

Mr. DIAZ-BALART. Specific scientific analysis.

Secretary CHU. Was there a specific committee formed and made the scientific analysis.

Mr. DIAZ-BALART. No. What—how was the scientific analysis made? I mean, is it because we have heard things in the past? I mean, you know, we now know that there are a lot of things that people heard in, you know, magazines and scientific decisions were made based on that. What was the scientific analysis and who made it to withdraw the application? It is a relatively simple question.

Secretary CHU. There is no single report.

Mr. DIAZ-BALART. There is no scientific analysis?

Secretary CHU. Well—

Mr. DIAZ-BALART. Was there a recent scientific analysis that showed something different?

Secretary CHU. By analysis, you are talking about a written report?

Mr. DIAZ-BALART. Scientific analysis.

Secretary CHU. Well, I would be glad to give you information on as time progressed what things were coming up. I would be glad to give you—

Mr. DIAZ-BALART. But there was no specific scientific analysis to make the decision to withdraw the application?

Secretary CHU. Well, it depends. You have to define for me if you don't want a letter explaining what some of the reasons that made it look like perhaps not the wisest choice. I would be glad to supply you with that. But if that doesn't count as a scientific analysis, I am not—

Mr. DIAZ-BALART. Well, you tell me. Do you consider that scientific analysis to make a decision of this scope or do you expect more scientific analysis? If you can get back to me, because I am not seeming to get it now.

[Additional material submitted for the record follows:]

PREPARED RESPONSE OF SECRETARY CHU

As requested by Congressman Mario Diaz-Balart at the March 3, 2010, House Science and Technology Committee hearing, I am submitting information on the reasons for withdrawing the Department's license application to the U.S. Nuclear Regulatory Commission (NRC) for the Yucca Mountain repository.

DOE is committed to meet the Government's obligation to take possession and dispose of the nation's spent nuclear fuel and high-level nuclear waste. The Administration believes there are better solutions to our spent fuel and nuclear waste storage needs than Yucca Mountain. The science has advanced considerably since the Yucca Mountain site was chosen 25 years ago. That is why we have convened the Blue Ribbon Commission on America's Nuclear Future; 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. The Commission plans to issue an interim report in 18 months and a final report within 24 months of its inception.

The decision to withdraw the pending NRC application accords with these decisions and avoids wasting approximately \$9 million per month on a licensing process for a project that is being terminated. It also ensures that the limited remaining funds available for the project are devoted to winding it down in a responsible manner that preserves scientific knowledge, retains employees with critical skills within the Department and minimizes harm to all affected employees.

The Department of Energy's Motion to Withdraw before the NRC summarizes its rationale for moving to withdraw the Yucca Mountain license application.²

We talked a little bit about the stimulus. There is a thing today that I just saw on Politico which talks about the stimulus. It says a number of Democrats are—this is the article—furious that a majority of the grants from the clean energy program from last year's stimulus have been awarded to foreign companies including one project that they make specific mention to, 3,000 jobs created in China where a tenth of those created in the United States. You know, I mean, we have all heard about the stimulus. It has obviously been a dismal failure, and we have heard about the \$18 million web pages and the millions of dollars for political consultants that helped individual candidates and millions of dollars going to Congressional districts that don't exist. This just seems to be another example of that. And if you wonder why the American people know, the reality is because here is just another example. I don't think it is in the published edition for all of you. It is on the web one. Mr. Chairman, again, it seems to be now another example of, if this happened in a different country, if money to create jobs went to Congressional districts that didn't exist, to projects that don't exist and to other countries, if this happened in a Latin American country, we wouldn't even call this waste. We know what we would call it. We would call it corruption.

Chairman GORDON. Dr. Ehlers gets to have the last word.

Mr. DIAZ-BALART. Thank you, sir.

Mr. EHLERS. Thank you, and if Mr. Diaz-Balart will remain a minute, I will give him my answer to his question but very briefly. I think the basic problem started in 1980 when Congress passed a bill which to me seemed rather absurd putting requirements on Yucca Mountain that in my mind could not possibly be met under any reasonable procedures and made it extremely costly. There are far better ways to deal with the nuclear waste than Yucca Mountain. And I don't want to waste my time by going into a lot of the details but I think the Department of Energy did the right thing, that Congress itself should have recognized that. I attempted when I first got here to try to write a decent law. The reaction from almost every Congressman I met was, oh, no, we don't want to touch that, we don't want to touch that, we don't want to touch it. And if you don't touch the law and change the law to deal with new discoveries and new situations, you can't make progress. So I think the decision was the right one.

Mr. DIAZ-BALART. Will the gentleman yield for 15 seconds?

Mr. EHLERS. No. I have very little time and you have had more than enough time.

ENERGY EFFICIENCY

I just want to comment on a major issue that I think the Department should spend a lot more time on, and that is part of what Dr. Bartlett was talking about and Dr. Baird, and I would hope that we would put far more emphasis on energy efficiency than we have. We have put far more emphasis on educating the people about energy waste, what is efficiency. I find that most people, most

²Motion is included in Appendix 2: Additional Material for the Record.

laypeople, don't even know what energy is, let alone energy efficiency, and I would love to see the Department doing more. I think it is an indictment, and this is long before you got here, that the only government program that really helped on energy efficiency did not come out of the Department of Energy but from the EPA with their Green Lights program for businesses. They went around the country, talked to businesses, showed them what the payback time was to put in efficient lighting in their factories, their shops, their stores, and by George, it was about a year and a half, sometimes two years payback time. Any businessman would jump at an investment that gets paid off in that short a time, and I would really like to see the Department of Energy emphasize that much more and be a servant of the people in that way.

I am delighted with what you are doing with the appliance standards, by the way. That is very good.

Also, Dr. Baird had some good points too and I won't repeat that, but I support what he was suggesting too. So I think the word was that you should probably hire or have the White House hire Dr. Bartlett and Dr. Baird. I don't know about Dr. Bartlett. I think he plans to run again but Dr. Baird is not running again. I am not running again. But I don't want a job. I just would be happy to help in any way I can without pay. That is a standing offer. But there is so much to be done in the area of energy efficiency, energy sources and energy education that I really think a lot of effort should go into that, and I would be happy to—we are out of time here, but I would be happy to talk to you about that.

Secretary CHU. I will take you up on that. There are not enough physicists in the Department of Energy. We would be happy to have one more.

Chairman GORDON. Thank you, Dr. Ehlers.

Mr. EHLERS. Even an unemployed one.

CLOSING

Chairman GORDON. Dr. Chu, you are always a crowd pleaser, so thank you for being here.

The record will remain open for two weeks for additional statements from members and the answers to any follow-up questions the committee may ask the witnesses. The witness is excused and the hearing is adjourned.

[Whereupon, at 2:02 p.m., the Committee was adjourned.]

Appendix 1:

ANSWERS TO POST-HEARING QUESTIONS

ANSWERS TO POST-HEARING QUESTIONS

Responses by Secretary Steven Chu, Secretary of Energy, U.S. Department of Energy

Questions submitted by Representative Daniel Lipinski**Infrastructure Spending**

Q1. I would like to understand DOE infrastructure spending and plans. Your written testimony states that DOE has requested \$7B to “upgrade our infrastructure that has been allowed to decay in the past decade, support the cutting-edge work our National Labs, and recruit the skilled workforce we need.” How much of this \$7B is going to infrastructure support, including both equipment and facilities? How does this subtotal breakdown between science laboratories and NNSA facilities? How large is our deferred maintenance backlog at the National Labs?

A1. The \$7 billion dollars to which you refer is the total requested for the Weapons Activities appropriation within the National Nuclear Security Administration to ensure the safety, security and effectiveness of our nuclear stockpile. Of the \$7 billion, approximately \$2.4 billion will provide infrastructure support. Within this amount, about \$2.3 billion is for programs that predominately support equipment and facilities—Readiness in Technical Base and Facilities; Secure Transportation Asset; Facilities and Infrastructure Recapitalization Program; and Site Stewardship. The balance of the \$2.4 billion funds capital equipment, general plant projects and construction line items supporting other Weapons Activities program areas.

Of the \$2.4 billion in infrastructure support, approximately \$1 billion would be spent at the Livermore, Los Alamos and Sandia National Laboratories.

As of the end of FY 2009, the deferred maintenance backlog at these laboratories was approximately \$1.5 billion.

Q2. I understand that the total Office of Science FY 2011 request for science laboratories infrastructure is \$126 M, 1.3% less than FY 2010 appropriations. Is this correct? How much do you project the Office of Science will need to maintain and modernize its physical plant over the next 10 years?

A2. The FY 2011 request reflects the completion of funding in FY 2010 for the Interdisciplinary Science Building at Brookhaven National Laboratory, as well as increases in remaining ongoing projects and the initiation of two new projects at the Fermi and Jefferson laboratories. The net effect is a small reduction in the FY 2011 request relative to the FY 2010 appropriation. The Science Laboratories Infrastructure program includes construction projects that will modernize the Office of Science laboratory facilities and utility systems, ensuring that they are mission-ready and can fully support scientific discovery. Seven projects have started design, construction, or both, with two additional projects proposed for 2011 funding. The cost of the full portfolio of recapitalization projects for which we have tentatively identified a need is roughly \$2.2 billion.

Questions submitted by Representative Paul D. Tonko

Q1. During my review of the Electricity Delivery and Energy Reliability budget I noticed an increase of \$26 million for energy storage technology research towards larger lithium ion batteries. My question is why is DOE requesting extra funding directed towards only larger lithium ion batteries, when there are many different types of batteries under development especially when it comes to stationary uses. Why not make the funding technology neutral?

A1. The Department’s FY 2011 increase for energy storage supports investments in a range of energy storage technologies and electricity grid applications, not just lithium ion batteries. The \$26 million increase will provide funding for a whole portfolio of research and field verifications, including advanced lead-carbon batteries, metal-air batteries, ultra fast flywheels, ultracapacitors, compressed air energy storage technologies, as well as large scale lithium ion systems. Also included are analytical studies of storage costs and benefits, and ongoing collaborative projects with state energy agencies such as California and New York.

Q2. I think most everyone on this committee is looking forward to the creation of the energy innovation hubs. I believe they will produce great outcomes for DOE and for our nation. Even through DOE is still in the process of setting up the first innovation hub, have there been any issues that have arisen thus far with imple-

mentation? Also, are there issues Congress can help resolve when it comes to streamlining and simplifying the application process for future hubs?

A2. The Department of Energy is in the process of establishing three Energy Innovation Hubs under the FY 2010 appropriations: Fuels from Sunlight; Modeling and Simulation for Nuclear Reactors; and Energy Efficient Building Systems Design. The Department coordinated development and issuance of the three Funding Opportunity Announcements (FOAs) for these Hubs. In each instance, applications are being evaluated according to the specific merit review criteria set forth in each FOA. The process is proceeding smoothly, and awards will be announced later this fiscal year. The application process for any potential future Hub will likely follow this same process.

Q3. *Do you support 100% fuel neutrality in the Clean Cities program to allow the best technology to come to market, instead of picking a fuel winner? If not, why not?*

A3. Yes, the Clean Cities program has supported fuel neutrality to allow local and regional groups to choose which technologies and alternative fuels make the most sense for their specific situation. This policy accommodates regional diversity and practical considerations related to local economic, business case, and market conditions as well as technology performance issues (impacts of severe cold or hot weather, unusual vehicle duty cycles, local air quality regulations, etc.). For the Fiscal Year 2011 budget request, Clean Cities proposes a portion of the budget for focused activity in electrification infrastructure to facilitate the introduction of a number of electric drive models, as well as to supplement activity supported by the Recovery Act.

