



Department of Energy

Washington, DC 20585

August 24, 2015

The Honorable Ed Whitfield
Chairman
Subcommittee on Energy and Power
Committee on Energy and Commerce
U. S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

On February 11, 2015, Secretary Ernest Moniz testified regarding "Fiscal Year 2016 Department of Energy Budget."

Enclosed are answers to the questions that were submitted by Representatives Shimkus, Latta, Harper, Pompeo, Griffith, Flores, McNerney, Doyle and you.

Also, enclosed are three Inserts for the Record that were requested by Representatives Olson, Latta, and Johnson to complete the hearing record.

If you need any additional information or further assistance, please contact me or Lillian Owen, Office of Congressional and Intergovernmental Affairs at (202) 586-5450.

Sincerely,

A handwritten signature in blue ink, appearing to read "Christopher King".

Christopher King
Principal Deputy Assistant Secretary
Congressional and Intergovernmental Affairs

Enclosures

cc: The Honorable Bobby L. Rush
Ranking Member



QUESTIONS FROM CHAIRMAN ED WHITFIELD

- Q1. Last May, you requested a National Coal Council review of the value of the agency's carbon capture and sequestration program. The advisory panel makes some troubling observations about the status of DOE's clean coal research. It notes, for example, that "it is impossible to objectively assess progress against the DOE program goals" – that program goals need "far greater clarity." We are a decade and \$6 billion into the CCS related research and we are no closer to achieving CCS deployment on a commercial scale. DOE has to do something to reform the management of this program.
- Q1a. I don't see anything in your budget about reforming the program measures and goals. What are you going to do about the advisory panel recommendations?
- A1a. The Department of Energy's (DOE) Carbon Capture and Storage (CCS) Program goals are established as guidelines and performance metrics for the conduct of research and development (R&D) of advanced technologies that are baselined against current, commercial technologies. These goals are established based on systems and techno-economic analyses conducted by the Department's National Energy Technology Laboratory.

The CCS program, along with all DOE programs, conducts periodic peer reviews and assessments of its R&D portfolio to ensure activities are aligned with and meeting program, DOE, and Administration goals. These reviews are conducted by panels consisting of experts from industry, academia, and national laboratories, which make recommendations to improve program and project activities. For example, the most recent review of the Regional Carbon Sequestration Partnerships (RCSPs) "concluded that the RCSP Initiative is a world leading initiative that is generating valuable results and experience."¹ The DOE programs also consider recommendations from advisory committees, such as the National Coal Council (NCC), to help guide and direct future activities.

With regard to CCS progress, NCC review also states, "To date, the DOE has been a world leader in advancing CCS technologies [...] there is no question that the dollars spent thus

¹ IEAGHG R&D Programme, <http://ieaghg.org/publications/blog/119-meetings-and-conferences/453-ieaghg-2013-peer-review-of-us-rcsp-phase-iii-projects>.

far have advanced and will continue to advance CCS.” Some examples of the Department’s CCS successes include six RCSPs that continue to inject or have injected carbon dioxide (CO₂) and monitor it to understand the factors that influence storage in geologic formations. Four large-scale CCS demonstration projects are either in operation or construction, and second generation carbon capture technologies are preceding to large pilot-scale tests. These efforts are catalyzing research, development, and demonstration activities that bolster the goal of widespread commercial deployment.

Q1b. Will you commit to working with the Committee to ensure this program is managed so that it may achieve measurable results?

A1b. The Department follows good management practices in all of its programs and looks forward to working with the Committee to ensure good results. CCS technology is necessary for the Nation to continue to use its fossil fuels (over 80% of our primary energy comes from fossil fuels) while meeting our commitment to reduce CO₂ emissions. As Secretary of Energy, my office will continue to maintain an open line of communication with your office.

Q2. Over the past four or five budget requests, DOE has consistently requested cuts in funding for coal related R&D, and each year, Congress has to put upwards of \$100 million back into the program. This year you appear to be requesting an increased budget for the Coal CCS, but this increase appears to come at the expense of coalrelated CCS R&D as nearly all of the requested increase would fund CCS for natural gas systems.

Q2a. Please explain this shift in focus to CCS for natural gas power plants.

A2a. DOE’s FY 2016 funding request for post-combustion capture will continue to focus on developing second generation and transformational CCS technologies for coal fired power systems. FY 2016 funding will also leverage the portfolio to conduct additional tests on existing and future R&D field test units using flue gas from a natural gas power system. These tests will address specific natural gas-related carbon capture issues such as higher oxygen (O₂) content and lower CO₂ concentration in flue gas, and higher flow rates of flue gas. Most R&D will address shared challenges for both coal and natural gas carbon capture such as energy penalty, capital and operation cost, and plant integration.

This will ensure activities efficiently use funding and are aligned with second generation capture targets.

Q2b. Given EPA's approach to require CCS on all new coal units and NOT on natural gas systems, why is DOE funding CCS for gas – and doing so out of funds that could otherwise be for the coal R&D program budget?

A2b. While it is true EPA's regulatory approach does not require CCS on natural gas based systems today, many studies — including the International Energy Agency's recent Energy Technology Perspectives report — have suggested that CCS on natural gas power systems will be necessary to achieve deep carbon reductions in the power sector. As with coal, we believe that natural gas will continue to play an important role in energy generation for some time to come, so it is prudent — and in fact critical — for the Department to develop and assess carbon capture technology options for natural gas that can be advanced long into the future. Furthermore, many of the technology advancements that have been developed — advanced solvents and sorbents, compression methods, and sub-surface research and development — are likely to be applicable to both coal and natural gas systems, and thus the advancements in both areas are mutually beneficial.

Q2c. Why are you cutting back on coal funding?

A2c. Overall, the FY 2016 Budget Request for Coal CCS and Power Systems is an increase of \$66 million above the FY 2015 Budget Request and the FY 2016 Request for Carbon Capture, specifically, is nearly \$40 million higher. The FY 2016 Budget Request continues the Carbon Capture Program's support for existing R&D for coal and will leverage a subset of the existing coal-related R&D activities at the laboratory-, bench-, and pilot-scale for natural gas activities. The additional funding in the carbon capture budget would be used to identify CO₂ capture technologies developed for coal-fired power systems and test, where feasible, these existing R&D field test units on natural gas flue streams. This does not reduce the level of effort and DOE's commitment to lowering the cost of CCS for coal fired power plants.

- Q3. Your budget requests nearly \$500 million for wind and solar programs but only \$34 million for advanced (non-CCS) coal technologies. That's a big difference. What is the basis for the disproportionate treatment?
- A3. Fossil energy is a critical component of the DOE all-of-the-above energy strategy, and DOE's FY 2016 Budget Request reflects a commitment to fossil energy as well as to wind and solar programs. The FY 2016 Request funds fossil energy R&D at roughly the same level provided by Congress in FY 2015. In fact, the FY 2016 Request is \$85 million (+18 percent) above the FY 2015 budget request for fossil energy R&D. While the Request for fossil energy R&D is roughly even with the FY 2015 enacted level, the budget includes significant increases in key technology areas like carbon capture, carbon storage, methane emissions mitigation, natural gas carbon capture, work under the Federal Multiagency Collaboration on Unconventional Oil and Gas Research, and supercritical CO₂ technologies.

In addition to the funding in the FY 2016 Request, the Department is also now receiving applications for an \$8 billion advanced fossil energy loan guarantee solicitation for projects that are innovative and reduce carbon emissions.

The budget for advanced coal technologies R&D at the National Energy Technology Laboratory (NETL) has gone down in the FY 2016 Request compared to the FY 2015 appropriation due to the completion of work assessing and analyzing the feasibility of economically recovering rare elements from coal and coal byproduct streams such as fly ash, coal reuse, and aqueous effluent.

Expanded funding in the FY 2016 Request for energy efficiency, renewable energy, and advanced transportation R&D reflects the importance of continued investment to develop technologies that will enhance the competitiveness of our domestic industries in a rapidly-evolving global marketplace. These technologies are also critical to our long-term energy independence and our efforts to address climate change.

- Q4. The budget proposes cutting funding in other important coal related R&D areas, such as the Advanced Energy Systems program, where technologies are being developed to explore significantly new and transformational coal conversion technologies.

Q4a. Why are you proposing to cut back funding for new, transformational technologies that could help ensure continued coal use with significantly lower GHG emissions?

A4a. The decrease in Advanced Energy Systems (AES) represents a natural transition from 2nd generation to transformational technologies. Pilot-scale work is being completed and our focus is now on the next generation of technologies capable of higher efficiencies and lower costs (i.e., a transition from higher cost pilot tests to lower cost lab and bench work). In advanced combustion, we have prioritized the most promising technologies for the next round of pilot testing. For turbines and gasification we are completing hydrogen turbine and oxygen production pilot-scale testing. Focus will now shift to support for lower cost R&D projects on better materials and components in our advanced turbines program and to novel designs and lab and bench scale testing in our gasification program. Recently, we released a Funding Opportunity Announcement (FOA) to test a 400kWe (or higher) thermally self-sustaining solid oxide fuel cell prototype system. This will allow us to focus in FY 2016 on ways to lower cost and improve system integration and stack life. In addition, some of the funding for component development that had been included under the AES program in previous requests has been moved and is now requested under the Supercritical Transformational Electric Power (STEP) budget line. For example, in FY 2016, turbine R&D related to the higher temperature, directly-fired supercritical CO₂ based power cycles will continue in the Advanced Turbines subprogram but materials development and systems analysis for the indirectly fired CO₂ based power cycle will be moved to the new SCO₂ subprogram.

Q5. During the hearing you said, in response to my question concerning the commercial readiness of CCS for power plants, that “there is no question that all of the technologies have been demonstrated, including in an integrated fashion, for example in the Boundary Dam project in Canada...”

Q5a. Is it correct that the Boundary Dam project in Canada is a 110 MW retrofit to an existing pulverized coal plant and the spending on this project has surpassed \$1 billion?

A5a. The Boundary Dam CCS Retrofit Project removes 90% of the CO₂ from a 110 megawatt facility. The reported cost of the project was \$1.35 billion². It should be noted that this is

² <http://www.saskpowerccs.com/newsandmedia/latest-news/rolling-out-the-worlds-first-ccs-power-plant/>

a first-of-a-kind project, and SaskPower, the owner of the project, has stated that a second unit would see a capital cost reduction of up to 30%³. The project also incurred costs that may not be associated with similar future projects, such as a CO₂ pipeline that is larger than the current project capacity in anticipation of additional units retrofitted at the same plant.

Q5b. Is it correct that this project, which has only been in operation for less than one year, has been identified by NETL as a technical readiness level of 7? And if not, what is the technical readiness level?

A5b. NETL has not undertaken a Technology Readiness Assessment of the CANSOLV capture technology being demonstrated at the Boundary Dam project. However, an assessment has been undertaken by the Global Carbon Capture and Storage Institute (GCCSI) in partnership with the Electric Power Research Institute (EPRI). Their report, which DOE has not independently verified, indicates “successful operation of Boundary Dam (110 MWe) ... would achieve TRL-8” (The Global Carbon Capture and Storage Institute and the Electric Power Research Institute, January 2012, p. 6).

[<http://decarboni.se/sites/default/files/publications/29701/co2-capture-technologies.pdf>]

Q5c. When will the project reach a technical readiness level of 9?

A5c. According to the aforementioned GCCSI/EPRI report, TRL-9 would be achieved when a subsequent project in the size range of 400-800 MWe is completed. Given market and regulatory uncertainties, it is not possible to estimate when such a project could be financed. The GCCSI/EPRI report indicates that at the end of the Kemper project it would achieve TRL-9.

Q5d. What other carbon capture and storage (CCS) technologies have been demonstrated at commercial scale – greater than 100 MW -- at coal based power plants integrated into an electricity transmission system?

A5d. NETL is aware of no other CCS technology demonstrations greater than 100 MWe that have been completed. However, DOE currently has two commercial-scale CCS demonstration projects on coal-fired power plants that are under construction. They are

³ <http://www.globalccsinstitute.com/insights/authors/RonMunson/2014/10/02/boundary-dam-first-power-ccs>

the 582 MWe (net) Kemper County Integrated Gasification Combined Cycle (IGCC) project, and the 240 MWe (equivalent) Petra Nova W.A. Parish Post-Combustion CO₂ Capture and Sequestration project. The projects are expected to enter operation in 2016 and 2017 respectively, and would represent TRL-8 and will mature from TRL-8 to TRL-9 once they achieve successful operation.

- Q6. During the hearing you also said, in response to my question, that “the key point is if one were to go out right now to build an ultra-supercritical plant, and they exist, and use conventional capture there, one is talking only about 30 percent.”
- Q6a. Has CCS at 30% been successfully demonstrated at a commercial scale ultra-supercritical power plant, integrated into an electricity transmission system? If so, please list all such plants DOE has identified.
- A6a. No, there is no ultra-supercritical power plant currently operating with 30% CCS. The only currently operating post-combustion capture system, which is the Boundary Dam project operated by Sask Power, is a 110 MW subcritical unit. However, there is no technical barrier to the inclusion of CCS on an ultra-supercritical unit. Many of the commercially available technologies and next generation technologies currently under development for post-combustion capture are applicable to a wide variety of units with varying steam temperatures. The example of carbon capture on an ultra-supercritical plant is only one possible way that a system could be built to achieve the proposed EPA standards, and newer technologies are rapidly achieving even lower energy penalties for advanced power systems.
- Q6b. Is it DOE’s view that, should EPA set a standard for 30% capture at an ultra-supercritical power plant, such a standard has been adequately demonstrated at commercial scale in commercial service in electric power generation? If so, identify where such a standard has been demonstrated at commercial scale, in power applications.
- A6b. The role of the U.S DOE is to develop advanced clean energy technologies, and to provide information to EPA as part of the regulatory process to ensure the most relevant data is used in determining the appropriate emissions standard. DOE is supportive of the current regulatory approach, and is not in a position to comment on alternative standards.

Q7. As part of your Quadrennial Energy Review, DOE has been evaluating energy transmission, distribution and storage, correct? So what critical findings and recommendations can you share with this committee with respect to:

Q7a. Natural gas infrastructure?

A7a. The first installment of the Quadrennial Energy Review (QER) focused on energy transmission, storage and distribution (TS&D) infrastructure. Below are select findings and recommendations for natural gas, oil and electricity infrastructure. Note that some findings and recommendations are repeated as they apply to multiple sectors, and this is not a complete list of all findings or recommendations in the QER.

Critical findings for natural gas infrastructure include:

1. As referenced on page 2-2, “Mitigating energy disruptions is fundamental to infrastructure resilience.”
2. As referenced on page 2-2, “Recovery from natural gas and liquid fuel system disruptions can be difficult.”
3. As referenced on page 2-2, “Shifts in the natural gas sector are having mixed effects on resilience, reliability, safety, and asset security.”
4. As referenced on page 2-2, “Dependencies and interdependencies are growing. Many components of liquid fuels and natural gas systems—including pumps, refineries, and about 5 percent of natural gas compressor stations—require electricity to operate. The interdependency of the electricity and gas systems is growing as more gas is used in power generation.”
5. As referenced on page 2-2, “Aging, leak-prone natural gas distribution pipelines and associated infrastructures prompt safety and environmental concerns. Most safety incidents involving natural gas pipelines occur on natural gas distribution systems. These incidents tend to occur in densely populated areas.”
6. As referenced on page 4-2, “Multiple factors affect U.S. energy security. These include the adequacy of emergency response systems dependent on natural gas; natural gas inventory levels; energy system resilience fueled by

natural gas; and the flexibility, transparency, and competitiveness of global natural gas markets.”

7. As referenced on page 4-2, “The United States has achieved unprecedented ... gas production growth.... The natural gas outlook has changed tremendously. Just 10 years ago, it was projected that the United States would become highly dependent on liquefied natural gas imports, whereas the current outlook projects that the United States will have enormous capacity and reserves and could become a major liquefied natural gas exporter.”
8. As referenced on page 4-2, “The United States is the world’s largest producer of petroleum and natural gas.”
9. As referenced on page 7-2, “TS&D infrastructure can serve as a key enabler for—or barrier to—better environmental outcomes. Certain types of TS&D infrastructure enable improvements in system-wide environmental performance at lower cost, such as electric transmission and distribution infrastructure to access renewable energy resources and interstate natural gas pipelines, which can facilitate CO₂ emission reductions from the electric power sector.”
10. As referenced on page 8-2, “Accelerating methane abatement actions in the natural gas transmission, storage, and distribution system is projected to support a significant number of jobs.”

Recommendations for natural gas infrastructure include the following:

1. As referenced on page 2-38, “Develop comprehensive data, metrics, and an analytical framework for energy infrastructure resilience, reliability, safety, and asset security...”
2. As referenced on page 2-38, “Establish a competitive program to accelerate pipeline replacement and enhance maintenance programs for natural gas distribution systems...”
3. As referenced on page 2-39, “Support the updating and expansion of state energy assurance plans...”

4. As referenced on page 2-40, “Establish a competitive grant program to promote innovative solutions to enhance energy infrastructure resilience, reliability, and security...”
5. As referenced on page 7-11, “Improve quantification of emissions from natural gas TS&D infrastructure...”
6. As referenced on page 7-12, “Expand natural gas transmission and distribution research and development programs...”
7. As referenced on page 7-12, “Invest in research and development to lower the cost of continuous emissions monitoring equipment...”
8. As referenced on page 7-18, “Provide funding to programs that reduce diesel emissions...”

Q7b. Oil infrastructure?

A7b. The QER focused on liquid fuels infrastructure, which included crude oil, refined products, biofuels and propane. Critical findings include:

1. As referenced on page 2-2, “Mitigating energy disruptions is fundamental to infrastructure resilience.”
2. As referenced on page 2-2, “Recovery from natural gas and liquid fuel system disruptions can be difficult.”
3. As referenced on page 2-2, “Dependencies and interdependencies are growing.”
4. As referenced on page 4-2, “Multiple factors affect U.S. energy security. These include U.S. oil demand; the level of oil imports; the adequacy of emergency response systems dependent on oil; oil inventory levels; and the flexibility, transparency, and competitiveness of global energy markets.”
5. As referenced on page 4-2, “The United States has achieved unprecedented oil and gas production growth. Oil production growth has enabled the United States to act as a stabilizing factor in the world market by offsetting large sustained supply outages in the Middle East and North Africa and, later, contributing to a supply surplus that has reduced oil prices to levels not seen since March 2009.”

6. As referenced on page 4-2, “The network of oil distribution (“the midstream”) has changed significantly. Product that had historically flowed through pipelines from south to north now moves from north to south, and multiple midstream modes (pipelines, rail, and barges) are moving oil from new producing regions to refineries throughout the United States.”
7. As referenced on page 4-2, “The Strategic Petroleum Reserve’s (SPR) ability to offset future energy supply disruptions has been adversely affected by domestic and global oil market developments coupled with the need for upgrades. Changes in the U.S. midstream (for example, competing commercial demands and pipeline reversals) and lower U.S. dependence on imported oil have created challenges to effectively distributing oil from the reserve. This diminishes the capacity of the SPR to protect the U.S. economy from severe economic harm in the event of a global supply emergency and associated oil price spike.”
8. As referenced on page 4-2, “Increasing domestic oil production has focused attention on U.S. oil export laws established in the aftermath of the 1973–1974 Arab Oil Embargo. There are now concerns that the U.S. oil slate may be too light for U.S. refineries; although, recent Department of Commerce clarifications that liquid hydrocarbons, after they have been processed through a crude oil distillation tower, are petroleum products, and therefore eligible for export, will help avoid adverse production impacts.”
9. As referenced on page 4-2, “Biofuel production in the United States has increased rapidly over the last decade, enhancing energy security and reducing emissions of greenhouse gases from transportation dependent on gasoline. This growth has been driven in part by the Renewable Fuel Standard. Ethanol now displaces approximately 10 percent of U.S. gasoline demand by volume; biodiesel, advanced, and cellulosic biofuel production volumes have also been growing. Continued growth in ethanol use will depend in part on investment in additional distribution capacity; growth in the use of other biofuels, such as “drop-in” fuels, will depend on continued investment in research, development, demonstration, and deployment.”

10. As referenced on page 5-2, “Rapid crude oil production increases have changed the patterns of flow of North American midstream (pipelines, rail, and barge) liquids transport infrastructure.”
11. As referenced on page 5-2, “Limited infrastructure capacities are intensifying competition among commodities, with some costs passed on to consumers.”
12. As referenced on page 5-2, “Increased transportation of crude oil by rail and barge has highlighted the need for additional safeguards.”
13. As referenced on page 7-2, “Transportation of crude oil by pipeline, rail, and waterborne vessels has safety and environmental impacts.”

Recommendations for liquid fuels infrastructure includes the following:

1. As referenced on page 2-38, “Develop comprehensive data, metrics, and an analytical framework for energy infrastructure resilience, reliability, safety, and asset security...”
2. As referenced on page 2-39, “Support the updating and expansion of state energy assurance plans...”
3. As referenced on page 2-40, “Establish a competitive grant program to promote innovative solutions to enhance energy infrastructure resilience, reliability, and security...”
4. As referenced on page 2-41, “Analyze the need for additional or expanded regional product reserves...”
5. As referenced on page 2-41, “Integrate the authorities of the President to release products from RPPRs into a single, unified authority...”
6. As referenced on page 4-9, “Update SPR release authorities to reflect modern oil markets...”
7. As referenced on page 4-9, “Invest to optimize the SPR’s emergency response capability...”
8. As referenced on page 4-9, “Support other U.S. actions related to energy security infrastructures that reflect a broader and more contemporary view of energy security...”