Questions submitted by Representative John Garamendi

Q1. *NERSC is no longer a part of the INCITE program, even though industry could often benefit more from the software expertise and computing capabilities of NERSC. Why is this the case and does the Department have a plan for utilizing the unique capabilities of NERSC for solving applied problems that may not need the massive computing power of the Leadership Class Facilities?*

A1. Although NERSC is no longer a part of the INCITE program, the ASCR Leadership Computing Challenge (ALCC), created in 2009, allocates up to 30 percent of the computational resources at NERSC and the Oak Ridge and Argonne Leadership Computing Facilities to scientists from academia, industry, other agencies, and the DOE applied programs. This allocation process is available year-round for high-risk, high-payoff simulations in areas directly related to the Department's energy mission, for national emergencies, and for broadening the community of researchers capable of using leadership computing resources. We believe that this is a more appropriate allocation mechanism for those industry and applied program research applications that may not need the massive computing power of the Leadership Class Facilities.

Q2. *The Department of Defense is the nation's largest single user of energy and the 2010 Quadrennial Defense Review recognizes the need for DOD to use alternative energy and improve energy efficiency to support its critical national security mission. In my District, Travis Air Force Base, the premier airlift facility on the West Coast, is taking steps to achieve greater energy efficiency and use energy from renewable sources, but they will need new technology to achieve their goals. As you know, my District is also home to two DOE national laboratories—Sandia and Lawrence Livermore. Therefore, what steps is the Department of Energy taking to partner with DOD to make sure that new energy technologies are being transferred and made available for the DOD to implement? Specifically, how are the capabilities of the DOE national laboratories being used to support the important DOD objective?*

A2. Significant collaboration exists between the Department of Energy (DOE) National Laboratories and the Department of Defense (DOD) and DOE Lab capabilities are being used to help DOD achieve its alternative energy and energy efficiency goals.

As an example of this support, the Federal Energy Management Program (FEMP) within the DOE's Office of Energy Efficiency and Renewable Energy used American Recovery and Reinvestment Act (ARRA) funds to issue a call for National Laboratory technical assistance (TA) services for Federal agency applicants. FEMP provided TA to DOD facilities through this call with the Navy, Army, Air Force, Marines, Pacific Command (PACOM), and Northern Command (NORTHCOM). While

not all projects fit into one category, most projects involve retro-commissioning, renewables, assessments, training, micro-grid/smart-grid analysis or some combination of these four activities.

The PACOM technical assistance project funded through the FEMP ARRA TA call is one example of using an integrated team of DOE National Labs to address complex DOD energy objectives. To help meet energy challenges at PACOM, FEMP organized a multilaboratory team to use each lab's area of expertise. The PACOM energy goal is to develop an integrated, expanded approach for military installations which will advance energy efficiency, renewable energy, energy manager training, and micro grid assessments. Instead of implementing individual projects, this systems approach maximizes energy savings by providing a framework for integrating the individual components into a logical whole.

FEMP has also funded NREL to provide expertise on in-theater tactical energy use assessment trips with the Marine Corps and the Air Force. During these two trips, NREL experts helped identify potential energy efficiencies in a deployed environment.

DOD and the Services are also receiving lab expertise through the DOD-DOE Initiative Net Zero Energy Installation (NZEI) activity to address issues of energy security. Through this initiative, NREL is analyzing one installation from each service to determine the potential for it to become a net zero energy installation. The sites selected are MCAS Miramar (Marine Corps), Air Force Academy (Air Force), and Pohakuloa Training Area (Army). The Navy project identification is pending. Based on the MCAS Miramar project, NREL is creating a standardized NZEI process template for other military bases.

In conclusion, the DOE National Laboratories are a resource for DOD facilities to achieve their energy goals. Dr. Dorothy Robyn, Deputy Under Secretary of Defense for Installations and Environment, supported this in her testimony before the House Armed Services Committee Subcommittee on Readiness, stating, "With respect to facilities energy, the military's most valuable role will be as a testbed for next generation technologies coming out of laboratories in industry, universities and the Department of Energy¹." DOE continues to interact with DOD to increase coordination and ensure that the DOD can increase its access to the DOE's National Laboratory System.

Q3. I would like to thank you, Mr. Secretary, for your prompt attention to a letter my colleagues and I sent on February 1st requesting you to appoint a Technology Transfer Coordinator. This appointment is an important first step in the revitalization of a robust Technology Transfer program which will ultimately lead to additional U.S. jobs and reestablish the technology leadership of the U.S. Mr. Secretary, I would like to know, now that the Coordinator is in place, how does the Department intend to find the funding needed to actually get money to our national laboratories to make technology transfer a reality?

A3. On February 23, 2010, I announced the selection of Dr. Karina Edmonds to serve as the Department of Energy's new Technology Transfer Coordinator. She will oversee a coordinated, strategic effort on behalf of the Department to increase the rate of successful technology transfers, create clean energy jobs, and provide more solutions to our energy and climate challenges. Dr. Edmonds will work directly with the Department's national laboratories to accelerate the process of moving discoveries and inventions from the laboratory to the private sector and ensure that America's scientific leadership translates into new, high-paying jobs for America's families.

Dr. Edmonds is scheduled to join the Department in mid-April 2010. Among her first tasks will be visits to the national laboratories, to discuss opportunities for streamlining the technology transfer process and reducing transaction costs. This should make the Department a more responsive partner for both large and small companies, as well as nonprofit R&D institutions, venture capital, and other investors.

Question submitted by Representative Lincoln Davis

Q1. The DOE energy programs conduct a significant part of the research at the Office of Science labs, drawing on the strong capabilities and tools that exist there. However, much of the infrastructure that supports these programs is aging and

¹Statement of Deputy Under Secretary of Defense for Installations and Environment Dr. Dorothy Robyn before the House Armed Services Committee Subcommittee on Readiness. February 24, 2010 http://www.acq.osd.mil/ie/download/robyn_testimony022410.pdf

no longer state of the art. While the Recovery Act has provided an opportunity to renew DOE infrastructure, there may still be additional opportunities to create jobs by considering funding infrastructure at science labs conducting research for the Energy Efficiency and Renewable Energy program by using some of the remaining ARRA funding. Oak Ridge has been working on a Translational Research Building that is ready to go and would be an example of how job creation could be accelerated and future EERE research supported. Secretary Chu, do you think we need to be using funds across the complex to modernize and update all science lab facilities that conduct EERE R&D work? Furthermore, could Recovery Act funding for EERE be used to address some of the immediate infrastructure needs of the program across the national laboratory complex?

A1. The Department's Office of Energy Efficiency and Renewable Energy (EERE) works with a variety of national laboratories to accomplish our mission of strengthening America's energy security, environmental quality and economic vitality. Yes, we believe that utilizing funding across the complex to modernize all labs that conduct EERE R&D is a good idea. To that end, EERE has awarded over \$258 million in Recovery Act funding to facilities projects that are largely directed to construct, upgrade, renew and modernize lab facilities and their infrastructure:

- Integrated Biorefinery Research Expansion—\$13.4 million for the construction of a national facility that provides continuous industrial scale research and development process capability designed to accelerate the development of advanced waste cellulose to ethanol production processes.
- Renewable Energy and Supporting Site Infrastructure—\$86.8 million to acquire renewable energy capabilities to replace electricity and gas purchased through the local utility, increase security capability, provide ADA access improvements, and provide enhanced site pedestrian access and circulation to the National Renewable Energy Laboratory (NREL). This project will develop a renewable energy strategy and design renewable energy supply networks to power the NREL site and buildings in pursuit of net zero energy.
- Lab Call for Facilities and Equipment—\$104.8 million to construct and/or buildout an existing facility to conduct research on the systems design, integration and control of new and existing buildings; construct highly flexible, highly instrumented, pilot scale facilities needed to support new and enhanced R&D into advanced energy storage technologies (batteries, ultra-capacitors, asymmetric or hybrid ultra-capacitors) for automotive applications; and construct and operate a highly flexible, highly instrumented low cost carbon fiber technology demonstration facility for demonstrating and evaluating new low-cost manufacturing processes and technologies at pilot scale.
- National Wind Technology Center (NWTC) Upgrades—\$10.0 million to provide the NWTC with two major upgrades to existing facilities that support testing of wind turbines: upgrades to the 2.5MW dynamometer facility to 5.0MW and upgrades to the electrical distribution system.
- National Renewable Energy Laboratory (NREL) Ingress/Egress Project—\$44 million for the parking, site access, and roadway improvements necessary to efficiently and effectively support development of the NREL campus and to maintain the safety and security of NREL.

For example, \$54 million was competitively awarded to the Oak Ridge National Lab for infrastructure investments expected to create jobs and aid future research. The investments at Oak Ridge include a Net-Zero Energy Buildings Research Laboratory and a 20,000 square foot Carbon Fiber Technology Center to help develop the next generation of lightweight materials to improve vehicle efficiency. These investments address critical infrastructure needs as the labs continue to expand their portfolios of research. The Recovery Act investments at Oak Ridge and other national labs are key to advancing our R&D work as well as accomplishing our mission.

Question submitted by Representative Ben Chandler

Q1. *Secretary Chu, the Department of Energy, through the American Reinvestment and Recovery Act and other funding opportunities, has shown that advanced battery manufacturing technology is a priority for the Obama Administration. As you know, nearly all high-volume commercial production of advanced batteries occurs in Asia, where government investment has facilitated the rapid development and production of these technologies. The Commonwealth of Kentucky*

is attempting to help the United States become a leader in the development of this technology by establishing a Battery Manufacturing R&D Center.

The center—a joint effort between the Commonwealth (represented by the University of Kentucky and the University of Louisville) and Argonne National Laboratory—will focus on the development and integration of manufacturing technology for new energy storage applications, and more specifically, the research and development of new battery technologies for the automotive sector.

How does the work that this Center will perform mirror the goals of the Obama Administration on advanced battery manufacturing technology? Also, how does the President's budget create or encourage research and development and/or manufacturing opportunities to create a vibrant and globally competitive Lithium-Ion industry in the United States?

A1. The President's budget places increasing importance on supporting research and development of battery technology. The American Reinvestment and Recovery Act created major opportunities for establishing domestic lithium-ion manufacturing facilities through competitive awards. In addition, the Advanced Technology Vehicles Manufacturing (AVTM) loan program and 48c tax credits support domestic manufacturers of advanced batteries. The combination of accelerated R&D and investment in manufacturing capabilities is expected to help create a vibrant and globally competitive advanced battery industry in the United States.

The work the Battery Manufacturing R&D Center plans to perform supports the goals of the Administration to establish a domestic advanced battery manufacturing capability. Its emphasis on battery manufacturing technology could help to bridge the gap between existing competitively awarded battery research/development efforts and the industrial materials and processes that are needed for fabricating these batteries on a mass production scale and at a globally competitive cost.

As you are probably aware, the Commerce Department's National Institute of Standards and Technology (NIST) recently awarded an \$11.8 million grant to the University of Kentucky Center for Applied Energy Research (CAER) to expand their laboratory facilities, including research into advanced battery technology for plug-in hybrid vehicles at the Kentucky-Argonne National Battery Manufacturing Research and Development Center. The new facility will include labs for process development, prototype manufacturing and testing to support applied research on batteries and capacitors.

Questions submitted by Ranking Member Ralph M. Hall

Office of Science Prioritization

Q1a. *In 2006 testimony before this Committee on behalf of the National Academies' Gathering Storm report, you said "In funding ARPA-E, it is critical that its funding not jeopardize the basic research Supported by the Department of Energy's Office of Science. The committee's recommendations are prioritized and its top recommendation in the area of research is to increase the funding for basic research by 10% per year over the next seven years." [Source: <http://science.house.gov/commdocs/hearings/ful106March%209/Chu.pdf>]*

The DOE budget requests \$300 million for ARPA-E, but only provides a four percent increase for the Office of Science (after it received just a two percent increase in FY 2010). This clearly violates the principle set forth in your 2006 testimony and the NAS Gathering Storm recommendations. What is the basis for the Administration's decision to place a lower priority on Office of Science funding?

A1a. The President's Plan for Science and Innovation commits to doubling the overall Federal investment in basic research at the Office of Science, the National Science Foundation, and the National Institute of Standards and Technology. The FY 2011 Office of Science request of \$5.12 billion represents 41 percent growth over the FY 2006 appropriation of \$3.63 billion; this growth equates to an annualized growth rate of 7.1 percent, close to the annualized growth rate of 7.2 percent required to double funding over ten years. While the President's Plan does not promise a specific growth rate for each individual agency, basic research funding in the Office of Science is on a strong growth path. Funding support for the Advanced Research Projects Agency-Energy has not jeopardized this growth path.

In addition to the annually appropriated funds, the American Recovery and Reinvestment Act provided \$1.6 billion for the Office of Science, which further supports the Office's basic science mission and the President's Science and Innovation Plan.

Q1b. Related to this, your testimony stated that the budget “sustains the President’s commitment to double the budgets of three key science agencies,” including the DOE Office of Science. However, the Office of Science is increased by just 4.4 percent, after receiving only a two percent increase last year. Do you intend to double the budget for the Office of Science and if so, over, how many years?

A1b. The FY 2011 request represents a 7.1 percent annualized growth rate since the FY 2006 appropriation. The White House Office of Science and Technology Policy released a document as part of the budget rollout entitled “Doubling Funding at Key Science Agencies” (available at <http://www.whitehouse.gov/sites/default/files/doubling%2011%20final.pdf>), which shows the doubling profile is on track to be completed by FY 2017.

Q2a. You stated in your testimony that ARPA-E “is dedicated to the market adoption” of new energy technologies. The statutory charge for ARPA-E, however, makes no reference to “market adoption” but instead says that ARPA-E’s mission should be to “overcome longterm and high-risk technological barriers.” Please reconcile this statement in your testimony in the context of ARPA-E’s statutory charge.

A2a. Your statement is correct about the statutory mission given for the establishment of ARPA-E in the *America COMPETES Act* of 2007. The statute elaborates on the means to achieving this mission as “translating scientific discoveries and cutting-edge inventions into technological innovations” and “accelerating transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty.” Included among the responsibilities of the ARPA-E Director in achieving the goals of ARPA-E is through awards that target acceleration of “demonstration of technologies and research applications to facilitate technology transfer.” We feel that the intent of the statute, though not completely explicit and at the same not entirely implicit, is for ARPA-E to overcome long-term and high-risk technological barriers that are preventing the translation of scientific discoveries and cutting-edge inventions into technological innovations, and to facilitate the transfer of those technological innovations to the market.

It is important to note that ARPA-E will not be picking the winners and deciding which technologies and associated products will be put on the market. Demand pull from the market and private companies will decide the winners. ARPA-E’s role is simply to identify and fund research projects that will overcome the long-term and high-risk technological barriers that are preventing a promising potentially transformational technological innovation from getting to the stage where private investment will take over and turn the technology into a marketable product. *Furthermore, ARPA-E will invest in multiple competitive approaches to reach technology targets, and then let the private sector pick those approaches that is best for business.*

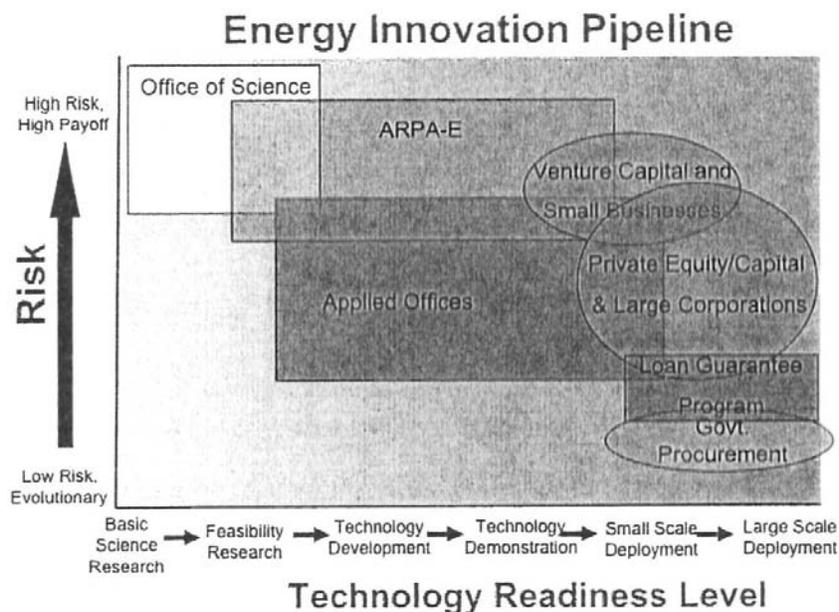
Q2b. Related to this, the law establishing ARPA-E states that it should pursue “high-risk” technological advances “in areas that industry by itself is not likely to undertake.” This seems appropriate, and will presumably ensure that tax dollars don’t compete with venture capital or other private equity, but rather are focused on advancing technologies through the “valley of death” that is too risky for private investment. Do you agree with this philosophy—specifically that tax dollars should not be invested/spent on technologies where the risk is already low enough to attract private investment?

A2b. I do agree with the philosophy outlined in the ARPA-E authorizing legislation. ARPA-E has a rigorous process for evaluating and selecting proposals. For its first funding opportunity, ARPA-E evaluated over 3,700 concept papers, and selected only 37 submissions for award. ARPA-E does not fund applications that are deemed to have low transformational value, meaning incremental improvements on existing technology. ARPA-E does not seek to ascend existing learning curves; instead, ARPA-E seeks to create entirely new learning curves. These types of projects have high technical and/or market uncertainty, and are not being funded by industry.

We meet and communicate regularly with venture capitalists and other private investors to get a sense of their appetite for risk and the types of projects they are funding and not funding. In addition, I have hired staff with background in the venture capital industry in order to make more precise determinations of the types of high risk projects that are appropriate for ARPA-E to fund.

Let me also explain through the figure below. Office of Science funds research in basic science and, at times, feasibility of a basic idea or a concept. Private capital is generally available at Technology Readiness Levels when products can be made based on a technology, and customers are ready to buy such products. Therefore,

from the concept feasibility stage to the product development stage, a big gap exists today where many good ideas perish because the concepts cannot be translated into technologies. When these technologies are disruptive and could make today's approaches obsolete, this translation of ideas to technology is too risky both for the private sector and the applied science offices in DOE, especially. ARPA-E's goal is to invest in translating such ideas and concepts into disruptive technologies and helping to make them market ready. Furthermore, ARPA-E will invest in multiple disruptive technological approaches to reach the same goal (e.g., high energy density, low-cost batteries for plug-in hybrid vehicles), and then let the private sector pick the winning technology based on what is best for business. Hence, ARPA-E's goal is to reduce technological risks at various stages of developing disruptive technologies.



Q3. Last week, investigative reporter John Stossell revealed that DOE awarded over \$500,000 in Stimulus funding to a company whose top public policy executive is married to the DOE political appointee (Assistant Secretary for EERE Cathy Zoi) in charge of the program that made the award. While the Department has stated that the appointee officially recused herself from the award process, her subordinates were presumably aware of, and potentially impacted by, the connection between their boss in this company.

What is your reaction to this story? Do you agree that it presents conflict of interest concerns, if not legally then at least perceptually? If so, how will you address these concerns? What additional steps is the Department taking to ensure that similar conflicts of interest are avoided as part of the unprecedented (\$27 billion) spending that it is carrying out due to the Stimulus bill?

A3. The entire Obama Administration and the Department of Energy in particular are committed to the highest ethical standards, and we take very seriously allegations of misconduct or appearances thereof. This Administration has been extraordinarily transparent and has put in place unprecedented ethics rules. With regards to this particular issue, the Department has taken concrete steps to maintain the independence of the merit review process. As the Committee knows, Ms. Zoi disclosed her husband's employment prior to her confirmation both to the Senate Energy and Natural Resources Committee and in her public financial disclosure report. The law requires her to recuse herself from acting on any particular matters that would have a direct and predictable effect on her husband's employer. She has fully complied with that recusal and voluntarily gone much further. She has completely recused herself from any DOE business regarding window manufacturing. The Office of En-

ergy Efficiency and Renewable Energy has a screening mechanism in place to ensure that matters from which she is recused do not reach her desk. The matters she is recused from are handled by a senior career official and her principal deputy, and by the Undersecretary and the Deputy Secretary where appropriate. However, the bulk of issues that EERE is involved in do not affect her husband's employer. These procedures are in place throughout the Department and we are confident in our ability to avoid conflicts.

Tax Increases on Fossil Fuels and Dependence on Foreign Energy

Q4. In your budget testimony to the committee last year, you emphasized reducing dependence on foreign oil and energy security as one of your top priorities. This year, you did not mention it, but you do note that the budget raises taxes on domestic energy sources and cancels oil and natural gas R&D programs. These measures will obviously raise the cost of production, increasing energy imports and our dependence on foreign oil, including that from hostile sources. Please reconcile these policy choices with your prior emphasis on energy security. Has the Department estimated how much impact these tax increases will have on domestic oil and gas production and, ultimately, energy prices? If not, why not?

A4. The Administration and the Department continue to emphasize the pressing need to reduce our dependence on oil as an essential matter of energy security. To promote this goal we are pushing forward with a wide range of initiatives including Vehicle and Fuel Cell Technologies to improve the efficiency with which we use energy as well as new alternative and "green" energy sources such as solar and biofuels. In addition, the President recently announced that the Department of the Interior can consider leasing oil and gas resources on the Federal Outer Continental Shelf off Virginia and other selected parts of the Atlantic seaboard and the Eastern Gulf of Mexico.

With respect to the Administration's proposal to reduce some of the advantageous tax benefits for the domestic petroleum industry, we believe as a matter of good tax policy that the Federal Government should not provide incentives for the commercial production of oil and gas. The Department has not estimated what the impacts might be on domestic production from these tax changes.

Q5a. What is DOE doing to ensure the NRC quickly establishes a licensing protocol for Small Modular Reactors? When do you envision the first design being licensed?

b. Please explain the evolution of DOE's R&D work on used fuel recycling over the past year.

c. How much progress has been made in partnering with the industrial community on development of the Next Generation Nuclear Plant? What is the status of the project?