9. As referenced on pages 4-13 and 4-16, “Support fuel diversity through research, demonstration, and analysis...”
10. As referenced on page 5-13, “Enhance the understanding of important safety-related challenges of transport of crude oil and ethanol by rail and accelerate responses...”

Q7c. Electricity infrastructure?

A7c. Critical findings for electricity infrastructure include:

1. As referenced on page 2-2, “Mitigating energy disruptions is fundamental to infrastructure resilience.”
2. As referenced on page 2-2, “TS&D is vulnerable to many natural phenomena.”
3. As referenced on page 2-2, “High-voltage transformers are critical to the grid. They represent one of its most vulnerable components.”
4. As referenced on page 2-2, “Dependencies and interdependencies are growing.”
5. As referenced on page 3-2, “Investments in transmission and distribution upgrades and expansions will grow.”
6. As referenced on page 3-2, “Both long-distance transmission and distributed energy resources can enable lower-carbon electricity.”
7. As referenced on page 3-2, “The potential range of new transmission construction is within historic investment magnitudes.”
8. As referenced on page 3-2, “Flexible grid system operations and demand response can enable renewables and reduce the need for new bulk-power-level infrastructure.”
9. As referenced on page 3-2, “Investments in resilience have multiple benefits.”
10. As referenced on page 3-2, “Innovative technologies have significant value for the electricity system.”
11. As referenced on page 3-2, “Enhancing the communication to customer devices that control demand or generate power will improve the efficiency and reliability of the electric grid.”

12. As referenced on page 3-2, “Appropriate valuation of new services and technologies and energy efficiency can provide options for the utility business model.”
13. As referenced on page 3-2, “Consistent measurement and evaluation of energy efficiency is essential for enhancing resilience and avoiding new transmission and distribution infrastructure.”
14. As referenced on page 3-2, “States are the test beds for the evolution of the grid of the future.”
15. As referenced on page 3-2, “Different business models and utility structures rule out “One-Size-Fits-All” solutions to challenges.”
16. As referenced on page 3-2, “Growing jurisdictional overlap impedes development of the grid of the future. Federal and state jurisdiction over electric services are increasingly interacting and overlapping.”
17. As referenced on page 7-2, “TS&D infrastructure can serve as a key enabler for—or barrier to—better environmental outcomes. Certain types of TS&D infrastructure enable improvements in system-wide environmental performance at lower cost, such as electric transmission and distribution infrastructure to access renewable energy resources and interstate natural gas pipelines, which can facilitate CO₂ emission reductions from the electric power sector.”
18. As referenced on page 8-2, “Changes in the electricity sector, in particular, affect the number and types of energy jobs.”

Recommendations for electricity infrastructure include the following:

1. As referenced on page 2-38, “Develop comprehensive data, metrics, and an analytical framework for energy infrastructure resilience, reliability, safety, and asset security...”
2. As referenced on page 2-39, “Support the updating and expansion of state energy assurance plans...”

3. As referenced on page 2-40, “Establish a competitive grant program to promote innovative solutions to enhance energy infrastructure resilience, reliability, and security...”
4. As referenced on page 3-25, “Provide grid modernization research and development, analysis, and institutional support...”
5. As referenced on page 3-25, “Establish a framework and strategy for storage and flexibility...”
6. As referenced on page 3-26, “Conduct a national review of transmission plans and assess barriers to their implementation...”
7. As referenced on page 3-26, “Provide state financial assistance to promote and integrate TS&D infrastructure investment plans for electricity reliability, affordability, efficiency, lower carbon generation, and environmental protection with a focus on regional coordination...”
8. As referenced on page 3-27, “Coordinate goals across jurisdictions...”
9. As referenced on page 3-27, “Value new services and technologies...”
10. As referenced on page 3-28, “Improve grid communication through standards and interoperability...”
11. As referenced on page 3-28, “Establish uniform methods for monitoring and verifying energy efficiency...”

Q8. One of the goals of your FY 2016 budget request is “modernizing our domestic energy infrastructure for the 21st century economy.” What are DOE’s top recommendations for achieving this objective?

A8. The Department of Energy’s Grid Modernization Initiative will create tools and technologies that measure, analyze, predict, and control the grid of the future by focusing on key policy questions related to regulatory practices, market designs, and business models building on analyses and findings of the QER. It will also ensure the development of a secure and resilient grid and collaborate with stakeholders to test and demonstrate combinations of promising new technologies.

More specifically, the FY 2016 Budget Request includes \$356 million, an increase of \$160 million, for a major crosscutting initiative led by the Office of Electricity Delivery

and Energy Reliability (OE) to focus on the modernization of the electricity grid. This initiative invests in technology development, enhanced security, and modeling to enable the electricity grid of the future. This initiative includes \$10 million for R&D to improve resilience of large-scale electricity transformers and \$14.6 million for Smart Grid R&D, which supports a transition to an integrated system at the distribution level and development of a platform for market-based control signals. In addition, the Request establishes a virtual collaborative environment for conducting real-time advanced digital forensics cybersecurity analysis, which can be used to analyze untested and untrusted code, programs, and websites without allowing the software to harm the host device.

As referenced on pages 7-2 and 7-27, the Budget Request includes \$15 million to develop advanced technologies to detect and mitigate methane emissions from natural gas transmission, distribution, and storage facilities, and \$10 million to improve methane leakage measurements.

We will focus new attention on state grants for energy assurance and reliability, recognizing that many authorities and actions in this area depend upon the states. The FY 2016 Budget Request includes \$35.5 million to provide grants to state, tribal, and local governments to update energy assurance plans to address infrastructure resilience, as well as \$27.5 million that is part of the Grid Modernization crosscutting initiative to provide competitive grants to states and multi-state entities to address electricity reliability.

Last year, the Department also completed a 5 million barrel test sale for the SPR to look at infrastructure challenges resulting in large part from pipelines now flowing in opposite directions from when the SPR was originally established. Through the test sale, we found challenges confronting the SPR's distribution system, and the FY 2016 Budget proposes requests funding for an increase of \$57 million above the FY 2015 enacted level. This Request includes funding of \$17 million for acquisition of a custody transfer flow metering skid at the Big Hill site to provide distribution flexibility and reliability, as well as additional funding for the SPR to address deferred major maintenance and cavern integrity issues that will enhance operational readiness for the SPR.

With regard to the SPR, the QER also recommends:

- As referenced on page 4-9, “Update SPR release authorities to reflect modern oil markets: Congress should update the SPR release authorities in the Energy Policy and Conservation Act of 1975 (EPCA) so that (1) the definition of a severe energy supply interruption includes an interruption of the supply of oil that is likely to cause a severe increase in the price of domestic petroleum products, and (2) the requirement that a severe increase in the price of petroleum products has resulted from such emergency situation is changed to a requirement that a severe price increase will likely result from such emergency situation.
- As referenced on page 4-9, “Invest to optimize the SPR’s emergency response capability: DOE should make investments to optimize the ability of the SPR to protect the U.S. economy in an energy supply emergency. It is anticipated that \$1.5–\$2.0 billion is needed to increase the incremental distribution capacity of the SPR by adding dedicated marine loading dock capacity at the Gulf Coast terminus of the SPR distribution systems, as well as undertaking a life extension program for key SPR components, including surface infrastructure and additional brine-drive caverns. This work should be preceded by DOE analyzing appropriate SPR size and configuration and carrying out detailed engineering studies.”
- As referenced on page 4-9, “Support other U.S. actions related to energy security infrastructures that reflect a broader and collective view of energy security: The United States should continue to consult with allies and key energy trading partners on energy security issues, as well as support actions related to energy infrastructures that are consistent with U.S. interests and G-7 principles on energy security.”

Finally, while we move toward implementation of recommendations on the first installment of the QER on infrastructure, DOE will move forward on future installments of the 4-year QER. The Budget includes \$35 million for the Office of Energy Policy and Systems Analysis to provide integrated energy systems analysis and follow-on QER support activities.

Q9. Would you agree that improved information sharing between federal agencies and owners and operators of critical energy infrastructure would be a valuable tool in protecting these assets? Would you be willing to work with us to develop practical solutions – such as information sharing and emergency preparedness and restoration – to address and respond to energy infrastructure security issues?

A9. Robust information sharing and the resulting improvement in situational awareness have always been a key goal in the energy sector’s Roadmap to Achieve Energy Delivery Systems Cybersecurity⁴. Several milestones are focused on tools and capabilities that will expedite the discovery, analysis, reporting, sharing, and mitigation of cyber threats. These milestones were identified by industry with concurrence from the DOE and Department of Homeland Security (DHS).

Achieving information sharing and communication is the first of six goals identified in DOE’s Energy Sector Specific Plan as part of the National Infrastructure Protection Plan: establish robust situational awareness within the energy sector through timely, reliable, and secure information exchange among trusted public and private sector security partners.

We envision a robust, resilient energy infrastructure in which business and service continuity is maintained through secure and reliable information sharing, effective risk management programs, coordinated response capabilities, and trusted relationships between public and private partners at all levels of industry and government.

In its role as the Sector Specific Agency for Energy, DOE works collaboratively with two energy Sector Coordinating Councils (SCCs), one for electricity and one for oil and natural gas, and a Government Coordinating Council with members from all levels of government concerned with energy security. These coordinating councils represent nearly all members of the energy community and are committed to working closely with DOE and other government energy sector partners.

⁴http://www.energy.gov/sites/prod/files/Energy%20Delivery%20Systems%20Cybersecurity%20Roadmap_finalweb.pdf

DOE works closely with the DHS's National Infrastructure Coordinating Center and National Cybersecurity Communications and Integration Center to enhance the efficient and effectiveness of the Government's work to secure the energy sector.

The Electricity Sector Information Sharing and Analysis Center (ES-ISAC) establishes situational awareness, incident management, coordination, and communication capabilities within the electricity sector through timely, reliable, and secure information exchange. The ES-ISAC, in collaboration with DOE and the Electricity SCC serves as the primary security communications channel for the electricity sector and enhances the ability of the sector to prepare for and respond to cyber and physical threats, vulnerabilities, and incidents.

Recent natural disasters have underscored the importance of having a resilient oil and natural gas infrastructure and effective ways for industry and government to communicate to address energy supply disruptions. To this end, in 2013 I asked the National Petroleum Council to give their advice through a study on Emergency Preparedness for Natural Disasters. This study resulted in seven recommendations, including leveraging the Energy Information Administration's (EIA) subject matter expertise within the DOE Emergency Response Team to improve supply chain situational assessments and recommending DOE and states establish routine education and training programs for key government emergency response positions. This report was delivered in December 2014 and the recommendations are currently being implemented.

I stand ready to work with all Members to develop practical solutions to address and respond to energy infrastructure security issues.

Q10. What is the Department's strategy for addressing potential cybersecurity challenges presented by existing and future grid and energy infrastructure technologies?

A10. DOE aligns cybersecurity for energy delivery systems activities with the vision, strategy, and milestones articulated in the energy sector's 2011 Roadmap to Achieve Energy Delivery Systems Cybersecurity. The Roadmap envisions resilient energy delivery

systems designed, installed, operated, and maintained to survive a cyber incident while sustaining critical functions, and offers five strategic directions to support this vision:

- Build a culture of security so that effective cybersecurity practices are reflexive and expected among all energy sector stakeholders.
- Assess and monitor risk so that continuous security state monitoring of all energy delivery system architecture levels and across cyber-physical domains becomes widely adopted by energy sector asset owners and operators.
- Develop and implement new protective measures to reduce risk so that energy delivery systems sustain critical functions during a cyber incident.
- Manage incidents so that energy sector stakeholders can rapidly mitigate an unfolding cyber incident, quickly return to normal operations, and derive lessons learned.
- Sustain security improvements through effective collaboration among industry, academia, and government that maintain cybersecurity advances.

DOE's cybersecurity for energy delivery systems activities align with the energy sector's Roadmap vision and strategy. Through these activities, DOE engages partnerships of energy sector stakeholders, suppliers, integrators, energy utilities, energy asset owners and operators, academia, national laboratories, and multiple Federal agencies.

Q10a. What programs or research and development efforts does the Department intend to pursue to understand potential cybersecurity vulnerabilities created by networked or digitally connected energy technologies?

A10a. The energy sector is a prime target for malicious cybersecurity attacks, and the ability to detect and mitigate the malicious activity is critical. As requested in FY 2016, OE's Cybersecurity for Energy Delivery Systems (CEDS) will conduct a competitive solicitation to establish a Virtual Energy Sector Advanced Digital Forensics Analysis Platform for conducting real-time advanced digital forensics analysis for the energy sector. The development of a virtual environment for forensic analysis will enable analysts to safely inspect malware, zero-day vulnerabilities, and advanced threats across multiple stages and different vectors, as well as to test mitigations. This environment will be used to analyze untested and untrusted code, programs, and websites without

allowing the software to harm the host device. The \$10 million requested for this initiative supports implementation over a two-year timeframe followed by transition to the private sector, where it will become self-sustaining.

The CEDS request also supports the Cybersecurity Risk Information Sharing Program (CRISP), which transitioned in FY 2014 from a small DOE-funded electricity sector pilot to a private-sector program primarily funded and managed by the North American Electric Reliability Corporation (NERC) and the electricity subsector companies that participate in the program. NERC manages unclassified elements of CRISP, and DOE performs critical classified elements. In FY 2016, DOE continues its classified analysis and reporting and will issue a competitive solicitation to identify and fund commercially available technologies and services that can be incorporated into CRISP via operational pilots designed to enhance all aspects of the program. As the energy sector-specific agency, DOE will also work with the oil and natural gas sector to bring it into CRISP.

Q11. Your budget requests \$10 million for “transformer resilience and advance components.” This is a new line item in the DOE budget. What is the purpose of this request? Would you be willing to work with us to develop practical solutions to address spare transformer issues?

A11. The Transformer Resilience and Advanced Components (TRAC) program will address the challenges facing transformers and other critical grid components as the electric grid modernizes. The risks posed by geomagnetic disturbances, electromagnetic pulses, and other physical stressors that can degrade or damage these vital assets are not well understood. Increased deployment of distributed generation also introduces new challenges of reversed power flows, increased harmonics, and larger fault currents. R&D and testing is needed to analyze how these stressors and changes will impact transformers and other components, as well as to identify mitigation options and solutions.

We welcome the opportunity to work with Congress to develop practical solutions to address spare transformer issues. Utilities currently keep spare transformers in their inventory in case of catastrophic failures but are limited by the unique design,

configuration, and footprint requirements at a given substation and location.

Standardized transformer specifications are a potential solution that some utilities are pursuing but are not a general practice across the industry.

Q12. What steps is DOE taking to better integrate advanced energy technologies, such as energy storage and micro-grids, into the electric grid? What about utilizing “big data” and energy information technologies? Would you be willing to work with us to develop practical solutions to addressing the needs of the 21st century electric system?

A12. We welcome the opportunity to work with the Committee to develop practical solutions to address the needs of the 21st century electric system. The OE energy storage program is engaged in research to drive down costs and increase lifetimes of the technology. OE-funded energy storage technologies have been licensed in the private sector and are being utilized on the grid. New energy storage use cases are being explored and tools for evaluating cost and benefits for specific applications have been developed to improve resilience of the grid. For integrating microgrids into the electric grid, OE has ongoing R&D in planning and design and in operations and control, following the activity plan jointly developed with industry stakeholders. For planning and design, an integrated toolset development will be completed and transitioned in FY 2016 to aid microgrid planners and designers to meet stakeholder-defined objectives for cost, reliability, environmental emissions, and efficiency. For operations and control, advanced microgrid controllers, developed through projects selected in FY 2014, will be ready for simulated/emulated testing of their grid-interactive functions in meeting DOE program performance targets. Field demonstration of advanced controllers in combination with microgrid system designs is planned for FY 2017. In addition, new projects to coordinate and optimize operations of multiple microgrids with the electric grid will be awarded through the planned networked microgrid R&D funding opportunity announcement in FY 2016.

On the subject of Big Data, note the “smart” in the Smart Grid comes from transforming energy infrastructure into a tightly integrated energy and information infrastructure. We are learning to use increasing amounts of information to increase the efficiency, flexibility, and resilience of our grid, and to capitalize on the potential

contributions of customer-owned assets of all types. The process has begun with Federal, state, and private investments in grid modernization and continues at the R&D level in OE's Smart Grid activities in Advanced Distribution Management Systems and Market-Based Controls.

Q13. As the electric grid becomes increasingly digital and utilities integrate more communications technologies into their systems, are you fearful that the grid is becoming increasingly vulnerable to cyber threats?

A13. The DOE is working in close partnership with energy sector stakeholders, suppliers, integrators, energy utilities, energy asset owners and operators, academia, national laboratories, and multiple Federal agencies toward the energy sector's Roadmap vision of resilient energy delivery systems designed, installed, operated, and maintained to survive a cyber incident while sustaining critical functions. As grid modernization proceeds with integration of new digital technologies that will make the modern grid more reliable and efficient, cybersecurity measures that are appropriate for energy delivery operations are also being researched, developed, and integrated, in partnership with industry, to reduce the risk of a cyber incident disrupting energy delivery.

Q13a. What steps is DOE taking to ensure that these new technologies do not weaken the security of the grid?

A13a. The DOE supports research and development of advanced cybersecurity innovations designed to reduce the risk that new grid technologies, as well as legacy grid technologies, could weaken the cybersecurity of the grid. Examples include cybersecurity innovations that help protect new grid technologies such as phasor measurement units, which provide unprecedented wide area situational awareness of modern grid operations, and cybersecurity innovations that help protect smart meter communications, thereby supporting energy efficiency and demand response, and accelerating local outage restoration.

Q13b. We want to work with DOE to protect the grid. But we are wary of stifling innovation through heavy-handed regulation. So would you be open to voluntary supply chain programs? Public-private partnerships? Improved information sharing?

A13b. DOE supports activities in each of these valuable areas. An example of supply chain cybersecurity is DOE's 2014 Cybersecurity Procurement Language for Energy Delivery Systems guidance document, which provides guidance for utilities to request—and suppliers to provide—appropriate cybersecurity controls in procured energy delivery systems. Examples of public-private partnerships include every grid cybersecurity research and development project that DOE supports, each of which engages public-private partnerships between DOE and research collaborations that can include energy sector stakeholders, utilities, asset owners and operators, universities, and national laboratories. An example of improved information sharing is national laboratory research dedicated to communication of cybersecurity and related physical security information to enable development and implementation of effective cyber incident response decisions.

Q14. Part of the stated goal of the White House "Strategy to Reduce Methane Emissions" is to stop leaks of methane from natural gas pipelines. This Committee is drafting legislation to modernize infrastructure, and one of our goals is to bring certainty to the natural gas permitting process.

Q14a. Do you agree that it's difficult to build new pipelines to reduce flaring or upgrade existing sections to eliminate leaks with a complicated and unpredictable regulatory regime in place?

A14a. According to a recent report prepared by ICF International for the Interstate Natural Gas Association of America (INGAA) Foundation titled "North American Midstream Infrastructure through 2035: Capitalizing on Our Energy Abundance," approximately 322,000 miles of natural gas transmission and gathering pipelines will be added through an estimated \$123 billion in capital expenditures between 2014 and 2035.

Recent analysis by DOE found that there has been significant investment in new interstate natural gas transmission pipeline capacity: over the last 18 years for which data are available, more than 133 billion cubic feet per day (Bcf/d) of capacity additions and \$65 billion in capital expenditures⁵.

⁵ <http://energy.gov/epso/downloads/natural-gas-infrastructure-implications-increased-demand-electric-sector>

The public and private sectors share a common interest in minimizing the finance, public safety, and environmental costs of natural gas flaring and methane leakage. Natural gas flaring and methane leakage are, however, separate issues that occur for different reasons and therefore different solution sets apply. In the case of flaring, one solution is the construction of natural gas gathering pipelines to connect oil production wells to natural gas processing facilities and interstate pipeline networks. While the Federal Government plays a role in permitting and siting of some gathering pipelines – for instance, if a pipeline crosses state lines, or is located on federal or Tribal lands, or has impacts to wildlife, cultural and historic resources– most onshore oil and gas production in the U.S. occurs on non-federal lands and therefore falls within the purview of state and local governments. Furthermore, it is worth noting that where natural gas gathering line capacity is either limited or underutilized, it may be due to a number of factors, including: the large investment and lead time needed to construct new facilities; the proximity of the wells and gas treatment plants; obtaining rights of way or easements; county and township zoning delays; challenging topography and geography; limited construction crews; the proper sizing of facilities to accommodate dramatic changes in production volumes; or other physical or mechanical limitations resulting from well and pipeline system operations. A North Dakota Petroleum Council (NDPC) Flaring Task Force identified securing landowner permissions as the biggest challenge in constructing gathering lines.

In the case of methane leakage, this occurs at a range of points throughout oil and natural gas infrastructure and challenges associated with permitting new pipeline facilities do not appear to be a barrier to emissions abatement. Chapter VII of the QER discusses this issue and related policy recommendations in some detail. For more information regarding major sources of methane emissions from natural gas infrastructure, we recommend the EPA’s Greenhouse Gas Emissions Inventory report, which was recently updated with 2013 data.