A5a. The DOE does not specify licensing protocol to the NRC for any reactor type. As an independent regulatory authority, the NRC establishes the licensing process for new nuclear power plants. The Office of Nuclear Energy (NE) has, however, been interacting with the NRC and attending forums and workshops with industry to consider the unique licensing requirements of small modular reactors (SMRs). These meetings and workshops are expected to help identify technical and potential regulatory questions such as differences in size, vulnerability and safety system requirements that are inherent to SMR designs. NE is also participating with NIST, NRC, vendors, and other relevant stakeholders to assure that the unique elements of SMRs are addressed in new or existing nuclear codes and standards. Improved licensing protocols and updated codes and standards are expected to benefit the licensing of large LWR plants and could help provide a basis for industry's eventual SMR design certification and plant licensing. It is possible that industry could submit design certification applications to the NRC for light water reactor-based SMRs as early as 2012, depending on the maturity of the technology. We anticipate the NRC review cycle for the Design Certification to take approximately three years, with the first SMR design potentially being certified in the 2015 timeframe.

A5b. During the past year, DOE's R&D work on used fuel recycling has shifted from a program in support of possible near-term implementation of evolutionary processes to a science-based research program seeking revolutionary approaches to recycling. The current program is designed to understand the fundamental mechanisms of the separation process and to develop advanced processes far beyond today's solvent extraction methods.

A5c. The Department has been working with private industry since the Next Generation Nuclear Plant (NGNP) project began. Industry has helped define the re-

quirements that guide all NGNP research and development, has participated with the Department as we work with the U.S. Nuclear Regulatory Commission on gas-cooled reactor licensing, and has completed a number of trade studies and pre-conceptual design reports for the NGNP. Industry has also worked with the Department to identify end-users and to establish end-user requirements for the NGNP. On March 8, 2010, the Department announced that it would cost share with industry for the conceptual design of the NGNP with teams led by Westinghouse Electric Co. and General Atomics. The status of the NGNP project was provided to Congress in the NGNP Report to Congress, which was submitted in March 2010.

Green Jobs

Q6. *Promoting “Green Jobs” or “Clean Energy Jobs” is clearly a priority for the administration as reflected in this budget, and President Obama has often noted that the clean energy subsidies pursued in Germany and Spain provide a model that he would like the U.S. to follow. However, a growing body of data indicates that these models are inefficient and highly expensive. An authoritative study by one of Spain’s leading universities found that the average subsidy cost for each “green job” created in Spain was \$800,000, and that Spain’s creation of 50,000 green jobs resulted in 110,000 lost jobs elsewhere in the country. A similar study in Germany found that wind and solar subsidization in Germany amounted to \$244,000 per “green job” and added 7.5% to the cost of household electricity bills.*

Do you agree with and have you considered the studies’ conclusions that such subsidies hurt job creation and increase energy prices in formulating your own green jobs agenda? How does the administration’s plan for subsidizing green jobs compare to from the models employed in Europe and cited by President Obama?

A6. I am not familiar with the studies you reference. While there are some initial costs to promoting the growth of green jobs, these up-front costs can be viewed as “down payments” on a future workforce that will have the skills to complete globally in the clean energy sector. At present, not one American university offers a master’s program in interdisciplinary energy studies that covers clean energy technology industries as well as business, economics, and other useful disciplines to create well-rounded energy entrepreneurs of the future. In addition, the American Association of Community Colleges estimates that less than ten percent of the nation’s 1,700 community colleges have begun to develop curricula for renewable energy and energy efficiency career tracks, and these programs generally lack national standards and accreditation processes. As we transition to a clean energy economy, developing national standards, training a new workforce (including measures to “train the trainer”), and improving quality and accountability are all important steps that take time and money to initiate. President Obama is committed to investing in clean energy jobs that cannot be outsourced. One example is in the home weatherization and retrofit market, which create jobs while saving home owners money on their utility bills. Moreover, through leveraging the investments made in the Recovery Act, the Federal Government plans to partner with state and local governments to help expand the nation’s home retrofit market by supporting municipal energy financing and increasing the use of Energy Efficient Mortgages, among other measures, that will reduce retrofit costs to the homeowner and create good-paying weatherization jobs.

Q7. *EERE Budget documents state that the \$50 million for RE-ENERGYSE will emphasize a “communications/media campaign to promote energy efficiency to K-12 students.” What specifically will this “campaign” entail? Is it appropriate for EERE and the Federal Government to invest tax dollars to behavioral-change activities at high schools? Given that energy efficiency measures typically include important tradeoffs (such as increased costs and lower convenience) and raise questions that students and other citizens should be free to decide upon on their own terms, how is such policy (and even political) activism an appropriate use of Federal tax dollars?*

A7. The Department of Energy’s newly proposed energy systems education and technical training program, RE-ENERGYSE, has been designed to create and enhance U.S. science, technology, engineering and math (STEM) education opportunities, and improve STEM and energy education resources for teachers and students; and is not intended at changing behaviors or inducing activism.

Through the Department’s FY 2011 Budget Request, \$55M was included for RE-ENERGYSE (\$50M administered by EERE and \$5M administered by NE), which

will educate and prepare today's students and workforce to enter and excel at professions in the low-carbon economy. The bulk of the RE-ENERGYSE proposed funding (\$46M) will support technical and research-focused undergraduate, community college, graduate and post-doctoral education opportunities, with \$9M of funding to support K-12 education and outreach. The K-12 and outreach activities will be aimed at inspiring the next generation of Americans to pursue careers in science, technology, engineering and math disciplines (STEM). Such activities could include: curricula development, competitions, teacher support and training, and communications/media campaigns that will harness a mix of technologies and innovative education methods such as videos, contests, and web interactivity. These activities will engage and attract students to STEM disciplines, and are critical to increasing the pipeline of students entering STEM and energy fields.

The communications/media campaign key activity will achieve a two-fold goal of communicating EERE's mission while simultaneously developing the next generation of scientists, engineers, energy entrepreneurs, and other energy professionals. To ensure the greatest impact, these funding opportunities will be awarded through a competitive grant process and will be made to schools, organizations, non-profits, etc., who can demonstrate the greatest ability to attract and engage K-12 students to STEM and energy disciplines using innovative education and communications methods.

Yucca Mountain

Q8a. What is the scientific or technical basis, if any, for your decision that the proposed Yucca Mountain repository is "not an option"?

- b. How does your decision comport with the Department of Energy's (DOE) statutory obligations under the Nuclear Waste Policy Act of 1982, as amended?*
- c. Prior to your public statements that Yucca Mountain repository is "not an option," was any analysis performed of the potential taxpayer liabilities associated with such a decision?*
- d. Please provide all documents relating to any legal, technical, or scientific analyses that formed the basis for your decision to re-evaluate nuclear waste disposal alternatives to the proposed Yucca Mountain repository, including, but not limited to, evaluations and recommendations that led you to determine that Yucca Mountain was "not an option."*
- e. What was the process for making your decision that Yucca Mountain repository is "not an option"? Please describe and identify when and with whom you consulted, including, but not limited to, a description and identification of attendees at any public meetings, any Administration meetings, and any consultations with States affected by the decision.*
- f. In reaching your determination that the Yucca Mountain repository is no longer an option, did you consult with or receive any briefings from the Nuclear Waste Technical Review Board, DOE laboratory directors or personnel, or any DOE scientists or technical personnel who performed work on the Yucca Mountain project? Please describe when and with whom you consulted, including, but not limited to, a description and identification of attendees at any meetings.*
- g. Have you shared your rationale for determining that the Yucca Mountain repository is "not an option" with the Nuclear Waste Technical Review Board or the Nuclear Regulatory Commission?*
- h. Have you or your staff prepared any analyses of the potential impact that failing to pursue the Yucca Mountain repository may have on the construction of new nuclear plants, which are essential to providing clean and reliable energy in the future? If so, please provide any such analyses.*
- i. How do you believe the Administration's decision to scale back the Yucca Mountain project will affect DOE's responsibility to develop, construct, and operate repositories for disposal of spent nuclear fuel and high-level radioactive waste under the Nuclear Waste Policy Act of 1982, the Nuclear Waste Policy Amendments Act of 1987, and the Energy Policy Act of 1992?*
- j. If a repository at Yucca Mountain is not pursued, what does the Administration propose to do with the billions of dollars that have been collected from ratepayers for the Nuclear Waste Fund?*

A8a. Scientific and engineering knowledge on issues relevant to disposition of high-level waste and spent nuclear fuel has advanced over the 20 years since the Yucca Mountain project was initiated. And, the Administration believes we can find a bet-

ter solution that achieves a broader national consensus. That is why we have convened the Blue Ribbon Commission on America's Nuclear Future; 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. The Commission plans to issue an interim report in 18 months and a final report within 24 months of its inception.

Ab. DOE is acting in a manner consistent with the Nuclear Waste Policy Act (NWPA) and the Atomic Energy Act (AEA), as amended. The AEA gives the Secretary broad authority to carry out the Act's purposes, including the authority to direct the Government's "control of the possession, use, and production of atomic energy and special nuclear material, whether owned by the Government or others, so directed as to make the maximum contribution to the common defense and security and the national welfare." This power was not limited in any relevant way by the NWPA. On the contrary, under the NWPA, the NRC proceeding as to Yucca must be conducted "in accordance with the laws applicable to such applications" NWPA § 114(d), 42 U.S.C. § 10134(d). Those laws include the NRC's regulations governing license applications, including the provision authorizing withdrawal of applications, 10 C.F.R. § 2.107(a).

Ac. The spent nuclear fuel litigation liability is currently estimated to be \$12.3 billion. Depending on the alternative option adopted as the nation's policy on spent nuclear fuel and high-level waste that liability could increase or decrease. I look forward to receiving the Blue Ribbon Commission's forthcoming recommendations on ways to proceed with the disposal of spent nuclear fuel and high-level waste.

Ad. As noted above, I believe that the scientific and engineering knowledge has advanced considerably over the past two decades and that those advances, as reviewed and evaluated by the Blue Ribbon Commission, should inform our choice of a solution to the nuclear waste disposal issue.

Ae. As the Secretary of Energy, I am responsible for this decision.

Af. Please see my answers above.

Ag. I have not shared my views with the Nuclear Waste Technical Review Board. DOE's Motion to Withdraw before the NRC summarizes its rationale for not proceeding with the Yucca Mountain application.

Ah. The Department is confident that the decision not to proceed with the development of the Yucca Mountain repository will not have an impact on the construction of new nuclear power plants. Spent nuclear fuel can be stored at nuclear facilities for many more decades. We will have recommendations from the Blue Ribbon commission by the end of 2011 or early 2012. The Department and Congress will thus have ample opportunity to move forward with a better approach to these issues in a manner informed by the Commission's recommendations.

Ai. Please see answer to subquestion (b) above.

Aj. The Administration will utilize the monies in the Nuclear Waste Fund to fulfill its responsibility for the disposal of spent nuclear fuel and high-level radioactive waste. The specific path that the Administration takes will be informed by the recommendations of the recently constituted Blue Ribbon Commission.

Questions submitted by Representative Bob Inglis

Yucca Mountain and Nuclear Considerations

Q1. *What is the factual basis for seeking to withdraw the Yucca Mountain application from the NRC? Is this a decision grounded in science or in political ideology? Has DOE conducted any analysis of the science and engineering behind the site or design to substantiate this decision?*

A1. In my judgment the scientific and engineering knowledge on issues relevant to disposition of high-level waste and spent nuclear fuel has advanced over the twenty years since the Yucca Mountain project was initiated. I believe future proposals for the disposition of such materials should thus be based on a comprehensive and careful evaluation of options supported by that knowledge, as well as other relevant factors, including the ability to secure broad public support, not on an approach that has not proven ineffective over several decades.

Yucca Mountain and Nuclear Considerations

Q2. *Why is this application being withdrawn before the NRC has completed its safety and environmental reviews of the Yucca Mountain site?*

A2. As stated previously the Administration has determined that Yucca Mountain is no longer a workable option. At this point, it no longer makes sense to expend limited resources on the licensing of the Yucca Mountain repository.

Q3. Do you agree that this decision is in violation of the Nuclear Waste Policy Act?

A3. No, I do not agree that this decision is in violation of the Nuclear Waste Policy Act (NWPA), as amended, or any other provision of Federal law. The Atomic Energy Act gives the Secretary broad authority to carry out the Act's purposes, including the authority to direct the Government's "control of the possession, use, and production of atomic energy and special nuclear material, whether owned by the Government or others, so directed as to make the maximum contribution to the common defense and security and the national welfare." Exercise of this power in connection with the NRC proceeding was not limited in any relevant way by the NWPA. On the contrary, under the NWPA, the NRC proceeding as to Yucca must be conducted "in accordance with the laws applicable to such applications . . ." NWPA § 114(d), 42 U.S.C. § 10134(d). Those laws include the NRC's regulations governing license applications, including the provision authorizing withdrawal of applications, 10 C.F.R. § 2.107(a).

Q4. Without Yucca Mountain, what do you plan to do with the DOE-spent fuel and high level waste accumulating at the Environmental Management Sites at Savannah River and elsewhere? Do you expect these sites and their surrounding communities to continue to bear the risk of temporary waste storage?

A4. DOE spent nuclear fuel and high-level waste will continue to be safely stored at the Department's sites until an alternative method of meeting the Federal Government's obligation to dispose of high-level waste and spent nuclear fuel is identified. The Office of Environmental Management will work with our stakeholders to assure them we intend to continue our tank waste projects as planned and in accordance with our compliance agreements, as reflected in the FY 2011 Budget Request.

Q5. The Blue Ribbon Commission is directed to review all alternatives for the storage, processing, and disposal of civilian and defense spent fuel and high level waste. Will the Commission review Yucca Mountain as an option for permanent disposal? If the Commission finds geologic storage to be the optimal decision for securing nuclear waste over the long term, will the Administration renew efforts at Yucca Mountain?

A5. The Commission will not review Yucca Mountain as an option for permanent disposal. The Blue Ribbon Commission to focus on alternative methods of meeting the Federal Government's obligation to dispose of high-level waste and spent nuclear fuel.

Q6. How do you reconcile the Administration's decision to terminate the Yucca Mountain Project with their commitment to bringing more clean, reliable nuclear energy on-line? Are you confident that the nuclear industry will be able to attract investment without a clear solution for long-term waste storage?

A6. The Administration remains committed to fulfilling its obligations to dispose of the Nation's spent nuclear fuel and high-level radioactive waste. I am confident that the nuclear industry will be able to attract investment and the decision to terminate the Yucca Mountain repository will have no bearing on the ability of the industry to attract investment. Spent nuclear fuel is safe in on-site storage for many decades, and, during that time, I am confident that, working together, we can devise better solutions for the long-term disposal of spent nuclear fuel.

Q7. Is DOE currently working with the NRC to streamline the application process to bring new nuclear reactors to market quicker?

A7. As an independent regulatory authority, the Nuclear Regulatory Commission (NRC) establishes the licensing process for new nuclear power plants. There is a working relationship between NRC and DOE in certain contexts but, owing to the distinctly different roles, missions, and responsibilities of the two agencies, DOE is not directly involved in the licensing process. DOE and NRC are cooperating on technical issues that may affect the overall licensing process. The two agencies are working on the implementation of the Next Generation Nuclear Plant (NGNP) Licensing Strategy, contained in the report submitted to Congress in August 2008. Periodic discussions are held on technical and procedural issues, including R&D needs, regulatory gaps, emerging technical issues, and requirements for a licensing application for NGNP. NRC and DOE have also been interacting on small modular

reactors (SMR), together looking at technical issues and clarifying process points for the SMR vendors.

Fossil Energy

Q1. The United States has considerable reserves of clean-burning natural gas both on-land and off-shore. These resources are significantly more energy secure than domestic petroleum resources because they are less exposed to price fluctuations dictated by foreign suppliers. Do you agree that these resources can buy us time as we transition to new sources of energy? Do you agree that these resources can start reducing energy-based pollution in the short term?

A1. The U.S. has an abundant supply of secure, domestic natural gas that has significant environmental benefits over other fossil fuel sources. Compared to coal-fired power generation, natural gas produces half the CO₂ and almost no sulfur oxide. For this reason, natural gas can play an important role in cutting greenhouse gas emissions. Natural gas can also be an important support to greater use of renewable energy sources such as wind and solar—variable-output natural gas electric plants can balance the electric grid when paired with solar and wind plants that supply intermittent power. These benefits are available now and can quickly expand because of the existing natural gas delivery and power generation infrastructure and the low capital costs for new natural gas power generation.

Hydrogen

Q1. This budget increases resources for research into solar, wind, and geothermal energy, but cuts hydrogen and fuel cell funding. Why does the administration continue to reduce investment in hydrogen? Does the Administration recognize the potential of hydrogen as a transportation fuel?

A1. The Department's reduction of the Hydrogen and Fuel Cell Technologies (HFCT) budget by \$37 million, allows a balanced portfolio of transportation solutions and continued focus on battery and advanced vehicle approaches for more near term impact. However, the Department will also maintain a strong effort in key areas of hydrogen and fuel cell research and development. In addition to \$137M in the EERE HFCT program, DOE has requested \$50M for the Solid State Energy Conversion Alliance (SECA) Program and expects to maintain funding levels at approximately \$38M through the Office of Basic Energy Sciences for long-term and crosscutting R&D in hydrogen and fuel cells.

The Department does recognize the long term potential of hydrogen as a transportation fuel. The hydrogen fuel cell vehicle is one of many transportation technologies being pursued by the Department including plug-in hybrid and battery electric vehicles.

Q2. In your opinion, how will we break free from our dependence on foreign oil if we do not pursue investments in multiple transportation fuel alternatives?

A2. We will not break free from our dependence on foreign oil without pursuing all viable options. This must include electric drivetrains (powered by renewable electricity for GHG reduction) for light-duty vehicles, biomass-derived liquid fuels that are compatible with existing fuel infrastructure for legacy light-duty vehicles and heavy-duty trucks, and mode-shifting from road transportation of freight to rail or barge/ship. There is also a substantial role to be played by domestic alternative fuels such as compressed and liquefied natural gas for road vehicles (especially buses and heavy-duty trucks). Improvements in efficiency of engines for future vehicles also represent an important opportunity for reducing foreign oil dependence.

The Department has a portfolio of programs to develop transportation alternatives including: programs addressing plug-in hybrid vehicles, advanced battery research for vehicle applications, the use of biofuels in transportation, and the development of hydrogen fuel cell vehicles.

Questions submitted by Representative Adrian Smith

Q1. Section 228 of the Energy Independence and Security Act of 2007 (P.L. 110-114) directed "Not later than 90 days after the date of enactment of this Act, the Secretary shall submit to the Committee on Science and Technology of the House of Representatives and the Committee on Energy and Natural Resources of the Senate, a report on the progress of the research and development that is being conducted on the use of algae as a feedstock for the production of biofuels," specifically, "identify continuing research and development challenges and any regulatory or other barriers found by the Secretary that hinder the use of this re-

source, as well as recommendations on how to encourage and further its development as a viable transportation fuel.” Although a draft of this report has been made available to the committee, the final report has been held up so the Department of Energy can seek peer review. When can we expect a final report to be made public? What, if anything, do you expect to be changed from the draft? Is it the Department’s position all scientific research should be peer reviewed before it is published or applied in rulemaking?

A1. A Report to Congress titled “Microalgae Feedstocks for Biofuels Production” in satisfaction of the EISA 2007 Section 228 requirements was provided to members of the House Committee on Science and Technology and the Senate Committee on Energy and Natural Resources on May 1, 2009. During the preparation of the Report to Congress, DOE convened a stakeholder meeting with algae researchers, technology developers, investors, and government officials to draft a more inclusive report intended for public release. The report, entitled The National Algal Biofuels Technology Roadmap, surveys a broader technology landscape than the original Report to Congress. DOE released a draft of the Roadmap to the public in June 2009 as part of a Request for Information (RFI) process, and used comments it received in the editing process. The Roadmap is currently being reviewed through our concurrence process. It is the Department’s position to ensure the quality of all scientific documents and reports to be disseminated to the public, and to abide by the guidelines set forth by the Final Information Quality Bulletin for Peer Review (Bulletin) as prescribed by the Office of Management and Budget (OMB). The initial Report to Congress was to be distributed on a limited basis within government, therefore it was not required to be reviewed. In contrast, The National Algal Biofuels Technology Roadmap will be peer reviewed in accordance to the DOE Information Quality policy based on the OMB guidelines.

Q2. *Please address current research to improve and commercialize small hydropower—anything less than one megawatt, including both tidal and small moving water sources. What efforts are underway to improve and commercialize this technology? What can this committee do to expedite research in this area?*

A2. The Department of Energy supports the small water power industry in the design and development of devices and components, as well as the deployment and testing of those devices in the laboratory or in-water settings. The Department supports the development and testing of a wide variety of hydrokinetic systems and components, from earliest-stage proof-of-concept studies through full-scale demonstration projects, as well as certain small hydropower projects. Projects are typically funded through competitive awards, which are designed to help devices progress toward commercial readiness along well-defined technology readiness levels. The testing of these devices and components in a variety of settings allows the Department to determine baseline costs and performance attributes for different water resources and technology types. The Department is also investigating technological innovations that will reduce the cost of generation at sites appropriate for small hydropower development.

While the energy contained in small hydropower resources like tides, rivers and streams is vast, the exact amount of extractable energy has not been well quantified. The Department has funded projects to conduct resource assessments for in-stream and tidal energy resources.

The Department awarded funds to national laboratories during FY 2009 to conduct basic and applied research and development projects. Laboratory projects are developing essential tools and methods for the engineering, design, and testing of marine and hydrokinetic technologies, such as tidal power; and they will identify, analyze, predict and prioritize environmental impacts from marine and hydrokinetic energy production to minimize the time, costs, and potential environmental risks associated with siting and deploying these systems. Together these efforts will help accelerate the commercialization of small hydropower systems.

Finally, the committee may expedite research in the area of hydrokinetic commercialization by supporting our FY 11 budget request which will continue the initiatives listed above.

Questions submitted by Representative Mario Diaz-Balart

Q1. *Secretary Chu, what is the factual basis for seeking to withdraw the application from the NRC? What new facts do you have or have you considered, as Secretary of Energy, to determine that you should withdraw the application? Under what statutory authority are you withdrawing the application? Please provide the citation for the record?*

A1. Scientific and engineering knowledge on issues relevant to disposition of high-level waste and spent nuclear fuel has advanced over the 20 years since the Yucca Mountain project was initiated. And, the Administration believes we can find a better solution that achieves a broader national consensus. That is why we have convened the Blue Ribbon Commission on America's Nuclear Future; 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. The Commission plans to issue an interim report in 18 months and a final report within 24 months of its inception.