- Q14b. Will DOE’s Quadrennial Energy Review propose ways to streamline the federal permitting process to accelerate the modernization of our natural gas supply infrastructure?

A14b. Siting energy infrastructure in the U.S. is a complex, multi-jurisdictional, and multidimensional process, with no two projects facing the same set of issues.

The QER discusses some of the barriers to timely and efficient siting and permitting of infrastructure, in addition to highlighting steps that this Administration has taken both across and within Federal agencies to reduce the aggregate permitting and review time for infrastructure projects, while improving environmental and community outcomes.

Chapter IX of the QER recommends the following steps for this Administration to work with Congress to further expedite infrastructure siting, improve communication and engagement among stakeholders, and modernize tools available to policymakers:

1. Appropriate adequate resources to key Federal agencies involved in the siting, permitting, and review of infrastructure projects.
2. Prioritize meaningful public engagement through consultation with Indian Tribes, coordination with state and local governments, and facilitation of non-Federal partnerships to help reduce siting conflicts.
3. Expand landscape- and watershed-level mitigation and conservation planning so that agencies can locate mitigation activities in the most ecologically important areas.
4. Enact statutory authorities to improve coordination across agencies by authorizing and funding the Interagency Infrastructure Permitting Improvement Center in the Department of Transportation, as set forth in Section 1009 of the Administration's draft legislation: the GROW AMERICA Act.
5. Adopt Administration proposals to authorize recovery of costs for review of project applications, consistent with the proposal in the President's Fiscal Year 2016 Budget Request.

Furthermore, Chapter II of the QER recommends a substantial competitive grant program that would leverage state programs and private investments to help to accelerate the replacement of distribution pipelines that are constructed with leak-prone materials, to implement directed inspection and maintenance programs, and to implement other innovative approaches to distribution system upgrades. This would

help to increase public safety, enhance natural gas deliverability and reduce emissions from the system.

Q15. This Committee has heard from several witnesses, such as Dr. Daniel Yergin, that the U.S. natural gas market is demand-constrained, rather than supply-constrained. We have also heard that the lack of market demand may be contributing to the flaring of natural gas.

Q15a. Do you believe that U.S. LNG exports would provide a new demand outlet that would have a net-positive impact on our economy?

A15a. At the request of DOE's Office of Fossil Energy, the EIA conducted an analysis to assess how scenarios of increased exports of Liquefied Natural Gas (LNG) from the lower-48 states could affect domestic energy markets and economic activity. The report – "Effect of Increased Levels of Liquefied Natural Gas Exports on U.S. Energy Markets" – was published on October 29, 2014. The report stated that increasing LNG exports leads to higher economic output, as measured by real gross domestic product (GDP). Depending on the export scenarios specified for the EIA study, the GDP increased between 0.05% and 0.2% over the 2015-2040 timeframe.

Q15b. Do you believe there would also be environmental benefits?

A15b. In January 2014 DOE commissioned the National Energy Technology Lab to undertake a study analyzing the life cycle emissions of greenhouse gases (GHG), including CO₂ and methane, associated with natural gas produced in the U.S. and exported as LNG to other countries for use in electric power generation. The study entitled: Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the U.S. (LCA GHG Report) – estimated the life cycle GHG emissions of U.S. LNG exports to Europe and Asia, compared with alternative fuel supplies (such as regional coal and other imported natural gas) for electric power generation in the destination countries. While acknowledging substantial uncertainty, the LCA GHG Report shows that to the extent U.S. LNG exports are preferred over coal in LNG-importing nations; U.S. LNG exports are likely to reduce global GHG emissions.

Q15c. Regardless if some of the LNG ships to Asia, do you believe it would still help our European allies?

- A15c. With respect to exports of LNG to support Europe’s energy market, increased production of domestic natural gas has significantly reduced the need for the U.S. to import LNG. In global trade, LNG shipments that would have been destined for U.S. markets have been redirected to Europe and Asia, improving energy security for many of our key trading partners.
- Q16. The House recently passed H.R. 351, the LNG Permitting Certainty and Transparency Act, to require DOE to issue a decision on an LNG export application within 60 days following the publication of the final environmental review document. The House bill is very similar to a Senate bill which DOE stated was workable. Do you support the House bill, H.R. 351?
- A16. The Department has clearly demonstrated a commitment to act expeditiously in its regulatory responsibilities, and, therefore, we do not believe that the decision-making timelines proposed in H.R. 351 and S.33 are necessary to ensure efficient and responsible action by the DOE. While we understand that the intent of H.R. 351 and S. 33 is to add greater regulatory assurance to applicants for LNG exports and the Department shares the goals of transparency and certainty of process, we do not believe that H.R. 351 or S. 33 is necessary to meet these goals. However, should either of these bills become law, the Department would be able to achieve these deadlines.
- Q17. The Strategic Petroleum Reserve was envisioned in an era of energy scarcity, designed as a tool to mitigate the impacts of a supply disruption like the Arab oil embargo. Times have changed drastically since its creation in 1975. Now that the U.S. is producing more oil and importing less, it may be time to re-examine some aspects of the SPR.
- Q17a. Last year’s test sale of crude oil from the SPR highlighted vulnerabilities in the distribution network of pipelines and marine terminals needed during an emergency. What steps need to be taken to modernize the SPR’s distribution network?
- A17a. The lessons learned from the 2014 Strategic Petroleum Reserve (SPR) test sale focused primarily on issues affecting SPR distribution capability in the Texoma Distribution Group. In particular, it identified a need to enhance marine distribution capability. Although the test sale was focused on the Texoma Distribution Group and the Seaway and Capline Distribution Groups were not specifically evaluated as part of the test sale,

the Department believes it is prudent to review the marine distribution capability in all three of these Distribution Groups. Accordingly, the Department has commenced a review and analysis of all marine distribution capabilities.

Q17b. Do you think it is time to re-examine the role of the SPR in this new age of energy abundance?

A17b. Yes. U.S. and global oil markets have evolved since the 1970s, changing the environment in which the SPR operates. When the SPR was established, U.S. oil production was in decline, oil price and allocation controls separated the U.S. oil market from the rest of the world, and a truly global commodity market for oil, as we know it today, did not exist. Consequently, the Administration's QER recommends an analysis of the appropriate SPR size and configuration.

Q17c. There is no hard and fast decision rule or trigger mechanism for an SPR release. Do you think the SPR should be used to mitigate global supply shocks?

A17c. The drawdown authority to use the SPR in the event of a petroleum supply emergency is provided by the EPCA. It requires the President to determine that a "severe energy supply disruption" has occurred and is likely to damage the U.S. economy absent an SPR release. EPCA also allows limited releases or exchanges of SPR oil under circumstances other than a "severe energy supply disruption." Specifically, petroleum may be released from the SPR under the following circumstances:

- A Presidential Finding of a "severe energy supply interruption as" defined by EPCA Section 3. In addition, the President must find that that the increase in domestic petroleum product prices, caused by the interruption, "is likely to cause a major adverse impact on the national economy" (Section 161 (d)). Section 161 (d) also permits a release to honor the obligations of the U.S. under the international energy program;
- A Presidential Finding of a circumstance, other than those described in Section 161(d), that is likely to become a domestic or international energy supply shortage of significant scope or duration (EPCA Section 161(h)). A drawdown under this authority is limited to 30 million barrels for no more than 60 days and cannot reduce the SPR holdings below 500 million barrels;

- A Secretarial authorization to carry out a test drawdown and sale or exchange as part of a continuing evaluation of the SPR's drawdown and sales procedures (EPCA Section 161(g)); or
- A Secretarial authorization to acquire, by purchase, exchange, or otherwise, petroleum products for storage in the SPR (EPCA Section 159(f) and Section 160(a)).

Q18. Should the federal government use a coordinated process to assess the impact of policy decisions on national security and foreign policy? Would you agree that federal decisions, from rulemakings to project reviews and export licenses, impact energy diplomacy?"

A18. The federal government uses a coordinated interagency process to assess the impact of policy decisions related to national security and foreign policy. The White House convenes a robust interagency process through which appropriate federal agencies are consulted in the decision making process. This interagency process is used to formulate and address any and all issues with geopolitical impacts, including on energy issues. Each agency brings important and specialized expertise to this process. The DOE lends its expertise on energy markets, energy technologies, nuclear security and nonproliferation and clean energy.

Q19. The U.S. is currently the world's largest producer of natural gas and will likely surpass Russia and Saudi Arabia as the world's largest oil producer.

Q19a. Would you agree that this new age of energy abundance will significantly benefit our global competitiveness, and allow the U.S. to position itself as a global energy superpower?

A19a. Yes. Relatively low domestic natural gas prices increase the competitiveness of several U.S. industries: for example, the chemical and petroleum refining sectors. Increased domestic petroleum production helps improve our balance of payments since our expenditures for oil imports are being sharply reduced. Increased U.S. oil production has also, over the last few years, replaced significant lost Middle Eastern and North African oil supplies keeping the world oil market relatively stable. More recently, in the fall of 2014, U.S. oil production has caused a major shift in world oil

prices which had been at historically high levels, resulting in significant savings to American consumers.

Q19b. Under your leadership, how will DOE facilitate this energy transition in a manner that takes full advantage of the nation's new energy abundance, including development of offshore resources?

A19b. The Quadrennial Energy Review discusses several opportunities to capitalize on the U.S. energy renaissance. The management of offshore resources is the responsibility of the Department of Interior and, as such, we defer to the Department of Interior to articulate their plans to manage the development of the nation's offshore resources.

Q20. You recently stated with respect to Canada and Mexico, that DOE will "have a very strong focus on...integrated infrastructure development."

Q20a. Why is it important to improve coordination and integration of U.S. energy infrastructure with Canada and Mexico?

A20a. To date, the integration of North America's energy systems has provided multiple benefits to the U.S. and its neighbors. These benefits include energy trade, increased ability to respond to disruptions, access to more diverse energy supplies and storage which aids energy security, enhanced reliability of supply, and increased access to renewable resources and the ability to address variability of renewable electricity generation resources. The highly intertwined energy relationship between the U.S. and Canada yielded \$140 billion in trade in 2013; similarly, energy trade between the U.S. and Mexico yielded \$65 billion in 2012. Improving the coordination and integration of cross-border systems has the potential to expand energy markets, increase trade flows, and capture additional benefits in terms of energy security and environmental responsibility. We anticipate that further integration will enlarge these opportunities and advantages.

Q20b. If the Keystone XL pipeline is any indicator, it seems that your goal of increased cross-border "integrated infrastructure development" may prove difficult? How can we – Congress and DOE – better educate the White House on the importance of a better integrated North America?

- A20b. North American energy systems utilize transmission, storage, and distribution infrastructure crossing our borders and linking our energy markets with the wider global markets. Policymakers in each country value the benefits this integrated system provides, and the U.S. will continue to seek opportunities to enhance collaboration at the Federal level with our neighboring countries on issues such as energy data, as well as encourage non-Federal entities to collaborate with their Canadian and Mexican counterparts on cross-border energy infrastructure issues. Individual projects and policies will continue to be evaluated by each government.
- Q21. In your view, how has the President's failure to render a timely decision on the Keystone XL pipeline impacted diplomacy with Canada? Are there lessons-learned from this example that the Department will include in the Quadrennial Energy Review?
- A21. Energy trade between the U.S. and Canada reached \$140 billion in 2013 and included imports and exports of liquid fuels, natural gas, and electricity. At the same time, both countries have collaborated on shared environmental and energy security goals, including, but not limited to, joint work through the G-7 on energy security, collaborative action on Ukraine, initiatives in the upcoming U.S. chairmanship of the Arctic Council, and the signing of bilateral and trilateral (with Mexico) memoranda of understanding to advance coordination on energy data, clean energy, and regulatory side-by-side comparisons. The first installment of the QER considers the overall energy relationship between the U.S. and Canada (as well as Mexico and the Caribbean) in terms of energy security, economic competitiveness, and environmental responsibility with a particular focus on climate change and its impacts. Individual projects and policies will continue to be evaluated by each government, and the QER will not evaluate the merits of singular projects in its analysis.
- Q22. Will U.S. LNG exports improve the efficiency and transparency of international natural gas markets?
- A22. As part of the public interest review for applications to export LNG under Section 3(a) of the Natural Gas Act, DOE considers the international consequences of export authorization decisions. The U.S. commitment to free trade is one factor bearing on that review. An efficient, transparent international market for natural gas with diverse

sources of supply provides both economic and strategic benefits to the U.S. and our allies. To the extent U.S. exports can diversify global LNG supplies, and increase the volumes of LNG available globally, they will improve energy security for many U.S. allies and trading partners.

Q23. Does a diverse source of natural gas and oil supply provide both economic and strategic benefits to the United States and our allies?

A23. Increased U.S. oil production has, over the last few years, replaced significant lost Middle Eastern and North African oil supplies keeping the world oil market relatively stable. More recently, in the fall of 2014, U.S. oil production has caused a major shift in world oil prices that had been at historically high levels. Reducing these high oil prices, which were well above what was necessary to maintain growing oil supplies, is a benefit to many American allies and, on balance, supports U.S. foreign policy initiatives.

In addition, the renaissance of U.S. natural gas production has benefited the U.S. and its allies. Ten years ago, EIA anticipated that the U.S. would be importing 12 billion cubic feet per day (bcf/d) of LNG today. Instead, the U.S. is poised to become a major LNG exporter. This benefits our allies as they can diversify their sources of LNG with U.S. supplies. More importantly, by not importing 12 bcf/d (50% of today's world LNG market), the LNG that would have otherwise been shipped to the U.S. is available to other countries, and without U.S. competition for world LNG supplies, world LNG prices are not as high as they would have been otherwise.

Finally, increased U.S. natural gas supplies benefit many U.S. industries. If the U.S. had become reliant on imported LNG, domestic natural gas prices might have been three or four times as high as current prices. Low natural gas prices are a boon to many U.S. industries and help the utility industry reduce its greenhouse gas emissions.

Q24. EPA's FY 2016 budget requests tens of millions of dollars to implement its Clean Power Plan because, according to EPA, "Evaluating and capturing these [compliance] strategies requires the agency to tap into technical and policy expertise not

traditionally needed in EPA regulatory development (for example, nuclear, wind, solar, hydroelectric, and demand-side energy efficiency), and to understand and project system-wide approaches and trends in areas such as electricity transmission, distribution, and storage.”

Q24a. It sounds like EPA plans to extend its jurisdiction over nuclear, wind, solar, hydro, energy efficiency and electricity transmission, distribution and storage. I thought these were areas in which DOE has jurisdiction and expertise. If EPA is asserting authority here, why should Congress support DOE’s request for increases for its Offices of Nuclear, Energy Efficiency and Renewables, Fossil and Electricity?

A24a. Given the complexity and scale of the nation’s energy economy, a number of Federal, State and local agencies maintain distinct authorities where the public interest must be balanced with commercial interests. The roles and responsibilities of the DOE and the Environmental Protection Agency (EPA) have not changed with the proposal of the Clean Power Plan. EPA is a regulatory body that must take into account in its proposed regulations, the technological readiness, economic viability and environmental impact of the full range of incumbent and emerging energy technologies. EPA does not, however, conduct extensive energy technology development research, nor is it the steward of the Nation’s national energy laboratory system. With the exception of activities such as setting appliance standards, DOE has comparatively limited regulatory jurisdiction.

In a Presidential Memorandum signed on June 25, 2013, President Obama called for EPA to work with DOE during the process of developing greenhouse gas performance standards, regulations, or guidelines for power plants. Specifically, the memorandum called for EPA “to work with DOE and other Federal and State agencies to promote the reliable and affordable provision of electric power through the continued development and deployment of cleaner technologies and by increasing energy efficiency, including through stronger appliance efficiency standards and other measures.”

Q24b. Your first Quadrennial Energy Review – expected any day now – is focused on “transmission, distribution and storage,” correct? If I have questions about these topics, should I go to you or Administrator McCarthy given EPA’s clear interest in DOE’s areas of jurisdiction and expertise?

- A24b. The 22 agencies in the QER task force reflect the energy equities across government, with each having some expertise, resources and authorities relating to the nation's vast, complex, and pervasive energy infrastructure. The QER is a "living document" and not intended to be the sole and final word on the issues it covers. If a question on the topic of transmission, storage and distribution infrastructure relates to the findings and recommendations resulting from the analytical and stakeholder process conducted by DOE and its interagency partners in the task force, the DOE would be happy to address it or direct it to the appropriate agency. If the question pertains to issues outside of the purview of either the QER or DOE's core mission, it is appropriate to direct it to the agency of jurisdiction.
- Q25. DOE is charged with setting effective and comprehensive national energy policy. And yet America's *de facto* energy policy is being set by agencies like the Environmental Protection Agency through its Clean Power Plan.
- Q25a. How will you facilitate the development and implementation of a coordinated national energy policy that actually helps the private sector and the states promote dependable, affordable, and environmentally sound production and distribution of energy?
- A25a. Helping states and the private sector promote dependable, affordable, and environmentally sound production and distribution of energy is central to our mission at the DOE. Similar in nature to the distribution of energy jurisdiction among Congressional Committees, numerous Federal agencies have regulatory authorities over different aspects of the nation's energy system. The QER is one example of DOE's role in setting national energy policy. Through the QER process, the interagency partners coordinated to develop a focused and actionable roadmap for progress in areas such as modernization of the electric grid, with considerable attention paid to the need for institutional coordination between Federal, as well as State, local and tribal institutions, as well as support in the form of analysis and financial and technical assistance to these governments.
- Q25b. Will you commit to challenging other federal agencies if their rules and regulations raise energy prices, limit energy production, or hurt consumers?

- A25b. The DOE monitors, analyzes and provides comments on proposed rules and regulations through standard interagency processes, which are designed to take into account the diversity of perspectives and expertise that exist within Federal agencies and resolve differences where needed. Agencies often have opportunities to shape such policies at multiple points in the process before finalization.
- Q26. In a classic example of “the right hand not knowing what the left hand is doing,” the EPA is proposing rules to prohibit the use of some refrigerants commonly used in refrigerators and home air conditioning. Meanwhile, DOE has set costly new efficiency standards for these same products. EPA and DOE have apparently acted independently of each other and made no attempt to coordinate the implementation deadlines of rules affecting the same products.
- Q26a. Were you notified by EPA prior to the commencement of its rulemaking?
- A26a. Yes. DOE was aware of EPA’s Significant New Alternatives Policy (SNAP) rulemakings.
- Q26b. Are you aware the EPA proposed alternative refrigerants are flammable and will be used in millions of restaurant businesses and near open flames?
- A26b. EPA has finalized regulations that will allow the use of particular hydrocarbon refrigerants in residential and commercial refrigeration applications. This action took the form of EPA Rule 19, which was published in the on April 10, 2015 at 80 FR 19454. Within Rule 19, the use conditions specified for each newly-listed refrigerant address safe use of flammable refrigerants and include incorporation by reference of portions of certain safety standards from Underwriters Laboratories (UL), refrigerant charge size limits, and requirements for markings on equipment using these refrigerants. The applicable UL standard for commercial refrigeration is supplement SB to the 10th edition of the Underwriters Laboratories Standard for Commercial Refrigerators and Freezers, UL 471, dated November 24, 2010. The UL requirements were developed through the long-term efforts of a UL working group and are designed to ensure maximum operational safety of applicable equipment. UL safety standards also have, historically, served as source material for many state and local building codes. Additionally, in some instances, the EPA SNAP final rule mandates even more stringent requirements than UL 471, and Rule 19 states that “in cases

where this final rule includes requirements more stringent than those of the 10th edition of UL Standard 471, the appliance would need to meet the requirements of the final rule in place of the requirements in the UL Standard.” 80 FR 19454, 19459.

Q26c. Are you aware the EPA proposed alternative refrigerants will decrease the energy efficiency of residential refrigerators?

A26c. In a notice issued on July 9, 2014 under the EPA’s SNAP program, EPA proposed to change the status of certain hydrochlorofluorocarbons (HCFCs) to unacceptable under the Montreal Protocol on Substances that Deplete the Ozone Layer and Section 605(a) of the Clean Air Act. This proposal, which was published in the Federal Register on August 6, 2014 (79 FR 46126), would not newly classify any refrigerants as unacceptable for residential refrigerators.

Further, in a final rule published on April 10, 2015, EPA added R-290 (propane) as an acceptable alternative refrigerant for residential refrigerators and freezers, subject to certain use conditions. 80 FR 19454, 19459-60. In the final rule, EPA noted that hydrocarbon refrigerants, which include propane, have “zero ozone depletion potential (ODP) and very low global warming potentials (GWPs) compared to most other refrigerants” and that “some companies have reported improved energy efficiency with hydrocarbon refrigerants” Id. at 19455.

As EPA SNAP has not proposed or moved to delist any refrigerants for residential refrigeration applications, DOE is not aware of any negative energy impacts that would arise from EPA actions currently in process. In the next residential refrigerator rulemaking, DOE will consider all relevant impacts of EPA Rule 20, when finalized, in its analysis. This will include any impacts on energy performance related to HFCs used for refrigerants and foam blowing agents, if applicable.

Q27. In 2014, DOE issued 10 new energy efficiency standards for various appliance and product categories. And you recently stated that DOE plans to hold itself to an even higher standard in 2015. Indeed, your budget requests \$69 million for appliance and equipment standards activities.

- Q27a. You say you will test at least 100 products for compliance for the ENERGY STAR program; how much of the \$69 million is for that testing?
- A27a. DOE estimates that the last 100 products tested under ENERGY STAR cost about \$750,000 in total.
- Q27b. At what point will DOE realize we may be fast approaching “the law of diminishing returns” when it comes to energy efficiency standards for appliances?
- A27b. DOE’s Appliance Standards Program is compelled by statute to regularly review its energy conservation standards and test procedures at intervals for 6 and 7 years, respectively. 42 U.S.C. 6295(m)(1) and 42 U.S.C. 6293(b)(1)(A). Additionally, specific products or equipment types may be subject to additional statutory requirements that mandate review of energy conservation standards at more frequent intervals. For example, if the standards contained within the American Society of Heating, Refrigerating and Air-Conditioning Engineers(ASHRAE) standard 90.1 are updated by that organization, DOE is compelled by statute to initiate rulemakings reviewing the appropriateness of those standards and either codifying them into DOE’s regulations as presented by ASHRAE or setting standards at a more stringent level. 42 U.S.C. 6313(a)(6)(A)(i). Therefore, consistent with its statutory charge, DOE regularly reviews existing standard levels through its rulemaking analyses and process. This is unrelated to products tested under the ENERGY STAR program.

DOE realizes that technologies are constantly evolving, with new innovations and features entering product portfolios on a regular basis. Such evolution of the product landscape in turn produces new data sets for analysis, both with respect to equipment performance and equipment cost. DOE examines these data sets through its rulemaking analyses in order to ensure that it maintains standards consistent with its requirement that they be at a level that is technologically feasible, economically justified, and would save a significant amount of energy given available data. The agency is also required by statute to consider the following seven factors when setting new standards: The economic impact of the standard on the manufacturers and on the consumers of the products subject to such standard; the savings in operating costs throughout the estimated average life of the covered product in the type (or class)

compared to any increase in the price of, or in the initial charges for, or maintenance expenses of, the covered products which are likely to result from the imposition of the standard; the total projected amount of energy, or as applicable, water, savings likely to result directly from the imposition of the standard; any lessening of the utility or the performance of the covered products likely to result from the imposition of the standard; the impact of any lessening of competition, as determined in writing by the Attorney General, that is likely to result from the imposition of the standard; the need for national energy and water conservation; and other factors the Secretary considers relevant.

Results of rulemaking analyses to date maintain that appliance and commercial equipment standards remain a very cost-effective policy tool, producing nationwide net benefits which are orders of magnitude greater than the costs of managing the Appliance Standards Program.

Q28. At times it seems the regulatory process for establishing DOE efficiency standards is overly burdensome to manufacturers. Below are comments submitted by industry during the rulemaking process and I would like to get your thoughts.

Q28a. "...the general increase in the volume of regulatory activity in recent years, we believe it's time for the Department to evaluate its processes to determine if a better way of soliciting and obtaining meaningful, data-driven public feedback is appropriate. It is our view that significant room for process improvement exists and would help the Department, regulated entities and even the public at large because a better process will produce better rules."

i. Are you evaluating any process improvements at this time?

A28a. DOE's Process Rule in the Code of Federal Regulations at 10 CFR 430 Appendix A to Subpart C, describes the procedures, interpretations, and policies that guide DOE in establishing new or revised energy-efficiency standards. These guidelines are designed to provide for greater and more productive interaction between the Department and interested parties throughout the rulemaking process. The process was designed with stakeholders in mind and with the intent to enhance the productivity of the program through improved communication and has enhanced the

quality of the resulting rules, most typically through additional analysis conducted as issues are raised by stakeholders through the open and transparent process the Department follows in all of its rulemakings.

In November 2010, DOE announced that it would, in appropriate cases, implement changes to expedite its rulemaking process while maintaining collaboration and interaction with stakeholders. See <http://energy.gov/eere/buildings/plans-and-schedules>. In nearly all rulemakings conducted by DOE, the energy conservation standards rulemaking process typically begins with a framework document, followed by a preliminary analysis, with the publication of each document opening a period for comment including holding a public meeting. Only after these steps are completed does the Department issue a proposed rule for public comment.

While the traditional process consisting of a framework document and a preliminary analysis provides useful information, the Department believes that a more flexible process, one adapted to a product's specific circumstances - such as its regulatory history- is a more efficient way of gathering data. To this end, in recent years, DOE has decided to use the negotiated rulemaking process to develop proposed energy efficiency standards. This process was just used to develop a proposed rulemaking for commercial and industrial pumps. DOE believes such a regulatory negotiation process will be less adversarial and better suited to resolving complex technical issues. An important virtue of negotiated rulemaking is that it allows expert dialog that is much better than traditional techniques at getting the facts and issues right and results in a better proposed rule. A regulatory negotiation enables DOE to engage in direct and sustained dialog with informed, interested, and affected parties when drafting the regulation, rather than obtaining input during a public comment period after developing and publishing a proposed rule. Gaining this early understanding of all parties' perspectives allows DOE to address key issues at an earlier stage of the process, thereby allowing more time for an iterative process to resolve issues.

Additionally, the Department has found that publishing a Request for Information (RFI) requesting input and data from interested parties to aid in the development of the technical analyses is an effective means to receive input and comments on issues

relevant to the conduct of a rulemaking. In other circumstances, DOE publishes a Notice of Data Availability (NODA) containing the analysis and the underlining assumptions and calculations, which may be used to ultimately support a proposed energy conservation standard. DOE encourages stakeholder comment on the NODA or Notice of Proposed Rulemaking (NOPR) and invites additional data or information that may improve the analysis.

DOE also routinely holds public meetings to listen to and respond to stakeholder comments. DOE is happy to consider process improvements that maintain transparency and stakeholder engagement.

Q28b. “...DOE relies too heavily on manufacturers having to be familiar with the content of all NOPRs, Final Rules, Technical Support Documents, Transcripts of Public Meetings, and other related documents which DOE has issued *during more than 20 years of the rulemaking process*. The information manufacturers need should be clearly stated in 10 CFR.”

i. Can you pledge to this committee to make improvements in your internal processes so that our constituents can be better served?

A28b. DOE has many options available for stakeholders to participate in its rulemaking process. In addition to public meetings, open comment periods, and manufacturer interviews, DOE allows for ex parte communications by any stakeholder at any point in the rulemaking process. Stakeholders regularly use this process to express concerns to DOE on a variety of rulemaking topics. These meetings are documented and placed in the rulemaking docket so that all stakeholders can be aware of the topics and issues discussed.

Additionally, to provide further clarity, DOE maintains on its website a repository containing product-specific guidance and answers to frequently asked questions on the appliance standards program. Guidance types span all covered products and covered equipment and cover such topics as: definitions, scope of coverage, conservation standards, test procedures, certification, Compliance and Certification Management System (CCMS), and enforcement. The website offers users an easy-to-use search function for existing (draft and final) guidance and FAQs relating to the

Department's appliance regulations. In addition, it provides interested parties with the ability to submit questions to the Department. The Department is happy to consider further opportunities for improvements and has and will continue to better organize and detail manufacturer requirements in 10 CFR.

Q29. Describe the coordination between EPA and DOE with respect to the Significant New Alternative Policy (SNAP) regulatory proposal published in the Federal Register on August 6, 2014.

Q29a. List all meetings between EPA and DOE with respect to the SNAP proposal, the attendees, and the topics discussed.

A29a. DOE participated in various phone calls with EPA to discuss product specific issues. In addition, the DOE Office of Energy Efficiency and Renewable Energy (EERE) and Office of the General Counsel staff, as well as staff from the EPA SNAP program participated in calls to discuss the timeline and products impacted by both DOE's appliance standards program and EPA's SNAP program.

Q29b. Did EPA ask DOE for information about the cost and timing of re-designing refrigeration equipment? Did DOE provide such information? What other questions did EPA ask DOE before presenting the SNAP delisting proposal?

A29b. DOE provided a detailed schedule of its upcoming rules concerning refrigeration equipment and cost information to meet the new efficiency standards through the interagency review process. Additionally, DOE consistently provides public information regarding equipment redesign costs as part of its rulemaking analyses, and it publishes its methodologies and analytical outcomes for public comment in its Technical Support Documents. In its Engineering Analysis, DOE considers the cost and performance impacts of redesigning equipment configurations for improved energy efficiency, including, in appropriate cases, redesign to consider alternative refrigerants available on the market. This analysis takes into account changes in component, material, and production process costs incorporated into the manufacturer selling price of the equipment. Additionally, in the Manufacturer Impact Analysis, DOE uses information from extensive confidential, on-site manufacturer interviews to quantify the costs, including capital conversion costs and product conversion costs,

which manufacturers would face in redesigning equipment to achieve the various levels of performance analyzed. Product-specific information is available in the Technical Support Documents for commercial refrigeration equipment, automatic commercial ice makers, walk-in coolers and freezers, refrigerated beverage vending machines, and other covered equipment and product types. The DOE final rules for commercial refrigeration equipment and walk-in coolers and freezers were published prior to the release of EPA's proposal to delist refrigerants in EPA's Rule 20 (40 CFR 82).

- Q29c. Provide copies of all materials that DOE provided to EPA in connection with the SNAP proposal.
- A29c. DOE provided EPA all published notices, analytical results, and other supporting materials generated through the DOE rulemaking process are available to the public at www.regulations.gov. DOE also provided a copy of its rulemaking schedule that had implications for SNAP refrigerants (see table on page 64).
- Q29d. Is any consultation between DOE and EPA still ongoing with respect to the EPA SNAP proposal? And in light of reports that EPA may be planning additional SNAP proposals for other industrial sectors later this year? If yes, please list and describe all such meetings.
- A29d. Yes. DOE and EPA have continued ongoing discussions.
- Q30. Did DOE take any position with EPA about the adequacy of publicly-available data on the design, construction, and operation of equipment featuring alternative refrigerants that is needed to analyze equipment performance for standard-setting purposes?
- A30. During the conduct of its rulemaking analyses, DOE remains cognizant of the refrigerant landscape applicable to covered products, and examines, as applicable, the impact on cost and performance of incorporating alternative refrigerants. For example, in its residential refrigerators rulemaking, DOE explored the use of isobutane, rather than HFC, refrigerant as a possible means to improve energy efficiency. In its preliminary engineering analysis for refrigerated beverage vending machines, DOE analyzed the cost and performance of vending machines utilizing carbon dioxide, a refrigerant allowable for use in that application at the time of the

analysis, as well as the dominant legacy HFC refrigerant. DOE maintains itself apprised of any EPA listing or delisting actions under SNAP, and, as appropriate, gathers relevant data during its research, solicitation of public comment, and confidential manufacturer interviews in order to ensure that it is sufficiently able to analyze the impacts of changes to the refrigerant landscape.

Q31. Considering that the SNAP proposal could affect many energy efficiency decisions for equipment manufacturers and other users with respect to the change of status of certain materials, has the level of EPA consultation with DOE been adequate to ensure that energy efficiency issues are properly addressed in the EPA SNAP proposal?

A31. Yes. DOE and EPA are both aware of the efficiency issues regarding refrigerant type. In particular, these issues are being explored in the drafting of the Notice of Proposed Rulemaking for Refrigerated Beverage Vending Machine Energy Conservation Standards.

Q32. Has DOE calculated the effect on energy efficiency of food equipment if refrigerants are changed as set out in the SNAP proposal? If so, please provide the estimates. If not, what is the level of confidence that a change in refrigerants will reduce climate risks?

A32. DOE conducted its analyses for the commercial refrigeration equipment (CRE) energy conservation standards final rule that was published on March 28, 2014 using the refrigerant landscape that was available at that time. While DOE coordinated with EPA prior to its publication of the Rule 20 proposal on August 6, 2014, DOE is unable to conduct rulemakings based on speculation about possible future regulatory changes that might be made by another agency. Since then, EPA has finalized a rule allowing for the use of additional refrigerant options by manufacturers. To date, EPA has not published any final rule phasing out or banning the use of refrigerants currently on the market and used by CRE manufacturers at the time of DOE's final rule analyses. As a result, commercial refrigeration equipment manufacturers have only been provided additional options and are not being compelled to change any refrigerants currently in use. As a result, DOE asserts that since the SNAP position has not officially changed since the time of the 2014 final rule, DOE's position as

articulated in that rule has remained unchanged. DOE also pointed to exception relief from its standards through the Office of Hearings and Appeals, should unavailability of certain refrigerants create a situation where manufacturers couldn't meet the standard.

Q33. Has DOE calculated, in light of all constraints on design and usage, the effect on energy efficiency of insulated products if foam blowing agents are changed as set out in the SNAP proposal? If so, please provide the estimates. If not, what is the level of confidence that a change in foam blowing agents will reduce climate risks?

A33. In the course of conducting its refrigeration rulemakings, DOE has interviewed a number of major equipment manufacturers who utilize non-HFC blowing agents for their foamed-in-place insulation. These manufacturers assert that their insulation performs as well as insulation formed using HFC blowing agents, and testing of equipment on the market confirms that the equipment is capable of performing at a high level.

As significant players in varied refrigeration industries have already changed blowing agents without a corresponding negative energy performance impact, DOE has no reason to believe that EPA's proposed actions with respect to blowing agents would be likely to create a significant impact on performance.

Q34. In promulgating its 2014 efficiency standards for the commercial refrigeration industry, DOE appeared to discount the possibility of an immediate mandated change in refrigerants. On the contrary, DOE attempted to be consistent with an HFC phasedown pursuant to the Montreal Protocol. Specifically, the Department found as follows:

While DOE appreciates the input from stakeholders at the public meeting and in subsequent written comment, DOE does not believe that there is sufficient specific, actionable data presented at this juncture to warrant a change in its analysis and assumptions regarding the refrigerants used in commercial refrigeration applications. As of now, there is inadequate publicly-available data on the design, construction, and operation of equipment featuring alternative refrigerants to facilitate the level of analysis of equipment performance which would be needed for standard-setting purposes. DOE is aware that many low-GWP refrigerants are being introduced to the market, and wishes to ensure that this rule is consistent with the phase-down of HFCs proposed by the United States under the

Montreal Protocol. DOE continues to welcome comments on experience within the industry with the use of low-GWP alternative refrigerants. Moreover, there are currently no mandatory initiatives such as refrigerant phase-outs driving a change to alternative refrigerants. Absent such action, DOE will continue to analyze the most commonly-used, industry-standard refrigerants in its analysis. 79 Fed. Reg. 17,726, 17,754 (March 28, 2014) (cols. 2-3).

- A34. DOE expressed its openness to receiving stakeholder data as it certainly wishes to remain apprised of the latest technological developments within the realm of covered products. However, DOE is unable to conduct rulemakings based on speculative policy changes that have not been implemented. When DOE published the CRE final rule on March 28, 2014, EPA had not finalized or proposed (EPA proposal was published August 6, 2014) any rule that would reduce the number of refrigerant types available for use by manufacturers, and therefore DOE maintained its analysis based on the refrigerant types allowable and in use in the industry. The reference to the Montreal Protocol amendment simply reaffirms what is stated elsewhere – that DOE will respond to regulatory changes as they occur, and that it wishes to ensure inter-departmental alignment. DOE also pointed to exception relief from its standards through the Office of Hearings and Appeals, should unavailability of certain refrigerants create a situation where manufacturers couldn't meet the standard.
- Q35. How does EPA's SNAP proposal affect DOE's conclusions about the technological feasibility of its commercial refrigeration efficiency standards, the resulting expected energy savings, the economic impact on manufacturers and customers, the effect on operating costs, the lessening of utility or performance, the cumulative burden on the regulated community, and the time needed to comply with the standards?
- A35. Please see the response to question 32, which is applicable to this question as well.
- Q36. How have lifecycle costs been addressed in the EPA SNAP proposal? From a DOE and energy efficiency perspective does the proposal accurately and adequately address potential higher capital spending and reduced energy efficiency trade-offs that may result from the proposed change in status for certain refrigerant and foam blowing products and materials?
- A36. DOE cannot speak to how lifecycle costs have been addressed in the EPA SNAP proposal. DOE's review of the EPA rule was strictly related to the refrigerants and

- products impacted in the appliance standards portfolio. Given that EPA had not finalized Rule 20 to delist and refrigerants, DOE did not consider any potential unavailability in its product rulemakings.
- Q37. Considering that the extruded polystyrene industry switched to HFC-134a as a foam blowing agent in 2009, is it reasonable to expect the industry to restrict the use of this material so soon after this recent market switch?
- A37. DOE does not have a basis for making assertions regarding the financial and operating structure of the extruded polystyrene industry. The manufacturers of equipment covered by DOE and utilizing extruded polystyrene, including walk-in coolers and freezers, commercial refrigeration equipment, and refrigerated beverage vending machines, procure their extruded polystyrene as board stock from a supplier. DOE has not conducted interviews with these suppliers and manufacturers of extruded polystyrene. Therefore, DOE does not have complete insight into the operation of the extruded polystyrene manufacturing industry. If DOE should need to seek data and insight from manufacturers on this issue in the future, DOE will reach out to these stakeholders in order to strengthen its analysis in this area.
- Q38. What is more important: complying with EPA SNAP change of status dates or DOE standards? Why?
- A38. Both EPA and DOE regulations provide significant benefits to the environment. Furthermore, DOE's Appliance Standards Program is estimated to produce large cost savings for U.S. customers over the lifetime of the equipment and appliances regulated.
- Q39. What is DOE's cost estimate (including both direct and indirect costs) for a foam blowing operation to switch blowing agents? Same question for a producer of reach-in coolers to switch refrigerants?
- A39. In Chapter 12 of the Final Rule Technical Support Document for the walk-in coolers and freezers energy conservation standards final rule, DOE states that: "For [walk-in cooler and freezer] panel manufacturers, conversion to a new blowing agent would be costly as they would have to go through a transition period in which foam would need to be reformulated. Production processes and facilities would need to adapt to the new

foam blend.” 79 FR 32049 (June 3, 2014). Therefore DOE has acknowledged that there would be a cost to manufacturers of some covered products in switching blowing agents.

However, in the course of its rulemaking analyses, DOE has also noted that manufacturers have long had the opportunity to choose a number of options for different foam blowing agents. In its commercial refrigeration equipment energy conservation standards notice of proposed rulemaking technical support document, DOE pointed out that “a variety of blowing agents are available for use on the market”. 78 FR 55889 (September 11, 2013). This is verified by the use of non-HFC blowing agents within the commercial refrigeration space even absent regulatory mandates. Choice of blowing agent has been part of manufacturers’ individual market strategies, and DOE does not see it as appropriate to suggest a single universal cost figure.

With respect to refrigerant switching, at the time of DOE’s analysis for the commercial refrigeration equipment standards rulemaking, EPA SNAP had not promulgated a final rule mandating the transition away from any currently-allowable refrigerants used within that industry. Therefore, DOE did not seek to estimate the costs of a mandated transition as DOE cannot base its rulemaking analyses upon policy speculation. To date, EPA has not issued any final rule reducing the allowable refrigerant options for the industry. DOE also pointed to exception relief from its standards through the Office of Hearings and Appeals, should unavailability of certain refrigerants create a situation where manufacturers couldn’t meet the standard.

Q40. Describe what actions DOE has taken to review and analyze the effects that its energy efficiency regulations and the EPA SNAP proposal will have on state and local building code requirements. What impacts will the EPA SNAP proposal have on companies in terms of compliance with state and local building codes?

A40. DOE conducts as part of each rulemaking an analysis of cumulative regulatory burden. For this analysis, DOE looks at other significant product-specific regulations that could affect the same manufacturers of covered products. In addition to the amended energy conservation regulations, other federal and state regulations may

apply to the covered products and other products made by the same manufacturers, and DOE conducts the cumulative regulatory burden analysis specifically to quantify these impacts. These external regulations could include amended building codes as suggested in the inquiry. However, as noted previously, DOE cannot base its analyses on speculated or anticipated regulatory outcomes. Since EPA SNAP has not yet produced any final rule reducing the available refrigerants for use by manufacturers, DOE does not have grounds on which to cover such actions in its cumulative regulatory burden analyses. This is additionally complicated by the fact that, as alluded to in the inquiry, state and local building code impacts would be removed by an additional degree of separation from any EPA SNAP outcomes, making it effectively impossible for DOE to speculate on any potential changes. DOE believes that any price impacts that might occur in building products relating to building code compliance would be contemplated in the next round of code updates, which occur every 3 years and are arrived at by industry consensus.

- Q41. One of the stated priorities in your FY 2016 budget request is to “continue to implement the President’s Climate Action Plan through the development and deployment of clean energy technologies that reduce carbon pollution.”
- Q41a. What specific actions is DOE undertaking to further the President’s climate goals?
- A41a. Our mission to research, develop, demonstrate and deploy energy technologies upholds the President’s all-of-the-above strategy within the context of energy security, economic competitiveness, and environmental responsibility, the latter including climate change.
- Q41b. If you had to estimate, what percentage of DOE’s \$30 billion budget request will go toward furthering the President’s climate goals?
- A41b. In the DOE’s organic statute, Congress found that “a strong national energy program is needed to meet the present and future energy needs of the Nation consistent with overall national economic, environmental and social goals.” The 2014-2018 DOE Strategic Plan states that, “DOE leads the nation in the transformational research, development, demonstration, and deployment of an extensive range of clean energy and efficiency technologies, supporting the President’s Climate Action Plan and an “all

of the above” energy strategy.” Furthermore, this year’s QER states, “The focus of U.S. energy policy discussions has shifted from worries about rising oil imports and high gasoline prices to debates about how much and what kinds of U.S. energy should be exported, concerns about the safety of transporting large quantities of domestic crude oil by rail, and the overriding question of what changes in patterns of U.S. energy supply and demand will be needed—and how they can be achieved—for the United States to do its part in meeting the global climate change challenge.”