The Atomic Energy Act ("AEA" or Act) gives the Secretary broad authority to carry out the Act's purposes, including the authority to direct the Government's "control of the possession, use, and production of atomic energy and special nuclear material, whether owned by the Government or others, so directed as to make the maximum contribution to the common defense and security and the national welfare." AEA § 3(c), 42 U.S.C. § 2013(c). Exercise of this power in connection with the Nuclear Regulatory Commission (NRC) proceeding was not limited in any relevant way by the Nuclear Waste Policy Act. In fact, the NWPA is clear that after the Secretary submits the license application for the Yucca Mountain repository, consideration of that application is to proceed in accordance with the laws applicable to such applications. NWPA § 114(d), 42 U.S.C. § 10134(d).

These laws include the AEA and the regulations adopted by NRC to implement the AEA. The regulations permit an applicant to withdraw an application. 10 C.F.R. 2.107.

Q2a. *The Copenhagen "accord" requested countries voluntarily submit by January 31, 2010, individual pledges to reduce greenhouse gas emissions. As I understand it, each nation determined its own target for reducing greenhouse gas emissions and this accord is only "politically" binding in nature. The world views the U.S. and China as the greatest emitters, although I believe the Chinese surpassed our levels and India's emissions continue to grow. China pledged to limit emissions as a share of its growing economy and the U.S. pledged reductions from historic levels.*

Are you concerned that at a time when the U.S. economy is in a recession and China's economy is growing, that committing the United States to such a reduction will place our country's economy farther behind?

A2a. There is a burgeoning clean energy market worldwide and commitment to climate change action can be a foundation for future economic strength. Since 2005, clean energy investments have increased 230 percent, reaching a total investment of \$162 billion worldwide by 2009, according to a March 2010 report by The Pew Charitable Trusts, "Who's Winning the Energy Race? Growth, Competition and Opportunity in the World's Largest Economies". China leads global clean energy investment, with \$34.6 billion, compared to the U.S. at \$18.6 billion. Comprehensive long-term U.S. climate change policy would provide clear market signals to help the U.S. clean energy technology industry compete in this growing global market.

Q2b. *The Copenhagen "accord" requested countries voluntarily submit by January 31, 2010, individual pledges to reduce greenhouse gas emissions. As I understand it, each nation determined its own target for reducing greenhouse gas emissions and this accord is only "politically" binding in nature. The world views the U.S. and China as the greatest emitters, although I believe the Chinese surpassed our levels and India's emissions continue to grow. China pledged to limit emissions as a share of its growing economy and the U.S. pledged reductions from historic levels.*

Since this "politically" binding accord is unenforceable, what steps would the United States take if China does not comply with the pledges it has made in the accord? When you testified before this Committee last year, you indicated that the U.S. might be forced to place tariffs on Chinese good if the Chinese were not willing to reduce greenhouse gas emissions. Would you still consider this an option?

A2b. The international community took a meaningful step forward during the United Nations Framework Convention on Climate Change climate negotiations in Copenhagen. The resulting Copenhagen Accord represents the first time that all major economies, including China, pledged to reduce greenhouse gas emissions relative to projections. This is an important step forward. China has already taken significant actions to address climate change and to reduce the greenhouse gas intensity of its economy and we expect that it will fulfill its commitments under the Accord. The Administration is closely monitoring the steps China and other major

emitters are taking in line with the Copenhagen Accord. As appropriate the Administration will also review the need for trade-related measures in domestic energy and climate legislation. We look forward to working towards an effective global climate agreement that serves our economic, national security, and environmental interests.

Questions submitted by Representative Brian P. Bilbray

Nuclear

Q1. You've made statements that commercially available used fuel recycling technology is not proliferation resistant. Could you detail for the Committee your definition of a "proliferation resistant technology?" If such a proliferation technology is developed, would you have any objections to exporting such a technology to other countries, irrespective of their proliferation history or credentials?

A1. The International Atomic Energy Agency (IAEA) defines proliferation resistance as "that characteristic of an NES (nuclear energy system) that impedes the diversion or undeclared production of nuclear material or misuse of technology by the Host State seeking to acquire nuclear weapons or other nuclear explosive devices." However, the U.S. Government has not and should not embrace a single definition of proliferation resistance or a specific level of proliferation resistance as acceptable or not acceptable. We view proliferation resistance as a matter of degree, rather than as an absolute. Our review of the concept of proliferation resistance shows that it cannot be applied in a vacuum without considering other critical factors when making technology choices on a nuclear energy system. In other words, there is no "silver bullet" technology that satisfies all of our proliferation concerns.

Regarding the transfers of technology directly or indirectly related to the recycling of used nuclear fuel, the Atomic Energy Act requires a number of considerations, including a determination of whether the action will constitute the transfer of sensitive nuclear technology to the recipient. Other criteria for consideration are what the recipient learns or derives from the export for development of similar systems, the use of the exported system itself, and the disposition pathway for recovered fissile materials. Decisions about nuclear systems exports must be made on a case-by-case basis weighing many factors.

Q2. Nonproliferation is a goal we all share. I think it is important that we distinguish between proliferation resistant technologies and proliferation resistant systems. As Secretary of Energy, you have a great deal of responsibility in securing this nation's sensitive technologies and materials. Is it your position that the United States cannot design systems safeguards that would allow for the near-term recycling of used fuel in this country, given all the sensitive materials and technologies that your Department already successfully secures? If this is not possible, what are the obstacles we need to overcome to create such a system of safeguards? Why haven't you included any R&D in your budget request that would address these obstacles?

A2. The deployment of nuclear fuel recycling technology in the United States or in any of the other Nuclear Weapons States (NWS) does not constitute proliferation because the NWS already have nuclear weapons and the technology and knowledge to build weapons. However, nuclear weapons proliferation by nation states and the terrorist threat are separate and distinct issues. While proliferation of nuclear weapons is not a concern in NWS, the issue of physical security is a significant concern that must be addressed when deploying new technologies or recycling facilities. The United States will always attempt to develop and deploy nuclear technologies that are as easy to safeguard and effectively secure as possible, no matter where they are deployed.

In developing safeguards systems, the United States looks to the IAEA for guidance and also relies upon its own expertise with the nuclear fuel cycle. Our funding to the national laboratories for the Next Generation Safeguards Initiative (NGSI) and the Fuel Cycle Research and Development program support continued advances in state-of-the-art safeguards concepts, as well as techniques and equipment for deployment not only in the United States, but also in other countries at existing and planned reprocessing/recycling facilities. The budget request includes \$7.8 million for Material Protection, Accountancy, and Controls Technology within Fuel Cycle Research and Development. This will continue the work started in fiscal year 2010 to develop technologies and analysis tools to enable next generation nuclear materials management for future U.S. nuclear fuel cycles to prevent diversion or misuse, thereby, reducing proliferation risks and enhancing confidence and acceptance of nuclear energy.

Future decisions about the recycling of used fuel in this country in the long term will depend on many factors in addition to nonproliferation and security issues. Economics, waste management, policy considerations and environmental factors are also very significant considerations, as well as the international ramifications of domestic decisions. The Blue Ribbon Commission on America's Nuclear Future will examine these issues along with many others and I look forward to their advice and recommendations.

Q3. Why aren't we moving forward aggressively with proven reprocessing technologies since we know that eventually that will be required to implement real clean air policies?

A3. The Department has a science-based research program on reprocessing technologies underway that is focused on identifying advanced reprocessing concepts that would be more efficient, safer and less expensive than current conventional processes. This research program will be able to inform future decisions on commercial reprocessing.

Q4. Mr. Secretary—Following the announcement at the American Chemical Society regarding low energy nuclear reactions (LENR), commonly known as “cold fusion,” international press accounts in the New Scientist and the economist reported upon this new, energy technology breakthrough. According to the reports, if this technology is validated and can be commercialized, it would provide a clean, CO₂-free, abundant energy source that could replace oil and gas. This would have a positive and significant impact on U.S. foreign policy by potentially reducing our dependence upon foreign energy sources. It would also contribute to minimizing nuclear waste material. Would the Department of Energy be willing to investigate and research this technology to determine its efficacy?

A4. The Office of Science supports basic energy research and R&D on related applications, subject to peer review in accordance with Federal regulations. The Office of Science considers all proposals submitted within its competitive solicitations and evaluates all in terms of merit according to established guidelines and procedures for research proposals.

Algae Biofuels Questions

Q1. The FY 2010 E&W Appropriations conference report directed the Department to “provide not less than \$35 million for a comprehensive research, development, and deployment strategy focused on algal biofuels.” It is my understanding that to date, the Department has allocated roughly \$10 million of these funds. Please elaborate as to how the Department has spent or is spending the \$10 million, and how it plans to utilize the remaining \$25 million, for algae fuels RD&D as specifically directed by Congress.

A1. The Department is directing \$35 million Fiscal Year 2010 Energy and Water appropriations toward comprehensive research, development, and deployment of algal biofuels. DOE is planning to direct \$25 million to three alternate consortia that were competitively selected and peer-reviewed from the funding opportunity announcement, DE-FOA-0000123. The Department is allocating the remaining \$10 million in FY 2010 funds to support three additional categories of efforts: capacity building projects at the National Laboratories through a competitive and peer-reviewed process; projects aimed at determining the resource potential of land, water, CO₂, and other nutrients to sustainably support commercial-scale algae production; and lifecycle analyses projects at universities and the National Laboratories to develop the Greenhouse Gases, Regulated Emissions and Energy Use in Transportation (GREET) modules for algae and to enhance international collaborations. The Biomass Program has begun spending on some of these projects, including components of the algae resource assessments and life cycle analyses, while other efforts are in the procurement and negotiation process.

Q2. The President recently announced his administration's new national biofuels plan that emphasizes a change in focus from second generation (ethanol) to third generation (dropin) transportation fuels. How will the DOE change its current funding and R&D resource allocations from focusing so overwhelmingly on second generation cellulosic biofuels, to following the president's lead in focusing on third generation drop in fuels, such as algae based fuels?

A2. In May 2009, to further his Administration's commitment to advance biofuels research and commercialization, President Obama established the Biofuels Inter-

agency Working Group.² In February 2010, the Working Group released its Growing America's Fuel strategy, which provides direction on several areas across the supply chain that support what are considered first, second, and third generation biofuels. In addition, the interagency Biomass Research and Development Board has committed to working closely with the Working Group as it defines a range of research and development coordination activities that will support the nation's transition toward developing greater volumes of sustainable cellulosic and hydrocarbon renewable fuels.³

It is crucial the Department of Energy (DOE) carry out its cellulosic ethanol investments, which are central to technology and industry growth as well as meeting Renewable Fuel Standard requirements. Our R&D and integrated biorefinery results will enable DOE and its national laboratory, academic, and industry partners to leverage and inform comparable technology developments for hydrocarbon biofuels. For example, Table 1 shows that many pilot, demonstration, and commercial-scale projects selected from 2007 through 2009 are scheduled to come on line over the next three years;⁴ the total multiyear Departmental investment toward these projects is more than \$723 million—including appropriated funds as well as American Recovery and Reinvestment Act funds with a total non-fed cost share of over \$1.6 billion.⁵ The execution of these projects will provide critical data, lessons learned, and ideas for improvement—all of which could noticeably increase production efficiencies and reduce fuel costs going forward.