The DOE’s FY 2016 Budget Requests \$29.923 billion. Approximately 42% of the DOE budget is for the National Nuclear Security Administration (NNSA); 19.4% is for Environmental Cleanup; and the remaining 38% is spent on applied energy, science, and other departmental management programs. Many DOE programs support climate mitigation and adaptation actions which have multiple benefits beyond climate, e.g. energy security. DOE programs also support other Administrative priorities, such as the President’s all-of-the-above energy strategy. Therefore, it is impossible to estimate the percentage of DOE budget going to support the President’s climate goals.

- Q42. Wouldn’t you agree that DOE’s pursuit of the President’s climate change agenda could conflict with DOE’s statutory duty under the DOE Organization Act to “promote the interests of consumers through the provision of an adequate and reliable supply of energy at the lowest reasonable cost?”
- Q42a. Would you challenge the President if you believed his climate policies would negatively impact households and businesses by increasing energy prices?
- A42a. The DOE plays a key role in the implementation of the domestic commitments of the President’s Climate Action Plan through our investment in promising scientific research and technology development, demonstration and deployment. Many DOE science and technology programs are related to climate change, even if climate change is not the primary focus. The “lowest reasonable cost” includes not only the financial cost to consumers, but also other externalities such as public health and costs associated with climate change. Most importantly, all activities in this regard are designed to provide cleaner power and fuels while protecting consumers’ requirements for adequate, reliable and affordable energy.

- Q43. DOE has the following active solicitations under its section 1703 loan guarantee program: \$4 billion for renewables and energy efficiency; \$8 billion in loan guarantees for advanced fossil energy projects; and \$12 billion for advanced nuclear technologies.
- Q43a. What has been the response to the renewable energy solicitation so far? The fossil energy solicitation? The advanced nuclear solicitation?
- A43a. Currently, the DOE has approximately 20 active applications under the Title XVII loan guarantee program. These applications have been received under the Advanced Fossil Energy Projects and Renewable Energy and Efficient Energy Projects solicitations, which were issued in December 2013 and July 2014, respectively. Application deadlines under both solicitations extend through 2016.
- Q44. Since January 2014, DOE has issued \$1.5 billion in grants and other financial support, primarily renewables, efficiency and advanced fuels and vehicles.
- Q44a. What mechanisms and metrics does DOE have in place to track this spending and measure the success of the support provided?
- A44a. Each of EERE's technology offices develops market-driven technology targets that are used to measure progress by project performers. For instance, on electric vehicle battery development, EERE measures against a 2022 out-year target of \$125 per kilowatt-hour, which would enable an electric vehicle to be owned and operated at the same cost as a gasoline vehicle today. A renewable energy example would be a 2020 target of \$1/W for installed solar photovoltaics, which would enable utility scale PV to compete with conventional baseload generators at a cost of \$0.06 per kilowatt-hour. In addition to cost targets, all programs have reliability, durability, power and energy density, and other metrics necessary to satisfy all market or consumer requirements.

In order to be an effective steward of taxpayer dollars and produce the highest impact from its investments, EERE has implemented Active Project Management (APM) approaches—inspired by the Advanced Research Projects Agency–Energy's (ARPA-E) rigorous project management efforts—across its portfolio of projects and is currently applying lessons learned to further refine our management of risk within the

portfolio. We hold our performers accountable for meeting aggressive targets and goals discussed above, and discontinue projects where appropriate.

As directed by Congress, EERE fully funds its multi-year projects once awarded, and includes annual Go/No-Go decision points within these awards to ensure underperforming projects can be discontinued and taxpayer dollars are spent only on the most promising projects.

- Some aspects of our APM policies and guidance include: Quarterly reporting by the recipient and then a subsequent quarterly assessment by the DOE technology manager to assesses risk, technical progress and cost performance.
- Our technology managers perform at least one site visit per year and have at least two face-to-face meetings each year to access and verify recipient project performance and progress toward our quantitative program goals.
- Every project is peer reviewed by an independent expert every two years.
- End-of-project deliverables are clearly oriented around accomplishments that impact the energy marketplace.

Q44b. How often do these projects receiving taxpayer support become replicable at commercial scale? Seems to me these are nothing more than pet projects that will have a limited return on investment, if any, for US taxpayers.

A44b. DOE's report *Revolution Now*⁶ outlines the recent rapid scaling and market uptake of four EERE-sponsored technologies: Wind, Solar Photovoltaics, Electric Vehicle Batteries and Solid State Lighting. More broadly, DOE-sponsored technology can be traced back to commercial deployment of almost every advanced clean energy technology on the market today: high efficiency residential and commercial buildings; advanced combustion, electric, hydrogen-powered, or lightweight cars and trucks; solar, wind, water, geothermal renewable generators and stationary fuel cells; and advanced manufacturing technology such as biofuels, steel, composites and other major industries. EERE's track record of success in research and development has helped catalyze the more than \$50B of annual U.S. investment in clean energy

⁶ http://energy.gov/sites/prod/files/2014/10/f18/revolution_now_updated_charts_and_text_october_2014_1.pdf

technology by private sector investors and industry⁷. The annual U.S. investment in clean energy technology has been documented by Bloomberg New Energy Finance and The Business Council for Sustainable Energy.

EERE takes its responsibility to deliver return on investment to the U.S. taxpayer very seriously. Accordingly, EERE performs ongoing return-on-investment (ROI) tracking and analyses for the technologies it supports, which are vital to understanding the impact of our R&D activities. To date, third-party evaluators have completed five evaluations covering EERE's research and development investments in solar photovoltaics, wind energy, geothermal technologies, advanced battery technologies for electric-drive vehicles, and vehicle combustion engines, with additional ROI evaluations being planned to start in 2015. As just one example of many, over a 30-year period, EERE-funded R&D on advanced combustion engines resulted in a net benefit of about \$70 billion dollars, representing a benefit to cost ratio of 53 to 1 (at 7% discount rate)⁸.

The overwhelming majority of EERE projects are completed successfully and many go on to attract significant private investment to reach the marketplace. For example, the Incubator programs were developed around the success of the SunShot Incubator Program, which has run since 2007 and continues to have remarkable success. EERE is proud of this track record of returning value to the American taxpayer and accelerating innovative clean energy technologies to commercial success.

Q45. One of the goals of your FY 2016 budget request is “educating and training the workforce for tomorrow’s energy economy.” What are DOE’s top recommendations for achieving this objective?

A45. The DOE is uniquely positioned to work with educational institutions, labor unions, and the energy industry to support education and training that address critical workforce needs in this growing sector of the economy. The Department has long-

⁷ Source: Bloomberg New Energy Finance, The Business Council for Sustainable Energy. *2015 Factbook: Sustainable Energy In America*. February 2015. Accessible at: <http://www.bcse.org/wp-content/uploads/2015-Sustainable-Energy-in-America-Factbook.pdf>.

⁸ Source: Retrospective Benefit-Cost Evaluation of U.S. DOE Vehicle Combustion Engine R&D Investments, By Link, Albert N. (2010). http://www1.eere.energy.gov/analysis/pdfs/advanced_combustion_report.pdf

standing relationships with colleges and universities that produce science, technology, engineering, and mathematics (STEM) graduates in fields that are critical to the energy industry. We have established the Jobs Strategy Council, whose mission is to accelerate the growth of and access to jobs in all sectors of the U.S. energy economy while meeting the goals of the Administration's Climate Action Plan. The Council will integrate the research, technical, and economic resources of the Department to respond to the workforce and economic development needs of the energy industry. We are also implementing a strategy to address the changing demographics in the country. This strategy, which is focused on minority-owned businesses and employees, increases efforts to engage minority and tribal communities with the energy industry.

Our top recommendations include:

1. Implementing a job-driven strategy among government, industry, labor unions, and academic partners. Operating through the Vice President's Task Force on Job-Driven Training for Workers over the last year, the Department's Task Force on Job Skills and Training has identified over a dozen program areas where energy workforce development initiatives are already underway. Examples include solar technician credentialing developed in partnership with the Solar Energy Industries Association, Industrial Assessment Centers in collaboration with 26 participating universities to improve plant operations, the Grid Engineering for Accelerated Renewable Energy Deployment to address shortages of power engineering university programs focused on distribution, and the Southwest Louisiana Regional Partnership that is focused on industry-driven workforce and supplier needs for mega-scale energy projects. These and many other similar efforts will deliver results on a locality or target audience basis by creating economic growth, supporting training for local workers, and providing opportunities for local businesses.
2. Providing a comprehensive resource for developing and administering high-quality, research-based and experience-based programs. The Department's National Laboratories support thousands of students and faculty who take part

- in internships, scholarships, and fellowship programs that provide direction and encouragement to pursue careers in the energy sector;
3. Strengthening the capacity of states and regions and workforce development planners to design and implement career pathways policies, pre-apprenticeship programs and training curricula in energy and manufacturing sectors as key components of workforce development systems.
 4. Closing the participation gap of minorities in the energy sector by fully implementing the Department's Minorities in Energy Initiative, a program to engage diverse Americans in the energy sector through STEM education and workforce development, energy economic development, and climate change policies;
 5. Partnering with initiatives across the country that promote participation of women in STEM fields that support energy jobs. The Department's initiatives include the #WomeninSTEM video series that raises the profile of women in STEM professions tackling some of the nation's most pressing energy challenges; the Women @ Energy Series with over 230 profiles of women in STEM in the Department that appear on the Department's web site and will ultimately appear in an inspirational book for middle school students; the STEM Mentoring Café developed in partnership with the Departments of Education and Housing and Urban Development, along with the Association of Science and Technology Centers, for speed-mentoring events between middle school girls and their teachers, and female STEM professionals; and the Clean Energy Education and Empowerment (C3E) Initiative with Massachusetts Institute of Technology intended to inspire women to pursue studies that will help them participate in the clean energy revolution.
 6. Emphasizing initiatives that connect our veterans to job opportunities in the energy sector. In Pittsburgh for instance, the Energy Alliance of Greater Pittsburgh estimates 24,000 vacancies in energy related jobs in that part of the state alone. In collaboration with the Departments of Labor, Defense and the Veterans Administration, DOE is engaging local stakeholders to revamp the workforce development system to respond to the demand for workers and

create a veteran employment pipeline by training exiting service members with the skills needed to fill the thousands of vacancies in the area.

We realize it is our collective responsibility to prepare our citizens for the workforce of the future. In doing so, we ensure clean energy, national security, and the economic vitality of this country.

Q46. Since you became Secretary, you have pursued a number of organizational and management reforms to improve the operations of the Department.

Q46a. What is the current status of these efforts and what additional steps do you intend to pursue in the coming years?

A46a. One of the first actions I took was a top-level Department reorganization to revise the roles of two Under Secretariats. This reorganization designated the Under Secretary position to be responsible for Management and Performance, focused primarily on increasing the efficiency and effectiveness of mission support functions across the Department and improving project management. It also merged the Department's Science and Energy Under Secretariats in order to coordinate and carry out our science and energy missions in a more cohesive manner. Finally, the Office of Energy Policy and Systems Analysis, established last year, carries out strategic studies and policy analysis, maintains and coordinates a supporting set of analytical capabilities, and carries out assessments of the strength, resiliency, and anticipated challenges of national energy systems.

In addition to this top-level reorganization, in August 2013, I established a Contract and Project Management Working Group. Its findings were issued in the December 2014 report titled "Improving Project Management," which led to the implementation of several additional efforts to improve project management. These included strengthening the Energy Systems Acquisition Advisory Board (ESAAB), establishing a Project Management Risk Committee comprised of the most senior project management officials from each Under Secretary's office to advise the ESAAB, and improving the lines of responsibility and the peer review process. The restructured ESAAB met for the first time in early April 2015. The Department is

currently establishing a project management assessment office within each Under Secretary's office that does not already have one.

In addition, the Department has established a number of Boards to engage senior laboratory leadership on an enterprise-wide basis, including the National Laboratory Policy Council (NLPC), which I chair. The NLPC consists of the National Laboratory Directors Council leadership and senior Departmental leadership. The Department has also established the National Laboratory Operations Board, which is led by our new Under Secretary for Management and Performance and includes representatives from the Chief Operating Officers, Chief Research Officers, and the Under Secretary for Science and Energy.

Q46b. What reforms or organizational changes, in your view, are most necessary to modernize DOE and ensure its continued success in coming decades?

A46b. As noted in Part A of this response, the reorganization of the Department to designate an Under Secretary for Management and Performance focuses specifically on improving effectiveness and efficiency, which represents a reform that is integral to the continued success of the agency. Specifically, a primary focus of this organizational change is having the Department operate more as a collective enterprise. In addition to a new approach pertaining to project management, this reform also focuses on increasing the efficiency and effectiveness of mission support functions across the Department, including efforts related to cybersecurity, human resources, and information technology services. Continued and focused efforts over time in these areas are essential to continued improvements in effectiveness and efficiency. A second reform example that is necessary to ensure the continued success of the Department centers on continuous and improved engagement with the National Laboratories. With this in mind, new actions have been instituted to change the strategic direction of the National Laboratories to ensure full participation and support of the senior leadership at the Department and to reflect the engagement of the National Laboratory community. To this end, we have established a regular strategic dialog with the laboratories through several new leadership councils involving laboratory directors and other key managers. In addition, the Laboratory

Operations Board led an effort to assess the condition of the general purpose infrastructure at the labs and NNSA plants and worked closely with federal program leadership to provide input on prioritization of infrastructure funding. This effort, which involves the Department and the laboratories working together, is seeking to establish a sustainable trajectory for the Department's infrastructure on an enterprise-wide basis. Additionally, this year, the Department held its second annual Laboratory Ideas Summit, in which the labs generate and present ideas for innovative and impactful new research directions for consideration by the Department. Several of last year's laboratory ideas were incorporated into budget crosscuts and program proposals that featured prominently in the Department's FY 2016 Budget Request. Institutionalizing these changes is an ongoing goal and necessary to ensure continued success and innovation in the coming decades.

Q47. The FY2013 National Defense Authorization Act (NDAA) established the Congressional Advisory Panel on the Governance of the Nuclear Security Enterprise to evaluate and make recommendations about "the most appropriate governance structure, mission and management of the nuclear security enterprise." The panel, Chaired by The Honorable Norman Augustine and Admiral Richard Mies (Ret.), recently delivered their report to Congress and DOE. Among the many recommendations included in the report, the Panel recommended a reorganization of the nuclear security enterprise, including amending the NNSA Act and related legislation to clarify Departmental leadership roles.

Q47a. What are your views on the recommendations of this report, including its recommendations concerning strengthening national leadership and solidifying the DOE Secretary's "ownership" of the nuclear security mission?

Q47b. Please explain how you intend to address the Panel's recommendations?

A47. The Department welcomes the recommendations of the Congressional Advisory Panel on NNSA governance. DOE and NNSA have already taken several significant steps to improve the operation and management of the nuclear security enterprise, including setting up a cost estimating and program evaluation office and improving project management functions.

The Department has thoroughly reviewed the report's recommendations and is working to provide our views to Congress as soon as possible. We will be happy to

provide this Committee with a copy of those views once they have been finalized, and look forward to working with Congress on this important issue going forward.

Q48. While the Committee is supportive of National Nuclear Security Administration's modernization efforts, NNSA's proffered plans have frequently changed (UPF, plutonium capability, IW-1/3+2 Strategy) making it difficult to commit to a long-term funding strategy. When can the Committee expect NNSA's modernization plans to stabilize?

A48. NNSA has taken a number of actions to stabilize our planning for modernization efforts. We established a dedicated cost estimating organization within Defense Programs that has now built Life Extension Program (LEP) cost models based on actual costs for the ongoing W76 LEP. This gives us confidence that we have "stabilized" this aspect of our planning. In response to growing cost ranges for UPF and Chemistry and Metallurgy Research Replacement (CMRR) during design, NNSA decided to pursue alternative, more affordable strategies to sustain these capabilities, consistent with the timelines directed by Congress. Also in response to Congressional direction, NNSA has established the Cost Estimation and Program Evaluation Office at the corporate level to set cost estimating policy, review program office estimates, and conduct independent cost estimates. Finally, NNSA has now appointed senior managers to oversee uranium, plutonium, and other nuclear material commodities to plan, manage and integrate their sustainment and recapitalization. These managers, along with LEP managers, will work in coordination with the cost estimating offices described above and, in the case of construction projects, the NNSA Office of Acquisition and Project Management to develop credible plans and estimates for what are expected to be multi-decade efforts.

Q49. What are the key factors that have affected the stability of these plans, and what steps is NNSA taking to address them?

A49. A number of factors have affected the stability of our plans. These include: 1) the cost estimates for the key modernization efforts (such as Life Extension Programs, Uranium Processing Facility, and plutonium capabilities); 2) evolving Department of Defense requirements (in both scope and timing of some of these efforts); 3) evolving needs of individual warheads, and the fiscal constraints on modernization efforts; and

4) to some extent, shortfalls in appropriated funding compared to requested funding (sequestration in FY 2013 was noteworthy), which have to be balanced against meeting the immediate needs of the stockpile, and sustaining the nuclear security enterprise (from both an infrastructure and workforce perspective).

Please refer to A48 for some of the steps taken by NNSA to address the factors that have affected the stability of these plans.

Q50. For fiscal years 2008 through 2014, administrative costs for DOE's Title XVII Loan Guarantee Program have totaled about \$251 million. DOE has collected fees from borrowers worth a little over three quarters of costs--\$196 million. Administrative costs not covered by borrowers' fees are paid for with taxpayers funds. In 2009 and 2011, the fees DOE collected from borrowers exceeded the appropriated limits set in those years. As a result of this federal budget accounting situation, about \$47 million of the \$196 million have not been applied to administrative costs and are sitting unused in a Treasury account. They cannot be used unless they are appropriated.

Q50a. What steps has DOE taken to gain access to those unused funds, in the event that fee collections do not cover administrative costs again this year?

A50. The Department supports using prior year excess collections to fund future administrative costs for the Title XVII Loan Guarantee Program. At the request of the Appropriations Committees, the Department has submitted legislative language that would allow the FY 2016 administrative costs of the program to utilize prior-year fee collections and future collections in FY 2016. However, the prior-year collections were already counted against the deficit in the year of collection and therefore would not offset future appropriations.

Q51. To date, fee collections for DOE's Title XVII Loan Guarantee Program have not been sufficient to fully cover administrative costs. DOE has 3 solicitations out for new loan guarantees.

Q51a. Does DOE think the fees specified in these solicitations will be sufficient to cover the administrative costs for those loans? Why or why not?

A51. The Department has established an identical fee structure for each of the current Title XVII loan guarantee solicitations to offset the administrative costs of reviewing applications, performing due diligence, underwriting terms, issuing the loan

guarantee, and monitoring the loan once it is issued. The fees are collected from applicants at various stages in the loan application process, as detailed in the solicitations, consistent with the administrative costs incurred by the Department to complete each of those stages.

However, the collection of fees occurs in some cases after significant work has been completed. For instance, the majority of the total fees for any individual loan guarantee are collected at conditional commitment and financial close in the form of a facility fee equal to 1 percent of the total loan guarantee amount. As a result, work completed in one fiscal year may not be offset by fees until the subsequent fiscal year, depending on the timing of financial close for any individual loan guarantee.

Q52. The EPA and the Corps of Engineers have jointly proposed a rule to modify the definition of what is a “water of the U.S.” for purposes of determining the scope of federal jurisdiction under the Clean Water Act. While EPA continues to assert that they are not expanding federal jurisdiction, most everyone else believes they are. Based on a plain reading of the regulatory text, energy producers throughout the country are seriously concerned that a final rule – that has not been substantially changed – will make it more difficult to expand, upgrade, and even decommission energy facilities necessary to assure safe, reliable, affordable, and resilient energy supplies to consumers of electricity, natural gas, renewables and other energy resources.

Q52a. I assume DOE participated in the interagency process on the proposed rule. Can you provide your analysis of how the proposed rule would affect energy infrastructure?

A52a. Yes, DOE participated in the interagency review process, which is deliberative in nature.

Q52b. Are you preparing to participate in the interagency process on the final rule? (EPA/Corps want to finalize as early as April) If so, who will participate for DOE? Have you or your senior staff met with energy infrastructure stakeholders regarding their concerns with the rulemaking?

A52b. DOE will participate in any deliberative interagency review process for the final rule, and all appropriate agency officials will be involved in that review. EPA has a process to solicit public comment on its rulemakings and all stakeholders can participate in that process.

- Q52c. Will you object to finalization of a rule that will adversely affect energy infrastructure? At a minimum, will you support reproposal of the rule so the public can see whether the agencies have in fact addressed the serious concerns with the rule in an appropriate way?
- A52c. The substance of DOE's deliberative technical comments in the interagency review process for the final rule will depend on the substance of the rule that is circulated.
- Q53. As you know, on October 21, 2014, DOE and the United States Enrichment Corporation (USEC) successfully transferred the Paducah Gaseous Diffusion Plant leased facilities from USEC back to DOE. At the same time, the DOE deactivation contractor officially began its work preparing for decontamination and decommissioning at the site.
- Q53a. Considering it took nearly 18 months to award the deactivation contract, what is the timeframe for extending or awarding a new contract?
- A53a. DOE is beginning the evaluation of its acquisition options regarding the follow-on contract to the current deactivation contract, including the options to re-compete or exercise a new task to the incumbent under the current Indefinite Deliverable/Indefinite Quantity (ID/IQ) contract.
- Q53b. Do you anticipate a gap in contracts since the current deactivation contract expires in July of 2017?
- A53b. No
- Q54. The deactivation contract for the site was awarded on July 23, 2014. Have there been any changes to the project work scope? If so, please describe.
- A54. Yes, there have been changes to the project work scope. In an effort to support an early transfer of the Gaseous Diffusion Plant, some critical scope was assigned to existing contractors prior to the deactivation contract award, and in other cases modifications were made to address changed conditions post-USEC transition. These modifications involved changes to waste disposal activities at C-746-B; electrical switch yard modifications; addition of the disposal of approximately 2,000 small UF6 cylinders; and package boiler design and installation. The original scope also included the transfer of natural uranium from thin-walled to thick-walled cylinders

which could then be shipped to Portsmouth to support barter activities. It was subsequently determined that the transfers would be performed at Portsmouth to allow resources at Paducah to focus on deposit removal activities. DOE also modified the deposit removal scope to be more comprehensive, which will result in safer facility condition and reduce lifecycle costs.

Q55. How many workers does the deactivation contract currently employ and what is the hiring schedule going forward?

A55. This is a performance based contract and the contractor has the flexibility to implement the scope of work to meet cost, schedule, and performance requirements.

Q56. Is DOE, through the deactivation contract, engaging the local subcontracting community?

A56. The deactivation contractor is actively engaging with the local subcontracting community. The deactivation contractor is utilizing subcontractors to perform various elements of the scope.

Q57. Is DOE developing an acquisition strategy based on the final end state for the site?

A57. As part of the current deactivation contractor's scope of work, the initial site-specific lifecycle baseline for the deactivation and decommissioning of the Paducah Gaseous Diffusion Plant is to be developed. DOE's acquisition strategy will be aligned to the final end state for the site to the extent that it overlaps with the upcoming contract period of performance. However, the final end state for the site will not be settled for quite some time, and DOE must comply with its regulatory obligations under CERCLA to collaboratively develop several more Records of Decision that will be critical in determining the final end state of the site. In the meantime, DOE will continue to work with our stakeholders and regulators to ensure progress is made in the direction consistent with yet-to-be-determined final end state.

Q58. The community has mentioned their interest in a recycling program through the local Paducah Area Community Reuse Organization (PACRO). How is DOE encouraging the recycle and reuse of these materials?

A58. In the current deactivation contract, DOE requested the contractor to provide an asset reuse and recycle plan. This plan is still being developed. It is expected that this plan will serve as the initial roadmap for the reuse and recycling activities. DOE is also in the process of updating the memorandum of understanding with the PACRO that will allow DOE to implement future actions. The deactivation contractor will be engaging PACRO on opportunities for recycling as opportunities develop.

Reg	Description	Stage	Scheduled Issuance Date	Refrigerants Currently Used	Notes
BVM	Proposes efficiency standards for refrigerated beverage vending machines	NOPR	2/27/2015	HFC-134a, R-744 (CO2)	2016 - Propose to ban 134a; Add Propane, Isobutane
PTACs	Proposes efficiency standards for package terminal air conditioners and heat pumps	Final Rule	4/1/2015	R-410A	Add HFC-32
CAC and HP	Sets efficiency standards for residential central air conditioners and heat pumps	NOPR	7/15/2015	R-410A	
SPVU	Sets efficiency standards for single packaged vertical air conditioners and heat pumps	Final Rule	10/13/2015	R-410A	Add HFC-32
CUAC	Sets efficiency standards for commercial unit air conditioners	Final Rule	11/3/2015	R-410A	Add HFC-32
Misc. Refrigeration	Proposes efficiency standards for miscellaneous residential refrigeration products	NOPR	12/14/2015	HFC-134a, R-600a (isobutane)	OK
Portable AC	Sets efficiency standards for portable air conditioners	NOPR	12/14/2015	R-410A	

QUESTIONS FROM REPRESENTATIVE JOHN SHIMKUS

- Q1. The Waste Treatment Plant (WTP), at the Hanford Site, is a \$13 billion facility being constructed to treat the waste and prepare it for final, long-term disposal is a key part of DOE's strategy for treating 56 million gallons of hazardous and radioactive waste held in underground tanks at the Richland Site in Washington State. The WTP is being constructed under a design-build contract and has a history of technical and management challenges. DOE has stopped construction on parts of the WTP pending resolution of these challenges and has stated that several milestones for the waste treatment mission will likely be missed. This project—one of the largest nuclear waste cleanup facilities in the world—was originally scheduled for completion in 2011 at an estimated cost of \$4.3 billion. Since its inception in 2000, DOE's estimated cost to construct the WTP has tripled and the scheduled completion date has slipped by nearly a decade.
- Q1a. When construction of the WTP began, Congress committed to funding the WTP at \$690 million per year until the project was complete. Over the past few years, construction on key facilities has slowed, and for the past several years, DOE has not spent the full \$690 million that has been allotted annually for construction the WTP. Furthermore, the current cost and schedule to complete the WTP is unknown, and the contract for its construction is under re-negotiation. What is the justification for DOE to continue to request the \$690 million under these circumstances, which suggest that far less than \$690 million in work is scheduled to be accomplished in FY 2016?
- A1a. A significant amount of Waste Treatment Plant (WTP) work is scheduled for Fiscal Year (FY) 2016, with total anticipated spending to be \$690 million plus a small amount of carry-over. Department of Energy (DOE) is continuing with full construction on the Low Activity Facility, Balance of Facilities and Analytical Laboratory (including needed plant modifications for directly feeding the Low Activity Waste Facility by 2022); resolution of technical issues continue for the Pretreatment Facility; and full production engineering and limited construction continue on the High Level Waste Facility.
- Q1b. Were there any unobligated funds for the WTP carried over from FY 2014 to FY 2015? If so, how much?
- A1b. At the end of FY 2014, the project had obligated 99% of its FY 2014 budget authority.
- Q1c. How much is DOE projecting to obligate from WTP funding (i.e. carryover plus FY15 appropriation) this year?

- A1c. By the end of FY 2015, the project expects to obligate nearly 100% of its FY15 budget authority to the WTP contractor and various small direct support contracts.
- Q2. Some of the most dangerous hazardous and radioactive waste at the Hanford site is stored in 177 large underground storage tanks. The underground tanks currently hold more than 56 million gallons of this waste. DOE spends over \$1 billion each year—through its Office of River Protection in Richland, WA—on its tank waste retrieval and treatment program at Hanford. Nearly half of this amount is spent managing the underground waste storage tanks. DOE is requesting \$179 million more in FY16 for tank waste management to cover ramp-up of design activities for the Low Activity Waste Pretreatment System (LAWPS) project and activities in the tank farms required to support the direct feed of low activity waste initiative and A/AX single-shell tank retrievals.
- Q2a. This request includes \$75 million for LAWPS design activities. In DOE’s FY 2015 request, DOE stated that the full amount needed for design was \$60 million, and received \$23 million towards that amount in their FY15 appropriation. Adding the \$23 million from the FY15 enactment to the \$75 million in the FY16 request gives us \$98 million for design of the LAWPS facility, up \$38 million from the FY15 estimate of \$60 million. What is the reason for the increase?
- A2a. The FY 2015 Request was based on pre-Critical Decision-0, mission need determination rough order of magnitude estimates. The Department used the best information and assumptions at the time to prepare the estimates. As the Department considered design alternatives this year, we were able to have better information on the requirements for designing the Low Activity Waste Pretreatment System (LAWPS) project and further mature the cost estimate.
- Q2b. The request also includes \$5 million for “other” costs for the LAWPS system. What are these other costs?
- A2b. The \$5 million is for other direct costs which include activities such as: completing conceptual design, preparing nuclear safety documentation, developing a Project Execution Plan, and testing of LAWPS technical capability.
- Q2c. What is the total estimated cost of the LAWPS project, inclusive of all costs to bring the project into operation? Is the \$75 million part of the total cost of the project, or is it in addition to the total cost? Is the \$5 million part of the total cost of the project, or is it in addition to the total cost?

- A2c. The cost range as reported in the FY 2016 Project Data Sheet was \$243 million to \$374 million. In the near future, DOE will issue Critical Decision-1 for the project, which will include an Independent Cost Estimate, and an updated point estimate and cost range. At this time, DOE anticipates the revised point estimate to remain essentially unchanged but the cost range to increase as project risks are identified and refined. The \$75 million and \$5 million are part of the total project cost.
- Q2d. What portion of the remaining \$99 million increase (\$179-\$75-\$5) is for tank farm activities to support the direct feed of low activity waste? Are these operational costs or equipment costs? Will they be included in the total estimated cost of the LAWPS project or will they be in addition to it?
- A2d. Of the \$99 million increase, it is expected that approximately \$8 million will be required for equipment modifications to Tank AP-107 which will support the LAW direct feed initiative. However, these costs are not part of the proposed LAWPS project.
- Q2e. What is the basis for shifting this LAWPS funding from the WTP budget account (ORP-0060) to the tank waste management budget account (ORP-0014) and why is the increased funding in the tank waste management account not offset by a similar decrease in the WTP account?
- A2e. The Department has always proposed to fund LAWPS out of tank farm activities.
- Q3. The Government Accountability Office (GAO) recently reported that the underground tanks are in a worse conditions that previously understood—many are leaking—but DOE's current schedule for managing the tank waste does not consider the worsening conditions of the tanks or the delays in the construction of WTP. Although DOE has efforts underway to empty the aging tanks, this process has been slower than expected. GAO recommended that DOE further assess the condition of the tanks and alternatives for creating additional double-shell tank space (such as building new tanks).
- Q3a. DOE has emptied 17 underground tanks since it began the retrieval work 10 years ago (less than 2 tanks emptied per year). In order to meet its regulatory agreements, DOE must empty 19 additional underground tanks by 2022. How does DOE plan to meet its regulatory requirements and how much additional funding is required to increase the rate of the retrievals?

- A3a. Of the nineteen tanks required to be emptied by 2022, seven have been completed in C-Farm, and three additional tanks in C-farm are nearing completion. Nine additional tanks in A and AX Farm will be retrieved by 2022 pursuant to the Consent Decree. Design and construction activities are ongoing in support of starting to retrieve two tanks in A and AX by 2017. For FY 2016, the budget proposes \$69 million to commence retrieval activities of the A and AX tanks as planned to meet the 2022 milestone.
- Q3b. GAO pointed out in 2014 that DOE lacks sufficient tank space to hold the waste being emptied from failing underground tanks until the WTP comes online. However, DOE's FY16 request does not include any plans to provide additional tank space. Why not? What is DOE's plan to store the tank waste until the WTP can begin treating it?
- A3b. In accordance with the Tri-Party Agreement, DOE regularly evaluates methods to create additional tank space, and is, in fact creating additional tank space. This includes implementing the results of detailed engineering analyses to increase the allowable capacity of the existing double-shell tanks (DSTs) and enhancing operations of the 242-A Evaporator to continue to reduce the liquid volume of the existing waste. The operating capacity in four DSTs has already been increased in FY 2014, creating approximately 400,000 gallons of additional usable space. The waste level capacity in two other DSTs will be increased in FY 2015 by a total of 200,000 gallons. Since the September 2014 restart of the 242-A Evaporator, over 750,000 gallons of additional DST space has been created. With continued operation of the 242-A Evaporator, DOE plans to reduce the waste volume in the DST system by about one million gallons per year over the next three years. DOE anticipates that these actions will create sufficient space to support the planned single-shell tank retrievals through 2022. DOE continues to evaluate strategies associated with the direct feed low-activity waste vitrification program to begin treating waste as soon as practicable and in a way that maximizes the amount of available DST space to support future single-shell tank retrievals.

Q3c. If another double-shell tank leaks, does DOE have the tank capacity and technical capability to respond? If this occurred, how long would it take to empty the tank as called for by federal and state requirements?

A3c. Yes. DOE maintains emergency space with the capacity to be able to mitigate events such as a double-shell tank leak. The technical capability and time to empty a tank is similar to the pumping on Tank AY-102.

Q4. DOE's Office of Environmental Management (EM) has responsibility for cleaning up the radioactive and chemical waste left from the cold war legacy at the Savannah River Site (SRS). DOE has agreed upon a plan for cleaning up SRS. The SRS Cleanup Project includes safely storing, treating, and disposing of a variety of radioactive and hazardous waste streams, cleaning up the environment, deactivating and decommissioning unneeded facilities, stabilization and immobilization of high level waste, and the secured storage of foreign and domestic nuclear materials, including spent nuclear fuel, and waste through safe stabilization, treatment, and/or disposition. All EM-owned facilities will be decommissioned once work is complete, except those identified to transfer to another office.

According to EM's November 2014 monthly project performance report, the SRS recently completed projects and ongoing projects are all within cost and schedule baselines. However, at the January 26, 2015 SRS Citizen's Advisory Board meeting, DOE reported that the SRS lifecycle cleanup estimate has increased by \$25 billion over an additional 23 years. What factors have contributed to the revised life-cycle cost estimate for EM's mission to clean up the site? Please describe the risk assessments DOE has performed to identify the vulnerabilities to cost and schedule and identify actions that can be taken to mitigate the risk.

Q4a. Is the SRS Cleanup Project under baseline change control? Why was there such a large change in the cost of lifecycle cost of the project and what is DOE doing to better understand the factors leading to the increased cost and schedule and to mitigate the impact of those factors?

A4a. The Savannah River Site (SRS) Cleanup Project is under baseline change control. As presented in the FY 2016 Budget Request, the approved lifecycle costs for SRS remains \$66 billion to \$72 billion. The Department is evaluating potential impacts to the life-cycle costs from emerging conditions that have occurred since 2012.

Q4b. Are these additional costs incorporated into the fiscal year 2016 budget request? What will the future budget request profile look like to address these additional costs?

- A4b. The approved lifecycle costs for SRS remains \$66 billion to \$72 billion as presented in the FY 2016 budget. The FY 2016 Request provides additional funding for cleanup activities at the SRS.
- Q4c. Do any of these additional costs reflect potential penalties that could be assessed against DOE by the state of South Carolina for missing clean up milestones? What are the potential costs in penalties, if any?
- A4c. The approved lifecycle costs for SRS remains \$66 billion to \$72 billion as presented in the FY 2016 budget. The life-cycle cost estimate for cleanup does not include fines or penalties. The Department is actively working to meet its cleanup commitments at the SRS. To the extent milestones are delayed, DOE will follow the provisions under the Federal Facilities Agreement for making notifications and working with the U.S. Environmental Protection Agency (EPA) and the South Carolina Department of Health and Environmental Control regarding schedule adjustments, if necessary.
- Q5. Part of the clean-up at SRS involves 37 million gallons of waste containing approximately 287 million curies of radioactivity stored in aging and degrading tanks. These tanks represent the single largest environmental threat in South Carolina, according to the South Carolina Department of Health and Environmental Control. DOE entered into an agreement with the state of South Carolina to meet certain milestones for cleanup. According to the South Carolina Department of Health and Environmental Control, DOE has not adequately prioritized clean-up of the tanks in fiscal years 2014 and 2015, leaving DOE behind in meeting its milestones.
- Q5a. What has DOE's response been to the South Carolina Department of Health and Environmental Control? Is DOE behind in meeting the milestones agreed upon and, if so, what factors have contributed to the delays and have the delays impacted DOE's budget?
- A5a. The Department is currently in formal dispute resolution with the South Carolina Department of Health and Environmental Control regarding milestones. An agreement with the State of South Carolina was reached on the Tank 16 closure schedule, but discussions continue regarding the Tank 12 closure schedule. The delay in the construction and startup of the Salt Waste Processing Facility (SWPF) will slow the treatment of liquid tank waste thus extending the schedule for completion of the tank waste cleanup program including tank closure. Many factors have contributed to the

delay, including sequestration impacts, significant weather events, and technical challenges.

Q5b. Is the cleanup of the waste a project that is under baseline change control? How have changes to the baseline been managed, particularly to address the factors that may have adversely affected schedule and cost?

A5b. The SRS cleanup project is under baseline change control. Project reviews are conducted by the Office of Environmental Management's (EM) management on a regular basis. The FY 2016 Budget Request provides additional funding for treatment of liquid tank waste which will help mitigate additional delays. EM will continue to aggressively seek out ways to reduce the life-cycle costs and accelerate the schedule of the EM cleanup program.

Q6. In a June 2014 letter to DOE, the South Carolina Department of Health and Environmental Control stated that DOE's missed commitments "will be met with penalty assessments" under the agreement. The South Carolina Department of Health and Environmental Control said that the potential penalties against DOE through the end of fiscal year 2016 could be assessed at more than \$193 million.

Q6a. What are DOE's potential liabilities at SRS? What plans is DOE developing with the South Carolina Department of Health and Environmental Control to address meeting the agreed-upon milestones and to minimize penalties?

A6a. The Department is actively working to meet its cleanup commitments at the SRS. To the extent milestones are delayed, DOE will follow the provisions under the Federal Facilities Agreement for making notifications and working with the EPA and the South Carolina Department of Health and Environmental Control regarding schedule adjustments if necessary.

Q6b. If South Carolina assesses penalties, what part of the federal government will be responsible for paying the penalties?

A6b. The Department is actively working to meet its cleanup commitments at the SRS. To the extent milestones are delayed, DOE will follow the provisions under the Federal Facilities Agreement for making notifications and working with the EPA and the South Carolina Department of Health and Environmental Control regarding schedule adjustments if necessary.

- Q7. At the Idaho National Laboratory, according to DOE's fiscal year 2016 budget justification, DOE missed a milestone to treat liquid radioactive waste by December 31, 2014, a milestone enforceable under the Idaho Settlement Agreement. The Idaho Department of Environmental Quality issued a Notice of Violation with fines starting at \$3,600 per day until DOE treats the waste as required. These fines may increase over time.
- Q7a. Why has DOE missed this milestone, which had already been revised from an earlier milestone of December 31, 2012?
- A7a. The liquid radioactive waste will be treated in the Integrated Waste Treatment Unit (IWTU) facility, currently being commissioned. The DOE is being very deliberate about testing the facility, implementing lessons learned, and moving ahead only when it is safe and sensible to do so. The plant is currently proceeding through the facility testing and startup process, which included a test run using approximately 60,000 gallons of waste simulant from November 2014 to January 2015. That simulant run identified additional issues that are being addressed prior to the next simulant run. This iterative approach using simulant is necessary to ensure that the facility will operate reliably during radioactive operations.
- Q7b. When does DOE expect to complete the cleanup required at the tanks holding the liquid radioactive waste? What is likely to be the total amount of money in fines that DOE may pay to Idaho, including potential increases in the fines over time?
- A7b. The Department is actively working to meet its cleanup commitments at the Idaho National Lab. On January 6, 2015, the Idaho Department of Environmental Quality issued a Notice of Violation (NOV) to DOE for failure to cease use of the high-level liquid waste tanks by December 31, 2014. The violations result from further delays associated with commissioning, testing, start of operations and waste processing at the IWTU at the Idaho Nuclear Technology and Engineering Center. DOE and the State are in discussions to resolve the NOV.
- Q7c. The Idaho Settlement Agreement also requires DOE to remove all spent nuclear fuel from the Idaho National Laboratory by January 1, 2035, or face additional fines of \$60,000 per day. Is DOE on track to meet this milestone? Please describe DOE's progress and potential challenges it may face in meeting this milestone.

- A7c. All spent nuclear fuel in Idaho will need to be packaged and shipped out of the state in order to meet the Settlement Agreement milestone in 2035. This will require DOE to build a new facility or to modify an existing one in order to provide this packaging capability. The Administration's Strategy for the Management and Disposal of Used Nuclear Fuel and High-Level Waste (January 2013) is to have a pilot interim storage facility with limited capacity of accepting high level radioactive waste by 2021, initially focused on shut down reactors; a larger consolidated interim storage facility operational by 2025; and a permanent geologic repository operational by 2048. Interim storage would provide flexibility in the waste management system and allow for important near-term progress in implementing the federal commitment. It could also offer similar benefits for government-owned and managed used nuclear fuel.
- Q8. The Waste Isolation Pilot Plant (WIPP), in New Mexico, has been shut down since February 5, 2014, when a truck fire and a subsequent February 14 release of radiation raised safety concerns and sparked investigations into operations. On September 30, 2014, DOE issued a recovery plan for WIPP, reporting that DOE planned to resume operations in 2016 at a cost of about \$242 million, plus additional capital asset project line items to replace the currently contaminated ventilation system and a supporting exhaust shaft, costing between \$77 million and \$309 million. This brings the total cost of restarting operations at WIPP to between \$319 million and \$551 million. The range is so large because, according to DOE, specific decisions have not yet been made. According to press reports, DOE officials reported at a meeting in Carlsbad with contractor and local officials that the recovery effort is already months behind schedule and plans to re-open WIPP may be delayed until 2018. Amidst DOE's plans, some investigations—such as that by the Defense Nuclear Facilities Safety Board—may continue.
- Q8a. How realistic are these costs and dates, particularly since key decisions have yet to be made and some investigations—such as that by the Defense Nuclear Facilities Safety Board—may continue?
- A8a. The cost and schedule estimates were approved using the best information and analysis the Department has to date, and it may change as new information is received or constraints change, e.g., in response to internal or external investigations or reviews that change current assumptions and requirements.