Table 1. Cellulosic Ethanol Integrated Biorefinery Projects funded by DOE Biomass

Applicant	Scale	Government Funding Source	DOE Funding Requested	Total Non Fed Cost Share	Non-Fed Cost Share %	Estimated Commissioning Year
Enerkem Corporation	Demonstration	ARRA	\$ 50,000,000	\$ 90,470,217	64%	2012
INEOS New Planet BioEnergy, LLC	Demonstration	ARRA	\$ 50,000,000	\$ 50,000,000	50%	2012
Algenol Biofuels, Inc.	Pilot	ARRA	\$ 25,000,000	\$ 33,915,478	58%	2012
American Process Inc.	Pilot	ARRA	\$ 17,944,902	\$ 10,148,508	36%	2011
Archer Daniels Midland	Pilot	ARRA	\$ 24,834,592	\$ 10,946,809	31%	2012
ICM	Pilot	ARRA	\$ 25,000,000	\$ 6,268,136	20%	2011
Logos Technologies, Inc.	Pilot	ARRA	\$ 20,455,849	\$ 5,113,962	20%	2012
Zechem Inc.	Pilot	ARRA	\$ 25,000,000	\$ 48,400,000	66%	2011
BlueFire LLC (Phase 2 Award)	Commercial	ARRA	\$ 81,134,686	\$ 246,000,000	73%	2013
BlueFire LLC (Phase 1 Award)	Commercial	Appropriations	\$ 6,425,564	\$ 9,638,000	60%	N/A
Abengoa	Commercial	Appropriations	\$ 100,000,000	\$ 485,000,000	83%	2012
POET	Commercial	Appropriations	\$ 100,000,000	\$ 152,661,833	60%	2012
RangeFuels	Commercial	Appropriations	\$ 76,000,000	\$ 293,392,253	79%	2010*
Lignol	Demonstration	Appropriations	\$ 50,000,000	\$ 101,000,000	67%	2013
Mascoma	Demonstration	Appropriations	\$ 32,400,000	\$ 32,400,000	50%	2013
Pacific Biogasol	Demonstration	Appropriations	\$ 24,340,000	\$ 24,340,000	50%	2013
Verenium	Demonstration	Appropriations	\$ 14,900,000	\$ 15,000,000	50%	2009
			\$ 723,435,593	\$ 1,614,694,996		

*Commissioning for Phase 1 only

DOE's Biomass Program has also taken substantial steps to accelerate hydrocarbon biofuels research, development, and demonstration (RD&D) in the past few years. We have annually evaluated the states of biofuels technologies to ensure work is progressing sufficiently. Since 2008, we have selected or awarded more than \$465 million toward hydrocarbon fuels in FY 08, FY 09, and FY 10 funds as well as American Recovery and Reinvestment Act funds to multiple RD&D projects. These projects include six pilotscale, two demonstration-scale, and one commercial-scale⁶ integrated biorefineries as well as two advanced and algal biofuels consortia.

²The Working Group is comprised of representatives from the Departments of Energy (DOE), Agriculture (USDA), and the Environmental Protection Agency (EPA).

³The Biomass Research and Development Act of 2000 established the Board, which was continued under the Food Conservation and Energy Act of 2008. DOE and USDA co-chair the Board, which is comprised of members from DOE, USDA, EPA, the National Science Foundation, the Department of the Interior, the Office of Science and Technology Policy, and other agencies the Board invites, such as the Departments of Transportation and Defense.

⁴For example, as of April 1, 2010, one demonstration-scale partner is now operational; a commercial-scale partner has initiated construction. We expect four additional projects to move into their construction phases later this fiscal year.

⁵See Energy Policy Act of 2005 section 932, and increases to FY 08 and FY 09 authority through the Energy Security and Independence Act of 2007.

⁶This integrated biorefinery project was originally awarded under a demonstration-scale solicitation; however, plans are for a facility large enough to be considered commercial-scale.

We believe a balanced portfolio of investments is needed to develop both second and third generation biofuels.

Our planned RD&D commitments for FY 11 will continue to shift toward supporting hydrocarbon biofuels activities while maintaining our commitments to cellulosic ethanol RD&D. Considerably more hydrocarbon biofuels RD&D is required over the next several years-and our consortia and integrated biorefinery activities are absolutely critical to achieving success. In this regard, we have developed internal targets for 2017 to focus our partners' efforts related to renewable gasoline, diesel, and jet fuels.

Q3. The Joint Genome Institute (JGI) can play a significant role in algae-based fuel development by helping the algae industry develop a library of sequenced: algal strains. Is this something that the Institute (JGI) sees as a priority on its own, and is willing to work on, or something that requires more attention and direction from Department of Energy to achieve?

A3. The Department and the Joint Genome Institute recognize the important role that algae can play in renewable biofuel development. JGI has provided genomic information on many algal species including green algae, diatoms, and cyanobacteria, as well as metagenomic information on algal blooms and environmental algal mats. JGI encourages high-throughput DNA sequencing and analysis projects in support of the DOE mission and national priorities to develop abundant sources of clean energy, control greenhouse gas accumulation in the atmosphere (especially carbon dioxide), and clean up contaminated sites for which DOE has ownership or stewardship responsibilities. Priority for proposed projects is established according to the JGI review process guidelines. JGI is encouraging the algae industry to submit proposals for consideration for the current Community Sequencing Program (CSP) 2011 call, especially *relating* to the development of clean energy sources.

Appendix 2:

ADDITIONAL MATERIAL FOR THE RECORD

NUCLEAR REGULATORY COMMISSION MOTION TO WITHDRAW YUCCA MOUNTAIN
LICENSE APPLICATION

March 3, 2010

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Atomic Safety and Licensing Board

Before Administrative Judges:
Thomas S. Moore, Chairman
Paul S. Ryerson
Richard E. Wardwell

In the Matter of)	Docket No. 63-001
U.S. DEPARTMENT OF ENERGY)	ASLBP No. 09-892-HLW-
CAB04)	
(High-Level Waste Repository))	
)	

U.S. DEPARTMENT OF ENERGY'S MOTION TO WITHDRAW

The United States Department of Energy ("DOE") hereby moves, pursuant to 10 C.F.R. § 2.107, to withdraw its pending license application for a permanent geologic repository at Yucca Mountain, Nevada. DOE asks the Board to dismiss its application with prejudice and to impose no additional terms of withdrawal.

While DOE reaffirms its obligation to take possession and dispose of the nation's spent nuclear fuel and high-level nuclear waste, the Secretary of Energy has decided that a geologic repository at Yucca Mountain is not a workable option for long-term disposition of these materials. Additionally, at the direction of the President, the Secretary has established the Blue Ribbon Commission on America's Nuclear Future, which will conduct a comprehensive review and consider alternatives for such

disposition.¹ And Congress has already appropriated \$5 million for the Blue Ribbon Commission to evaluate and recommend such “alternatives.” Energy and Water Development and Related Agencies Appropriations Act, 2010, Pub. L. No. 111-85, 123 Stat. 2845, 2864-65 (2009). In accord with those decisions, and to avoid further expenditure of funds on a licensing proceeding for a project that is being terminated, DOE has decided to discontinue the pending application in this docket,² and hereby moves to withdraw that application with prejudice.

Under the Nuclear Waste Policy Act of 1982, as amended, 42 U.S.C. §§ 10101 *et seq.* (“NWPA”), this licensing proceeding must be conducted “in accordance with the laws applicable to such applications” NWPA § 114(d), 42 U.S.C. § 10134(d). Those laws necessarily include the NRC’s regulations governing license applications, including, as this Board has already recognized, 10 C.F.R. § 2.107(a). *See* CAB Order (Concerning LSNA Memorandum), ASLBP No. 09-892-HLW-CAB04, at 2 (Dec. 22, 2009) (stating that “the parties are reminded that, pursuant to 10 C.F.R. § 2.107, withdrawal shall be on such terms as the Board may prescribe.”). That section provides

¹ *See* Presidential Memorandum – Blue Ribbon Commission on America’s Nuclear Future (Jan. 29, 2010) (“Presidential Memorandum”), available at <http://www.whitehouse.gov/the-press-office/presidential-memorandum-blue-ribbon-commission-americas-nuclear-future>; Department of Energy Press Release, Secretary Chu Announces Blue Ribbon Commission on America’s Nuclear Future (January 29, 2010), available at <http://www.energy.gov/news/8584.htm>; Charter, Blue Ribbon Commission on America’s Nuclear Future (filed March 1, 2010), available at http://www.energy.gov/news/documents/BRC_Charter.pdf. The Commission will conduct a comprehensive review of policies for managing the back end of the nuclear fuel cycle, including all alternatives for the storage, processing, and disposal of civilian and defense used nuclear fuel and materials derived from nuclear activities. *See id.*

² This decision was announced in the Administration’s Fiscal Year 2011 Budget, which states that “[i]n 2010, the Department will discontinue its application to the Nuclear Regulatory Commission (NRC) for a license to construct a high-level waste geologic repository at Yucca Mountain, Nevada.” Budget of the U.S. Government, Fiscal Year 2011: Terminations, Reductions, and Savings, at 62 (Feb. 1, 2010). The Department of Energy’s Fiscal Year 2011 Congressional Budget Request similarly states that “in 2010, 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.” Department of Energy, FY 2011 Congressional Budget Request, Vol. 7, at 163 (Feb. 2010).

in relevant part that “[w]ithdrawal of an application after the issuance of a notice of hearing shall be on such terms as the presiding officer may prescribe.” 10 C.F.R. § 2.107(a).

Thus, applicable Commission regulations empower this Board to regulate the terms and conditions of withdrawal. *Philadelphia Electric Company* (Fulton Generating Station, Units 1 and 2), ALAB-657, 14 N.R.C. 967, 974 (1981). Any terms imposed for withdrawal must bear a rational relationship to the conduct and legal harm at issue. *Id.* And the record must support any findings concerning the conduct and harm in question to impose a term. *Id.*, citing *LeCompte v. Mr. Chip, Inc.*, 528 F.2d 601, 604-05 (5th Cir. 1976); 5 Moore's Federal Practice ¶ 41.05[1] at 41-58.

A. The Board Should Grant Dismissal With Prejudice

In this instance, the Board should prescribe only one term of withdrawal—that the pending application for a permanent geologic repository at the Yucca Mountain site shall be dismissed with prejudice.³

That action will provide finality in ending the Yucca Mountain project for a permanent geologic repository and will enable the Blue Ribbon Commission, as established by the Department and funded by Congress, to focus on alternative methods of meeting the federal government's obligation to take high-level waste and spent nuclear fuel. It is the Secretary of Energy's judgment that scientific and engineering knowledge on issues relevant to disposition of high-level waste and spent nuclear fuel has advanced dramatically over the twenty years since the Yucca Mountain project was initiated. *See also* Presidential Memorandum at 1. Future

³ DOE seeks this form of dismissal because it does not intend ever to refile an application to construct a permanent geologic repository for spent nuclear fuel and high-level radioactive waste at Yucca Mountain.

proposals for the disposition of such materials should thus be based on a comprehensive and careful evaluation of options supported by that knowledge, as well as other relevant factors, including the ability to secure broad public support, not on an approach that “has not proven effective” over several decades. *Id.*

The Board should defer to the Secretary’s judgment that dismissal of the pending application with prejudice is appropriate here. Settled law in this area directs the NRC to defer to the judgment of policymakers within the Executive Branch.⁴ And whether the public interest would be served by dismissing this application with prejudice is a matter within the purview of the Secretary.⁵ From public statements already made, we of course understand that some will nevertheless argue that dismissing this application is contrary to the NWP. Although it is impossible to anticipate exactly what parties will argue at this point, at least one litigant seeking to raise these issues in federal court has said the

⁴ *U.S. Department Of Energy* (Plutonium Export License), CLI-04-17, 59 N.R.C. 357, 374 (2004) (deferring, upon “balanc[ing] our statutory role in export licensing with the conduct of United States foreign relations, which is the responsibility of the Executive Branch,” to Executive Branch determination on an export license application). *See also Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), LBP-03-30, 58 N.R.C. 454, 472 (2003) (expressing “considerable doubt” about the NRC’s authority to “second-guess” the Bureau of Land Management on an issue relating to recommendations as to the wilderness status of land, and declining an invitation to do so); *see also Environmental Radiation Protection Standards for Nuclear Power Operations, 40 CFR 190*, CLI-81-4, 13 N.R.C. 298, 301 (1981) (deferring to EPA standards for radiation protection: “This agency does not sit as a reviewing court for a sister agency’s regulations...”). *See generally Pacific Gas & Electric Company* (Stanislaus Nuclear Project, Unit 1), LBP-83-2, 17 N.R.C. 45, 52 (1983) (“The law on withdrawal does not require a determination of whether [the applicant’s] decision [to withdraw] is sound.”).