Q8b. Please describe the funding profile for the WIPP recovery effort, including how much money was on hand when WIPP was shut down in February 2014, how much came from supplemental appropriations, and how much is being requested in the fiscal year 2016 budget request. Given the delays, what is DOE's level of confidence in this funding profile and whether mission recovery needs can be accomplished with these funds?

A8b. Funding Profile

The Waste Isolation Pilot Plant (WIPP) recovery funding profile is as follows:

- FY 2014: \$23 million repurposed from WIPP base program to recovery.
- FY 2015: \$127 million.
- FY 2016: \$87 million in the budget request.

The total funding level for WIPP in FY 2015 is \$324 million, and the FY 2016 Budget Request for WIPP is \$248 million. The FY 2016 Request includes \$87 million for recovery activities, compared to \$127 million in recovery funding provided in FY 2015. The remaining funding goes to WIPP base operations and maintenance, the Central Characterization Project, transportation and safeguards and security.

Approximately \$154 million of the total \$221 million enacted in FY 2014 was on hand in February 2014 (approximately \$67 million spent at the time of the incidents in February 2014).

FY 2015 Appropriations

An increase of \$103,980,000 was provided in the Omnibus Appropriations bill above the FY 2015 requested level of \$220,475,000. The increase supports WIPP recovery efforts in FY 2015.

Confidence

The Department is confident that it can effectively implement the recovery plan to resume operations in the first quarter of calendar year 2016 as proposed in the 2016 budget, but DOE will only resume operations when it is safe to do so.

- Q9. The radiation release at WIPP originated at the Los Alamos National Laboratory (LANL) during treatment and handling of waste. The National Nuclear Security Administration (NNSA) stated in a performance evaluation of LANL that the laboratory was noncompliant with proper waste handling requirements.
- Q9a. Please expand on the uncertainties that have resulted from LANL's action of non-compliance. Specifically, what are the damages to the U.S. government in terms of cost and credibility and how will this affect the cost of doing business in the future?
- A9a. The 2014 radiological release event at the WIPP has highlighted the need for continued vigilance in management oversight of the Department's activities at the contractor, site, and headquarters levels. The national transuranic (TRU) waste program will be strengthened through reviews and analyses to understand the causes of the event, and subsequent implementation of the necessary corrective actions followed by a demonstrated period of performance. With respect to costs, the total impact to the TRU waste program has yet to be determined.
- Q9b. What actions has DOE or NNSA taken to address these issues at WIPP, and LANL, or other affected sites?
- A9b. Actions Taken at WIPP—TRU Waste Handling
The Department of Energy (DOE) has completed one formal Accident Investigation and a technical assessment by National Laboratory experts. The first Accident Investigation Board report on the radiological release (Phase I) was issued April 24, 2014. The Department is in the process of completing a second Accident Investigation (Phase II). DOE is committed to putting systems in place to avoid the potential of another radiological event at any of the Department's facilities. This starts with understanding the cause of the event and any contributing causes. The reports serve as the basis for understanding the event and will strengthen the TRU program. Robust corrective actions at WIPP have been identified and are being implemented in response to the Accident Investigation Board Phase I report. Corrective actions will similarly be identified and completed for the Phase II investigation and will include activities at WIPP, Los Alamos National Laboratory (LANL) and DOE Headquarters.

The Interface Agreement between the LANL contractor and the Central Characterization Project is being revised to ensure any direction on the handling of specific waste or waste streams is directed through the proper channels such that the directed controls are fully understood, formalized and implemented. Enhanced oversight by both the Los Alamos Site Office and the Carlsbad Field Office will occur prior to the resumption of repackaging of TRU waste. The Certification Program will focus additional oversight efforts on understanding and validating upstream waste processing.

Protective measures taken at WIPP to address risks related to the LANL waste that caused the radiological release include: continuous air monitoring in the underground for personnel access and habitability; interim safety controls for all activities underground; restricted access in high risk areas; underground ventilation is filtered on the surface prior to release to the environment; real time monitoring is in place on the exhaust to the environment. Additionally, activities for initial closure of Panel 6 and closure of Panel 7, Room 7 (where waste similar to the LANL drum is emplaced) are in process. These closures are expected to be completed in Summer 2015.

Actions Taken at LANL

Processing of legacy TRU waste at LANL was paused in May 2014. An Extent of Condition Review by the contractor is ongoing. Prior to the resumption of repackaging operations, enhanced reviews of the repackaging processes will be conducted by regulatory and environmental specialists to ensure waste treatment and repackaging operations comply with the LANL Hazardous Waste Facility Permit.

In September 2014, the Secretary decided to transfer operation of the environmental cleanup program at LANL, including TRU waste operations, to the Environmental Management Program in DOE. This places the management of the LANL TRU program into the same organization that operates the WIPP disposal facility and allows National Nuclear Security Administration (NNSA) and DOE EM to focus on their core missions.

LANL is also making improvements and strengthening of the standards used in reviewing and maintaining procedures have been added to the process, e.g., enhanced Integrated Safety Management which includes hazard identification and controls. As part of the review process, validation that the hazard identification and controls processes are in place, are being used, and are effective will be assessed.

Additionally, the contractor will conduct a review of its Contractor Assurance System and identify areas where it can be improved to be more effective.

Actions Taken at Other Affected Sites—TRU Waste Handling

DOE has completed an assessment of the chemical stability of the TRU waste inventory at those sites that were actively processing and shipping TRU waste to WIPP at the time of the incident (Idaho, Oak Ridge, and Argonne). This assessment confirmed waste processing practices and the inventory do not present conditions discovered at LANL. In addition, DOE is developing an annual TRU waste management assessment program for conducting more in-depth assessment on TRU waste origins, processing, and packaging before waste characterization.

- Q10. In its performance evaluation of the Los Alamos National Laboratory (LANL), the National Nuclear Security Administration (NNSA) stated that as a direct result of LANL's action of non-compliance with proper handling of transuranic waste, other facilities that generate transuranic waste have been adversely affected across the nation, leading to "large costs that cannot yet be accurately computed, and degrading an important regulatory relationship" with the state of New Mexico. In addition, "there is a very high likelihood that the government will ultimately be responsible for significant fines and penalties."
- Q10a. What have the costs to the U.S. government been to date as a result of LANL's action of non-compliance? In particular, has the state of New Mexico assessed fines against the federal government and, if so, how much are the fines and how many more can the federal government expect?
- A10a. The majority of the costs to the Government are for recovery activities at WIPP, totaling approximately \$150 million to date, with \$87 million in additional funds in the FY 2016 Budget Request.

LANL has incurred approximately \$15 million for waste re-characterization, investigations, and relocation and storage of transuranic waste at a commercial facility.

Other DOE sites with TRU waste continue to incur incremental costs for extended storage of waste in existing onsite facilities, totaling approximately \$10 million to date across the complex.

In December 2014, the State of New Mexico levied \$54.3 million in fines against DOE and its contractors for alleged violations of the New Mexico Hazardous Waste Regulations at the LANL and the WIPP. We cannot address any additional fines that the State of New Mexico may be considering.

- Q11. Some transuranic waste from the Los Alamos National Laboratory—which still must be shipped off site to meet certain milestones agreed to with the state of New Mexico—has to be transported to temporary storage sites in Texas while WIPP is closed.
- Q11a. What have been the costs of moving transuranic waste to Texas for temporary storage and what will be the likely costs of moving this waste a second time to WIPP once it re-opens?
- A11. TRU waste transport, the DOE uses indefinite delivery, indefinite quantity contracts utilizing firm-fixed price delivery task orders, with some specified cost reimbursable items like fuel costs and permit costs. The firm-fixed price for transport of TRU waste from Los Alamos, New Mexico to Texas has been about \$2,000 per loaded shipment exclusive of fuel and other reimbursable costs. A total of 39 shipments were completed. The estimated firm-fixed price to transport TRU waste from the temporary storage site in Texas to WIPP will be about \$500 per loaded shipment exclusive of fuel and other reimbursable costs.
- Q11b. Do other sites with transuranic or mixed waste have to move the waste off-site to temporary storage sites? If so, how will such efforts impact cost and schedule of WIPP's disposal mission?

- A11b. TRU waste generator sites have sufficient storage capacity for certified waste ready for WIPP disposal through at least fiscal year 2016. The DOE will continue to evaluate sites' storage capacity and available off-site options, if necessary. It is premature to estimate cost and schedule impacts at this time.
- Q12. In the President's fiscal year 2015 budget request for WIPP, DOE had reported the life cycle cost for WIPP was between \$7 billion and \$7.5 billion and that the completion date was between 2035 and 2039.
- Q12a. Has DOE revised these life cycle costs or completion date to account for the shut-down and recovery of WIPP and changes in procedures? If so, please describe the factors that DOE has taken into account and how these factors have affected the life cycle cost of and schedule of WIPP.
- A12a. Once the impacts of the WIPP recovery are better understood, the Department will be able to evaluate a revision to the WIPP life-cycle cost.
- Q13. Looking across all of DOE's program offices, what are the highest-risk contaminated facilities and how are they prioritized for deactivation and decommissioning (D&D)?
- A13. The Office of Environmental Management does not prioritize excess contaminated facilities for deactivation and decommissioning (D&D), using a strict risk model. Within the EM program, each DOE field office creates their own Integrated Priority List (IPL), which identifies the overall cleanup priorities specific to that site. EM-Headquarters does provide guidance to the field offices for developing IPLs, but the guidance does not direct a site to make excess contaminated facilities a high priority. In addition, other factors, such as regulatory drivers, site-specific agreements, or safety requirements may also influence what is deemed a priority at an individual site. For example, regulators may identify a low-risk excess facility for D&D as a "high priority", because they want the facility removed so soil or groundwater remediation can commence.
- Q13a. To what extent do regulatory drivers and site-specific agreements affect DOE's D&D planning with respect to risk?
- A13a. Regulatory drivers and site-specific agreements can affect D&D planning for EM facilities. For example, a regulatory agreement may identify a specific facility the

regulators believe to be important to disposition. While risk is an important consideration, there are other considerations which regulators consider such as the need to remove a building so cleanup of soil or groundwater can commence.

Q13b. There are hundreds of contaminated facilities across DOE's program offices that are no longer in operation. What is DOE's plan for decontaminating and decommissioning these facilities—in what order will they be cleaned up and what is the budget plan for EM's requests?

A13b. In addressing contaminated facilities across DOE programs, the Department's Laboratory Operations Board has formed a new a new working group on excess facilities that is the process of developing strategic approaches and options for how the Department will address the numerous excess contaminated facilities owned by the various program offices.

QUESTIONS FROM REPRESENTATIVE BOB LATTA

Q1. As you are undoubtedly aware, Executive Orders 13563 and 12866 were meant to address and reduce redundant and burdensome government regulations that could stymie private sector job growth and innovation. It is confusing, however, that the DOE seems to ignore these Presidential directives and continue to increase the regulatory pressures on businesses. Specifically, failing to rely on long standing, nationally recognized and respected private sector Voluntary Independent Certification Programs (VICP) seems to be a failure to deploy ready-made, cost effective programs to reduce such burdens on regulated businesses. Your counterparts at the Environmental Protection Agency rely on 3rd party testing to more effectively and more efficiently approve products for their ENERGY STAR program, in many cases streamlining the process for businesses to get their products to market.

To assist us in understanding your decisions, I would appreciate responses to the following questions:

Q1a. Congress has already directed DOE to use third party certification for certain products. Both the Energy Independence and Security Act of 2007 and the Energy Policy Act of 2005 clearly instruct the DOE to rely on third party certification programs for commercial refrigerators, furnaces, central air conditioners, and heat pumps when available. Despite this clear direction from Congress, why has DOE not relied on third-party certification programs for verification purposes?

A1a. The Appliance Standards Program is the Department of Energy (DOE) regulatory program responsible for implementing the Federal energy conservation program for appliances and industrial equipment established by Congress. Compliance with those standards, many of which were enacted directly, and all of which were authorized by, Congress, is determined through testing of covered products and equipment. A *verification* program typically verifies manufacturers' efficiency ratings through periodic testing of models and requires participants to revise ratings based on those test results. A *certification* program typically provides verification of efficiency ratings through review of paperwork submittals by manufacturers, as well as providing an endorsement by the certifying body regarding the veracity of the claims.

DOE attempted to negotiate a rule that would establish some form of DOE recognition for voluntary independent verification programs, as well as implement the Energy Policy Act of 2005 requirement for commercial refrigerator manufacturers to participate in a third-party certification program. When that negotiation stalled, the Appliance Standards

Rulemaking Federal Advisory Committee, a committee established under the Federal Advisory Committee Act and composed of members from industry, energy advocacy groups, utilities, and testing organizations, voted to cease negotiations due to the disparate views expressed by the various industries, testing organizations, small domestic businesses, importers, global manufacturers, etc., leading to a failure to negotiate an agreement. DOE takes the recommendations of the advisory committee quite seriously; if the consensus view of the interested parties is that DOE should proceed, DOE believes that there is broad-based interest and is certainly willing to proceed again with either a traditional notice and comment rulemaking or a negotiated rulemaking.

Certification and verification are separate and distinct processes. DOE requires manufacturers to certify compliance with the Federal energy conservation standards before distributing products in the U.S. This compliance certification requirement is an essential part of the DOE Appliance Standards Program, and is fundamentally different than, for example, the EPACT 2005 requirement for commercial refrigerator manufacturers to participate in a third-party certification program. Consistent with the statutory mandate, DOE already allows the manufacturers at their discretion to use third-parties, such as an industry-run certification program, to submit the paperwork associated with certifying compliance to the Department. Industry, DOE, and energy efficiency advocates worked for four months in 2013 negotiating every detail of certification requirements for commercial heating, ventilation, and air conditioning (HVAC), refrigeration, and water heating equipment. The requirements negotiated during that process are currently being phased-in, with the last equipment category - requiring manufacturers to certify compliance with Federal standards for the first time - due on July 1, 2015. DOE has found that, as it has instituted certification requirements for similar products in 2011 as well as the products covered under the negotiated provisions, that a lack of a requirement to submit a manufacturer's certification of compliance correlates closely with lack of compliance with testing and Federal standards, some of which were enacted by Congress. When manufacturers are not required to certify compliance, those manufacturers frequently do not test, and the products are more likely not to meet Federal minimum standards. DOE's current certification regulations allow manufacturers to use

third-parties, such as an industry association or a third-party laboratory, to submit compliance certification reports to DOE. Thus, a subset of manufacturers of commercial refrigerators, central air conditioners and heat pumps, and furnaces currently utilize a third-party, such as AHRI or one of various laboratories, to submit compliance certification reports on the manufacturer's behalf to DOE.

In addition, DOE has taken steps in response to Executive Order (EO) 13563 to routinely request public feedback through the retrospective review of existing regulatory and reporting requirements. The Department issued several Requests for Information (RFI) seeking public comment on how best to review its existing regulations and to identify whether any of its existing regulations should be modified, streamlined, expanded, or repealed. DOE created a retrospective regulatory review website¹, where the public can access the RFIs and comments received in response. DOE also briefed the Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC) on its public engagement efforts pursuant to EO 13563 and tasked the ASRAC with identifying: (1) specific rules for which revision would have the most positive impact; and (2) potential improvements to the regulatory process. ASRAC is comprised of representatives from industry, utilities, energy efficiency/environmental advocacy groups, and consumers. Furthermore, ASRAC meetings are noticed in the Federal Register and open to the public. Members of the public can submit written comments to the committee and make oral statements during the meetings.

- Q2. Is DOE considering developing a rule that would create a new Department of Energy verification program for HVACR products? Please identify any long standing private sector VICPs that provide testing and certification of HVACR products and explain and document any consideration DOE gave to utilizing existing VICPs to fully ensure verification and compliance with federal energy conservation standards? Additionally, has DOE suggested ways to enhance VICPs to ensure that private sector verifications are conducted in a manner that eliminates the need for a taxpayer-funded verification program?
- A2. DOE currently does not have a plan to issue a rulemaking to create a DOE-approved verification program for HVAC and refrigeration products. As noted above, DOE

¹ <http://energy.gov/gc/services/open-government/restrospective-regulatory-review>

attempted to negotiate a rule that would establish some form of DOE recognition for voluntary independent verification programs. When that negotiation stalled, the Appliance Standards Rulemaking Federal Advisory Committee voted to cease negotiations due to the disparate views expressed by the various industries, testing organizations, small domestic businesses, importers, global manufacturers, etc., leading to a failure to negotiate an agreement. DOE takes the recommendations of the advisory committee quite seriously; if the consensus view of all of the interested parties is that DOE should proceed, DOE believes that there is broad-based interest and is certainly willing to proceed again with either a traditional notice and comment rulemaking or a negotiated rulemaking.

DOE is aware that one trade organization (the Air-Conditioning, Heating, and Refrigeration Institute – AHRI) and several third-party laboratories (Intertek, Canadian Standards Association, and Underwriters Laboratory) provide manufacturers with the option of enrolling in their third-party certification programs (commonly referred to as a VICPs within industry) for commercial refrigerators, furnaces, central air conditioners, and heat pumps.

AHRI's Voluntary Industry Certification Program (VICP), in addition to reviewing summary ratings data submitted by participants, also conducts some testing and provides a listing service for participants in its certification program. AHRI's program minimizes test burden by allowing participants to identify untested models as "AHRI certified" as long as a small percentage of tested models meet program requirements, even if neither AHRI nor the manufacturer has tested the model being listed. AHRI's program requirements do not align with Federal regulations in all respects.

Product certification is another key element of the Appliance Standards Program. Industry, DOE, and energy efficiency advocates worked for four months in 2013 negotiating every detail of certification requirements for commercial HVAC, refrigeration, and water heating equipment. The requirements negotiated during that process are currently being phased-in, with the last equipment category - requiring manufacturers to certify compliance with Federal standards for the first time - due on July

1, 2015. DOE has found that, as it has instituted certification requirements for similar products in 2011 as well as the products covered under the negotiated provisions, that a lack of a requirement to submit a manufacturer's certification of compliance correlates closely with lack of compliance with testing and Federal standards, some of which were enacted by Congress. When manufacturers are not required to certify compliance, those manufacturers frequently do not test, and the products are more likely not to meet Federal minimum standards. DOE's current certification regulations allow manufacturers to use third-parties, such as an industry association or a third-party laboratory, to submit compliance certification reports to DOE. A subset of manufacturers of commercial refrigerators, central air conditioners and heat pumps, and furnaces currently utilize a third-party, such as AHRI and various laboratories, to submit compliance certification reports on the manufacturer's behalf to DOE.

DOE has considered regulatory changes to allow qualified programs to conduct verification testing to ensure efficiency ratings are reliable. Manufacturer certification and compliance with standards, however, are regulatory functions that should remain administered by DOE. DOE has not proposed regulatory changes that would remove the requirement for manufacturers to certify the compliance of their products to the Federal Government. Congress established the program to be a relationship between the Federal government and a manufacturer, with the Federal Government having authority to enforce compliance with standards.

- Q3. How would a proposed DOE verification program run more effectively, cost less money, and produce better results than the current VICPs? Recent results of DOE verification testing of efficiency ratings of residential tankless and storage water heaters conducted for the ENERGY STAR® program show that not a single test result required further action to verify the rating. The results of these tests support the belief that participants' products in nationally recognized and respected voluntary certification programs are being properly rated and should not be the focus of enhanced federal scrutiny. The water heater tests are an excellent indication that nationally recognized and respected VCIPs should be relied upon by DOE to verify compliance with federal energy efficiency standards.
- A3. DOE does not seek to administer a verification program that mimics those currently administered by industry associations. Instead, DOE envisions a collaborative approach

that takes full advantage of, and does not needlessly duplicate, current verification programs. DOE approval and oversight would ensure a level playing field between participants and non-participants and would ensure equity amongst different verification programs for the same products, regardless of the size of the business. A DOE-approved verification program would also ensure that small businesses that cannot afford to participate in a voluntary verification program, which can cost businesses thousands of dollars to join, would not be inappropriately disadvantaged. DOE could periodically review the procedures and processes of the verification program to ensure that DOE's regulations were being implemented correctly by an industry-run program.

Product testing provides a wealth of information to DOE that is used in all aspects of its appliance standards program, especially in the area of test procedure development. Sharing of test data and testing experiences is vital to the DOE's ability to ensure that DOE's regulations stay current, reflect new technologies, and are not unduly burdensome. Ensuring DOE has the tools to respond quickly to product innovation ensures that the regulatory program is less expensive for businesses. Most VICPs, however, do not engage in this level of coordination and information sharing with DOE. Indeed, some have indicated that they do not feel free to share information with DOE at the level of detail and frequency with which DOE believes is necessary to administer an effective regulatory program.

Over the past two years, DOE has tested just less than 200 models of automatic commercial ice makers, central air conditioners and heat pumps, commercial air conditioners and heat pumps, direct heating equipment, and residential heating appliances, which are all products for which an industry verification program exists today. While the question references a year of limited testing of residential water heaters for the ENERGY STAR verification program, DOE found in its recent testing that over half of the 200 models had issues that warranted further investigation by DOE. More specifically, almost one-quarter of those models required investigation for potentially failing the Federal minimum energy conservation standards even though those industries already are and have historically participated in an industry-run verification program.