⁵ The Atomic Energy Act (“AEA” or “Act”) gives the Secretary broad authority to carry out the Act’s purposes, including the authority to direct the Government’s “control of the possession, use, and production of atomic energy and special nuclear material, whether owned by the Government or others, so directed as to make the maximum contribution to the common defense and security and the national welfare.” AEA § 3(c), 42 U.S.C. § 2013(c). Indeed, as the D.C. Circuit has recognized, the AEA established “a regulatory scheme which is virtually unique in the degree to which broad responsibility is reposed in the administering agency, free of close prescription in its charter as to how it shall proceed in achieving the statutory objectives.” *Siegel v. AEC*, 400 F.2d 778, 783 (D.C. Cir. 1968). While *Siegel* concerned directly the branch of the then-Atomic Energy Commission that later became the NRC, its recognition that broad discretion is to be given to the governmental agencies charged with administering the AEA’s objectives applies equally to the Department of Energy, the other lineal descendant of the AEC.

NWPA obligation to file the pending application is inconsistent with the decision to withdraw the application. This is simply wrong.

Nothing in the text of the NWPA strips the Secretary of an applicant's ordinary right to seek dismissal. In fact, the text of the statute cuts sharply in favor of the Secretary's right to seek dismissal. The statute simply requires that the Secretary "shall submit . . . an application for a construction authorization." NWPA § 114(b), 42 U.S.C. § 10134(b). It neither directs nor circumscribes the Secretary's actions on the application after that submission.⁶

Indeed, far from imposing special limitations on DOE after the submission, the NWPA expressly requires that the application be considered "in accordance with the laws applicable to such applications." NWPA § 114(d), 42 U.S.C. § 10134(d). Those laws include 10 C.F.R. § 2.107, which, as this Board has recognized, authorizes withdrawals on terms the Board prescribes. Congress, when it enacted the NWPA in 1982, could have dictated that special rules applied to this proceeding to prevent withdrawal motions, or could have prescribed duties by DOE with respect to prosecution of the application after filing, but it chose not to do so.

Nor does the structure of the NWPA somehow override the plain textual indication in the statute that ordinary NRC rules govern here or dictate that the Secretary must continue with an application he has decided is contrary to the public interest. The NWPA does not prescribe a step-by-step process that leads inexorably to the opening of a

⁶ After filing the application, the only NWPA mandate imposed on the Secretary is a *reporting* requirement to Congress to note the "project decision schedule that portrays the optimum way to attain the operation of the repository, within the time periods specified in this part." NWPA § 114(e)(1), 42 U.S.C. § 10134(e)(1).

repository at Yucca Mountain. Indeed, even if the NRC granted the pending application today, the Secretary would not have the authority to create an operational repository. That would require further action by DOE, other agencies, and Congress itself, yet none of those actions is either mandated or even mentioned by the NWPA. The NWPA does not require the Secretary to undertake the actions necessary to obtain the license to receive and possess materials that would be necessary to open a repository. 10 C.F.R. §§ 63.3, 63.32(d). Rather, the NWPA refers only to the need for a “construction authorization,” NWPA § 114(b), 42 U.S.C. § 10134(b) – and even there, as discussed, it mandates only the submission of an application. To open a facility, moreover, the Department would be required to obtain water rights, rights of way from the Bureau of Land Management for utilities and access roads, and Clean Water Act § 404 permits for repository construction, as well as all the state and federal approvals necessary for an approximately 300-mile rail line, among many other things. None of those actions is mandated by the NWPA. At least as important, as the prior Administration stressed, *Congress* would need to take further action not contained in the NWPA before any such repository could be opened.⁷ In short, there are many acts between the filing of the application and the actual use of the repository that the NWPA does not require.

Where, even if the NRC granted the pending application, Congress has not authorized the Secretary to make the Yucca Mountain site operational, or even mandated that he take the many required steps to make it operational, it would be bizarre to read the statute to impose a non-discretionary duty to continue with any particular intermediate

⁷ See January 2009 Project Decision Schedule at 1 (“This schedule is predicated upon the enactment of legislation ... [regarding] land withdrawal.”). See also, e.g., Nuclear Fuel Management and Disposal Act, S.2589, 109th Congress, 2d Sess. § 3 (2006) (proposed legislation authorizing the withdrawal of lands necessary for the Yucca Mountain repository).

step (here, prosecuting the application), absent clear statutory language mandating that result. More generally, it has not been the NRC's practice to require any litigant to maintain a license application that the litigant does not wish to pursue. That deference to an applicant's decisions should apply more strongly where a government official has decided not to pursue a license application because he believes that other courses would better serve the public interest.

Finally, the fact that Congress has approved Yucca Mountain as the site of a repository, *see* Pub. L. No. 107-200, 116 Stat. 735 (2002) ("there hereby is approved the site at Yucca Mountain, Nevada, for a repository, with respect to which a notice of disapproval was submitted by the Governor of the State of Nevada on April 8, 2002"), means, in the D.C. Circuit's words, simply that the Secretary is "permitted" to seek authority to open such a site and that challenges to the prior process to select that site are moot. *Nuclear Energy Institute, Inc. v. EPA*, 373 F.3d 1251, 1309-10 (D.C. Cir. 2004). It does *not* require the Secretary to continue with an application proceeding if the Secretary decides that action is contrary to the public interest. *See, e.g.*, S. Rep. No. 107-159, at 13 (2002) ("It bears repeating that enactment of the joint resolution will not authorize construction of the repository or allow DOE to put any radioactive waste or spent nuclear fuel in it or even allow DOE to begin transporting waste to it. Enactment of the joint resolution will only allow DOE to take the next step in the process laid out by the Nuclear Waste Policy Act and apply to the NRC for authorization to construct the repository at Yucca Mountain."); H.R. Rep. No. 107-425, at 7 (2002) ("In accordance with the Nuclear Waste Policy Act (NWPA), such approval would allow the Department of Energy (DOE) to apply for a license with the Nuclear Regulatory Commission to construct a nuclear waste storage facility on

the approved site.”)⁸ That conclusion is even more strongly compelled now, in light of Congress’s recent decision to provide funding to a Blue Ribbon Commission, whose explicit purpose is to propose “alternatives” for the disposal of high-level waste and spent nuclear fuel.

Even if there were any ambiguity on these points, the Secretary’s interpretation of the NWPA would be entitled to deference. *See Chevron, U.S.A., Inc. v. Natural Resources Defense Council, Inc.*, 467 U.S. 837 (1984); *Gen. Elec. Uranium Mgmt. Corp. v. DOE*, 764 F.2d 896, 907 (D.C. Cir. 1985) (applying *Chevron* deference to uphold DOE’s interpretation of the NWPA); *see also Skidmore v. Swift Co.*, 323 U.S. 65 (1944); *Auer v. Robbins*, 519 U.S. 452 (1977); *Coeur Alaska, Inc. v. Southeastern Alaska Conservation Council*, 129 S. Ct. 2458 (2009). Simply put, the text of the NWPA does not specify actions the Secretary can or must take once the application is filed. Accordingly, while some may disagree with the wisdom of the Secretary’s underlying policy decision, the Secretary may fill this statutory “gap.” The Secretary’s interpretation is a reasonable one that should be given great weight and sustained. *See, e.g., Tennessee v. Herrington*, 806 F.2d 642, 653 (6th Cir. 1986) (“[W]e are mindful of the Supreme Court’s statement in *Chevron, supra*, that: ‘When a challenge to an agency construction of a statutory provision, fairly conceptualized, really centers on the wisdom of the agency’s policy, rather than whether it is a reasonable choice within a gap left open by Congress, the challenge must fail.’”).

⁸ *See also* 148 Cong. Rec. 7155 (2002) (Rep. Dingell) (stating that Yucca Mountain Site Approval Act “is just about a step in a process”); *id.* at 7166 (Rep. Norwood) (“The vote today does not lock us in forever and we are not committed forever to Yucca Mountain.”); *id.* at 12340 (Sen. Crapo) (“[T]his debate is not about whether to open the Yucca Mountain facility so much as it is about allowing the process of permitting to begin to take place.”).

B. No Conditions Are Necessary As to the Licensing Support Network

Finally, there is no reason to impose conditions relating to the Licensing Support Network (“LSN”) as a term of withdrawal. As DOE’s prior filings with this Board explain, DOE will, at a minimum, maintain the LSN throughout this proceeding, including any appeals, and then archive the LSN materials in accordance with the Federal Records Act and other relevant law. *See* Department of Energy’s Answers to the Board’s Questions at the January 27, 2010 Case Management Conference (filed Feb. 4, 2010); Department of Energy’s Status Report on Its Archiving Plan (filed Feb. 19, 2010). Thus, DOE will retain the full LSN functionality throughout this proceeding, including appeal, and then follow well established legal requirements that already govern DOE’s obligations regarding these documents. DOE is also considering whether sound public and fiscal policy, and the goal of preserving the knowledge gained both inside and outside of this proceeding, suggest going even further than those legal requirements. There is thus no need for this Board to impose additional conditions concerning the preservation of records.

* * *

DOE counsel has communicated with counsel for the other parties commencing on February 24, 2010, in an effort to resolve any issues raised by them prior to filing this Motion, per 10 C.F.R. § 2.323(b). The State of Nevada and the State of California have stated that they agree with the relief requested here. The Nuclear Regulatory Commission Staff has stated that it takes no position at this time. The Nuclear Energy Institute has stated that it does not consent to the relief requested and will file its position

in a response. All other parties that have responded have stated that they reserve their positions until they see the final text of the motion.⁹

⁹ These parties include: Clark County, Eureka County, Four Counties (Esmeralda, Lavender, Churchill, Mineral), Inyo County, Lincoln County, Native Community Action Council, Nye County, Timbisha Shoshone Tribal Group, White Pine County.

Respectfully submitted,

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March 3, 2010

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

Atomic Safety and Licensing Board

Before Administrative Judges:
Thomas S. Moore, Chairman
Paul S. Ryerson
Richard E. Wardwell

In the Matter of)	Docket No. 63-001
U.S. DEPARTMENT OF ENERGY)	ASLBP No. 09-892-HLW-
CAB04)	
(High-Level Waste Repository))	

CERTIFICATE OF SERVICE

I hereby certify that copies of the U.S. DEPARTMENT OF ENERGY'S MOTION TO WITHDRAW have been served on the following persons on this 3rd day of March 2010 through the Nuclear Regulatory Commission's Electronic Information Exchange.

CAB 04

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