- Q4. Does maintaining coal as part of the electric generation fleet provide value to consumers?
- A4. Coal provides many benefits as part of the electric generation fleet. Coal fired electricity units provide ancillary services such as reactive power and voltage control, which are necessary to support the transmission of electric power. Coal also provides a measure of fuel diversity, protecting the electric power industry and consumers against large deviations in fuel prices, as end use electricity prices are mitigated by the use of multiple fuel sources. During the polar vortex of 2014, natural gas prices spiked to historically high levels, yet coal prices and the price of electricity produced from coal units were not as severely impacted. Coal units operate with an on-site reserve of fuel to protect the unit from supply disruptions. A typical coal plant will have a reserve of coal in a holding pile on-site with a multi-day supply of fuel, providing a buffer when rail shipments are delayed. In contrast, natural gas for electricity use is delivered “just-in-time”, and is subject to spot-market prices and other price fluctuations.

DOE's clean coal research and development (R&D) is focused on developing and demonstrating carbon capture, utilization, and storage technologies and advanced power generation systems that support CCS for existing facilities and new fossil-fueled power plants by increasing overall system efficiencies and reducing capital costs. These activities will help allow coal to remain a strategic fuel for the nation while enhancing environmental protection.

- Q5. DOE's Office of Electricity website has information on the “Rapid Response Team for Transmission” the Administration formed among nine federal agencies, including DOE, that signed a Memorandum of Understanding in 2009 “increasing their coordination to expedite and simplify building of transmission lines on Federal lands.” Of the seven projects listed on the website, six show when the project application was accepted by the lead agency, when the project is expected to begin construction, and when the project is expected to be complete. According to your website, it will take an average of 7 years and 1 month from the time these projects apply to the time construction begins! It will take 9 years 7 months on average – nearly 10 years! – from the time the application is accepted to the time it is expected to be complete. We all know years of planning goes into an application before it even can be filed, so the real time between identifying a need and serving it is even longer. And transmission on private lands can be almost as tricky.
- Q5a. Would you say the Rapid Response Team is working as intended?

A5a. The Rapid Response Team for Transmission (RRTT) is a pilot program and there are some highlights I'd like to mention. The RRTT has made several strides in improving the permitting process for transmission lines requiring multiple Federal authorizations. The RRTT established consistent points of contact at the headquarters level at each agency that can be called upon as issues arise with a particular project. The RRTT holds regular calls with the sponsors of the remaining RRTT pilot projects to identify and find resolution to emerging issues. The RRTT, pursuant to a June 7, 2013 Presidential Memorandum, also developed a draft Integrated, Interagency Pre-Application (IIP) process for transmission line projects that would be utilized prior to the formal application phase and requested comments on it via the Federal Register. The DOE analyzed the comments received in response to the request for information (78 FR 168; August 29, 2013) and shared its analysis with the RRTT agencies, as well as DOE's proposed modifications to the draft IIP process based on that comments analysis. Shortly thereafter, DOE staff developed draft regulatory language to implement the IIP process as modified. DOE, in coordination with the Council on Environmental Quality (CEQ), requested interagency comments from the RRTT on DOE's proposed regulatory language for implementing the IIP in the fall of 2014. DOE is currently reviewing and addressing these interagency comments. Following this comment resolution, DOE intends to finalize its regulatory language to implement the IIP process and issue a Notice of Proposed Rulemaking using its authority in section 216(h) of the Federal Power Act that would formally implement the IIP process in summer 2015. If implemented, DOE would act as the lead agency to coordinate all activities for the other agencies during the IIP process for transmission line projects requiring multiple authorizations.

DOE is currently piloting elements of the IIP while reviewing the Presidential permit application for Minnesota Power's proposed Great Northern Transmission Line (GNTL) project, a 500kV transmission line that would run from Manitoba to the Mesabi Iron Range in northern Minnesota. The GNTL project is a 220-mile, 500kV high-voltage alternating current, overhead transmission line that has an agreed-upon 18-month environmental review schedule. This review is a combined Federal-state environmental analysis (and environmental impact statement) with the involvement of a number of

Federal and state agencies. It is intended to identify inefficiencies in the review process and capitalize on early information sharing.

Finally, the RRTT has identified institutional changes that could be made to improve the permitting process in transmission, and perhaps other areas of major infrastructure; these include early pre-application interagency coordination activities and developing a clear escalation process when issues that threaten to stall the review and permitting process cannot be resolved at the staff level between agencies.

The RRTT has a clear responsibility in identifying and exploring lessons learned from the pilot projects as they progress and reviews are completed.

Q5b. Is it possible that these lines will take longer than the projected construction completion estimate?

A5b. Depending on the project, there could be delays that cause the project to go into service on a later date due to any number of factors, not limited to just permitting.

Q6. Do you believe the world will be burning more coal per year in 2050 than it is today? How much more?

A6. The majority of the projections seen in the public domain suggest that the world will be burning more coal in 2050 than it is today, yet projections differ widely, mainly due to uncertainties pertaining to coal consumption in China and assumptions regarding climate change policies.

The Reference case of the DOE's U.S. Energy Information Administration (EIA) *International Energy Outlook 2013 (IEO2013)* projects global coal use in 2040 at roughly 12 billion tons, compared to 8.2 billion tons in 2012. EIA's projections only extend through 2040, and the reference case reflects only policies in effect as of 2012.

By comparison, the International Energy Agency's (IEA) *World Energy Outlook 2014* projections vary from 1 billion tons higher in 2040 in its New Policies Scenario to 4 billion tons higher in its Current Policies Scenario, the latter which reflects a policy baseline similar to that in EIA's *IEO2013*.

The Massachusetts Institute of Technology's Joint Program Energy and Climate Outlook 2014, which extends to 2050, project that world coal use in that year that is slightly more than 4 billion tons above its 2012 level.

The primary driver for world coal consumption is China, which currently produces and consumes about half of the world's coal. Within China, coal-fired electricity generation will play an even more important role in driving future coal consumption, as electrification expands and end-uses of coal decline (particularly in the industrial sector). Outside of China, India and other developing countries in Asia represent key nations where coal consumption is expected to grow.

In its *IEO2015*, EIA will examine when China's projected coal consumption will reach its maximum level and, consequently, at what level world coal consumption may plateau. EIA will also account for several new developments, mainly new environmental policies and regulations, new total energy and coal consumption targets for 2014-2020, and China's pledge to stop increasing carbon dioxide (CO₂) emissions after 2030. Preliminary indications suggest that these developments could lead to China's projected maximum coal use to occur earlier and at a lower level than projected previously, with maximum world coal consumption also occurring at a lower level than in EIA's *IEO2013*.

- Q7. What, if any, legal mandate is there for the NRC to work with DOE to develop new regulatory framework to license a Gen IV reactor. If there isn't a mandate, isn't it possible that efforts could be stalled based on future regulatory budgets and leadership?
- A7. There is no legal mandate for the Nuclear Regulatory Commission (NRC) to work with the Department to develop a new regulatory framework for licensing Generation IV reactors. At present, the DOE is working on a joint initiative with the NRC on the development of advanced reactor design criteria in support of a longer term effort to establish the advanced reactor licensing processes and procedures and reduce the risk and uncertainty for future applicants. The DOE is not providing funds to the NRC to support this current effort.

The Energy Policy Act of 2005 provided a legal mandate for DOE and NRC to work together on licensing for any Next Generation Nuclear Power Plant (NGNP) prototype reactor. However, it was decided that the NGNP Project would not proceed to Phase 2, as noted in the Secretary of Energy's letter to Congress from October 17, 2011.

Q8. What is the timeline on having the NRC develop new regulatory framework to license a Gen IV reactor? Why can't that time be shorter?

A8. The NRC would need to provide any information about any possible new regulatory developments. At present, the DOE is working on a joint initiative with the NRC on the development of advanced reactor design criteria in support of an overall effort to establish the advanced reactor licensing processes and procedures and reduce the risk and uncertainty to future applicants.

QUESTIONS FROM REPRESENTATIVE GREGG HARPER

Q1. I noted that recently, the Department announced its intention to cancel funding for the FutureGen 2.0 project in Illinois that was to demonstrate that carbon capture and storage (CCS) technology can be used to preserve coal as an element of our nation's fuel mix in the future. Kemper County, Mississippi plant is the closest and most immediate project this country has to use carbon capture and storage technology in a commercial-scale power plant demonstration. What are you doing to make sure that the Kemper County facility succeeds in light of the FutureGen announcement?

A1. The Department of Energy (DOE) has worked diligently over the last six years to make the FutureGen 2.0 project a success. The Department believes strongly in the importance of oxycombustion technology and, accordingly, has worked closely with Congress and non-federal partners to advance this priority project despite setbacks.

However, in light of a number of challenges to the project, including the lack of private financing and other hurdles, the Department has concluded that the FutureGen Alliance did not have the ability to spend the funds appropriated by the American Recovery and Reinvestment Act (ARRA) before the statutory deadline of September 30th, 2015. Absent an extension of that deadline by Congress, and in order to best protect those taxpayer funds, the Department has notified the FutureGen Alliance that Federal support is no longer available for construction activities at this time. Accordingly, we have initiated a structured closeout of Federal support for the project that will help maximize the value of investments to date while minimizing ongoing risks and further costs.

The cancellation of the FutureGen project is not expected to have any negative effect on the Kemper project. The Kemper County Integrated Gasification Combined Cycle (IGCC) project is expected to enter operation in 2016.

Q2. Since the budget request was completed prior to the announcement that the plug is being pulled on FutureGen – are there any changes that you anticipate to reflect a decision to move away from that project and perhaps provide additional support to CCS facilities currently being built like the Kemper facility?

A2. Funds from the ARRA provided the bulk of the Government's support for FutureGen. ARRA funds obligated to FutureGen cannot be transferred to other projects and must be returned to the Treasury. DOE continues to support major carbon capture and storage

(CCS) demonstration projects such as Kemper, Summit, and Petra Nova with prior year obligations. The cancellation of ARRA funding for FutureGen does not affect the budget request.

- Q3. Do you believe the small refinery petition process is working as the Energy Policy Act of 2005 intended?
- A3. The Environmental Protection Agency (EPA) is responsible for granting or denying petitions by small refiners for exemption from the Renewable Fuel Standard. While the Department of Energy provides certain analytic information to the EPA, with regard to these petitions, we defer to EPA whether to confirm that the petition process is being administered in accordance with the Clean Air Act.
- Q4. It is my understanding that the Addendum to the Small Refinery Exemption Study, released in May of 2014, was not put out for public comment.
- Q4a. Is that the case?
- A4a. The Addendum to the Small Refinery Exemption Study was not issued for public comment. The DOE defers to the EPA as to what public notice is necessary to administer its responsibilities to grant economic hardship relief under the Clean Air Act.
- Q4b. This change in the scoring system that determines whether a small refinery is profitable enough to warrant temporary RFS relief had the practical effect of making it much more difficult for a small refinery to qualify.
- A4b. The Addendum documented a change that was made to DOE's scoring system that was used in DOE's 2011 Small Refiners' Exemption study. The change, to add a mid-point score to one of the scoring criteria, does not have any systematic effect on whether a small refiner would or would not receive a quantitative assessment that might make it more or less likely that EPA would grant the exemption request. Nonetheless, DOE defers to the EPA as the appropriate agency for questions about the regulatory procedures that are required under the Clean Air Act.

QUESTIONS FROM REPRESENTATIVE MIKE POMPEO

Q1. How much are you spending to support renewables (wind/biofuels/solar)?

Q1a. By line items, how much has been spent on these over the last ten years?

A1a. The Department of Energy (DOE) supports the President's all-of-the-above energy strategy that seeks to fully leverage fossil, nuclear as well as renewable energy technologies to enable the transition to a clean energy future, support economic growth and job creation, and enhance energy security.

The Office of Energy Efficiency and Renewable Energy (EERE) implements a range of strategies to reduce U.S. reliance on oil, save American families and businesses money, create jobs, and reduce pollution. EERE has established goals for its technology development programs to make the renewable electricity market competitive without subsidies, and works to ensure that the clean energy technologies of today and tomorrow are invented and manufactured in America.

Over the past ten years (beginning in Fiscal Year 2005), the following approximate amounts of funds have been costed within these specified technology offices¹:

Wind: \$740 million

Solar: \$1.750 billion

Bioenergy: \$2.121 billion

Q1b. What is the dollar amount on per BTU/KwH equivalent to dollars spent, either through grants or loan guarantees, from those sources?

Q1c. How much electricity has that produced and what is the value for that?

A1b&c. The majority of EERE's investments are focused in foundational, high-impact research, development and demonstration activities and pre-competitive technologies, not on direct deployment activities for renewable energy. As such, it is not appropriate or feasible to

¹ Costed funds do not include program direction activities, and as of 2009 includes American Recovery and Reinvestment Act funding.

tie research and development (R&D) funding streams directly to commercialized power generation.

Overall, EERE's investments in renewable energy technologies are showing great returns, as highlighted in the recent update to the Department's Revolution Now report. This report highlighted the dramatic decreases in cost and increases in deployment of four key clean energy technologies, including polysilicon photovoltaic (PV) solar modules and onshore wind power.

For example, by 2014, rooftop solar panels cost about 1% of what they did 35 years ago, and solar PV installations were about 15 times what they were in 2008. Just since 2008, the cost of a PV module declined from \$3.40/watt to about \$0.79/watt². From 1975-2008, DOE invested \$3.7 billion in solar photovoltaic R&D, which resulted in a net economic benefit of \$15 billion (in 2008 dollars)³ – and this does not include the benefits reaped from the cost improvements and rapid increase in deployment seen since 2008.

In 2014, deployed wind power had the equivalent generation capacity of more than 65 gigawatt (GW), equivalent to about 60 large nuclear reactors, with capacity roughly tripling since the beginning of 2008. This has been made possible by larger, more cost-effective and efficient turbines, which were developed with the support of DOE investments, working with industry and national laboratory partners on critical R&D in turbine design and performance.

From 2000-2013, deployment of total renewable electricity capacity (including hydropower) increased by an average of 4.8% per year, and non-hydropower renewable

² Revolution Now: The Future Arrives for Four Clean Energy Technologies – 2014 Update. U.S. Department of Energy. Accessible at: http://energy.gov/sites/prod/files/2014/10/f18/revolution_now_updated_charts_and_text_october_2014_1.pdf

³ Retrospective Benefit-Cost Evaluation of DOE Investments in Photovoltaic Energy Systems, by O'Connor, A., R. Loomis, and F. Braun, 2010. http://www1.eere.energy.gov/analysis/pdfs/solar_pv.pdf

electricity capacity increased by more than 460%. Just since 2009, non-hydropower renewable electricity increased by 75%, a rate of growth of roughly 15.1% per year.

DOE's biofuels investments have focused on research, development and demonstration to develop sustainable and cost-competitive biofuels. DOE has lowered the cost of non-food-based ethanol by more than \$7 per gallon since 2001, and it is now projected to be cost-competitive when ramped up to a commercial scale⁴. DOE is also developing advanced "drop-in" biofuels, which take advantage of existing infrastructure by providing nearly identical biobased substitutes for crude oil, gasoline, diesel fuel, and jet fuel.

EERE takes its responsibility to deliver return on investment to the U.S. taxpayer very seriously. EERE is proud of its strong track record of returning value to the American taxpayer and helping develop commercially viable, innovative clean energy technologies. Through its Loan Programs Office, the Department of Energy has guaranteed approximately \$16 billion in loans to renewable energy borrowers pursuant to Title XVII of the Energy Policy Act of 2005. These borrowers have developed the world's largest concentrating solar facilities, the first utility-scale PV solar projects built in the U.S., one of the first commercial-scale cellulosic biofuels refineries in the U.S., one of the world's largest wind farms, and many other innovative projects.

As of February 2014, these guaranteed loans have financed more than 3,800 megawatts (MW) of installed generation capacity. The installed generation capacity will increase as additional projects financed with guaranteed loans begin commercial operations. Over the next twenty years, DOE estimates that the renewable energy projects in the current portfolio will generate more than 195,000,000 MWh of renewable electricity. Additional non-generation renewable energy projects in the portfolio will produce cellulosic biofuel and provide energy storage and transmission services.

⁴ Source: Bioenergy Success 2014 Fact Sheet. U.S. Department of Energy. Accessible at: http://www.energy.gov/sites/prod/files/2015/03/f20/accomplishments_two_pager_2014.pdf

DOE's loan programs helped finance the first five utility-scale solar PV projects in the U.S. beginning in 2009 representing more than 1,500 MW of installed capacity. Since deploying these first five projects, utility-scale solar has become a bankable technology and 17 additional utility-scale solar projects providing more than 5,100 MW of capacity have been financed in the U.S. – all without DOE support.

- Q2. New England natural gas prices hit record levels last winter, and the pipeline constraints that lead to those prices haven't been resolved. According to the Energy Information Administration: "On many days during the winter of 2014, natural gas pipelines filled to capacity, leading to record-high wholesale natural gas prices at several locations. Spot natural gas prices reached \$120 per MMBtu in New York City, \$78 per MMBtu in Boston, and \$34 per MMBtu in Chicago." Meanwhile, spot natural gas prices at the Henry Hub averaged only \$4.38 per MMBtu in 2014.
- Q2a. Would you agree that the region needs energy upgrades, including more natural gas pipeline capacity, to deliver gas for home heating and to generate affordable electricity?
- A2a. Additional natural gas pipeline capacity is one solution to the high natural gas prices experienced recently in New England. It is not, however, the only possible solution. For example, adequate mandatory alternative fuel inventories could also cap natural gas prices, as they did the prior winter. LNG deliveries to existing LNG import facilities in New England might also help. The financing of additional pipeline capacity to serve gas-for-power generation is a complex, multi-state issue linked to the organized electricity and capacity markets run by ISO-New England (ISO-NE). ISO-NE and related regulatory and other regional policy-setting bodies continue to explore solutions appropriate for New England.
- Q2b. Numerous pipeline proposals are under consideration in the Northeast to transport natural gas from the Marcellus shale fields to areas of high demand. Will you agree to do everything in your power to prioritize these reviews?
- A2b. DOE has no authority over the review of pipelines to move natural gas from Marcellus to New England.
- Q3. Based on recent history, as well as your budget request and its stated objectives, it appears that DOE is increasingly focused on emissions reductions, as opposed to resource production and an all of the above energy strategy. In fact, sometimes I get the sense that DOE and EPA

are merging, with DOE serving merely as a research organization to support EPA's climate agenda.

Q3a. Do you agree that the line between DOE and EPA has been blurred?

A3a. No, DOE monitors, analyzes and provides comments on proposed rules and regulations through standard interagency processes, which are designed to take into account the diversity of perspectives and expertise that exist within Federal agencies.

Given the complexity and scale of the nation's energy economy, a number of federal, state and local agencies maintain distinct authorities where the public interest must be balanced with commercial interests. The roles and responsibilities of the DOE and the EPA have not changed. EPA is a regulatory body that must take into account in its proposed regulations the technological readiness, economic viability and environmental impact of the full range of incumbent and emerging energy technologies. It does not, however, conduct extensive research on energy technology development, nor is it the steward of the Nation's national energy laboratory system. Likewise, with the exception of activities such as setting appliance standards, the DOE has comparatively limited regulatory jurisdiction. Instead, DOE's primary mission in energy is to support R&D and discovery science that private industry, academia and other agencies cannot do alone. DOE also leverages its convening power and significant analytical resources to provide technical assistance to State regulators and other stakeholders and policymakers upon request. For example, its Federal Energy Management Program provides training and technical assistance to Federal agencies in a variety of areas.

The mission of DOE is to research, develop, demonstrate and deploy energy technologies. It upholds the President's all-of-the-above strategy within the context of energy security, economic competitiveness, and environmental responsibility.

Q4. It is clear from the stated budget priorities that DOE is pursuing administrative remedies to continue furthering the President's Climate Action Plan through the "development and deployment of clean energy technologies that reduce carbon pollution."

Q4a. Would you agree that, as elected representatives, Congress speaks for the people?

- Q4b. Do you think it's appropriate for DOE and the President to bypass the will of the people – i.e., Congress – to unilaterally pursue the President's climate agenda?
- A4. We believe that our budget execution is consistent with statutory requirements and authorities enacted by Congress.
- Q5. The intent of the Energy Policy and Conservation Act with respect to efficiency standards was to “cover major household appliances.” Currently on the docket are several rules in various stages.
- Q5a. Do you consider “hearth heating products” or gas fireplaces a major household appliance?
- A5a. Congress listed the consumer products covered under the Energy Policy and Conservation Act at 42 U.S.C. § 6292(a) and provided DOE the authority to classify other consumer products as covered products under 42 U.S.C. § 6292(b). For DOE to classify other consumer products as covered products, the Secretary must determine that classifying the product as covered is necessary for the purposes of the statute and that the average annual per-household energy use of the product is likely to exceed 100 kilowatt-hours per year, in addition to other energy saving metrics listed at 42 U.S.C. § 6295(l)(1).
- Q5b. For that matter, wine chillers?
- A5b. Please see the response to question a, above.
- Q5c. What's next, will you attempt to regulate outdoor gas barbeque grills?
- A5c. DOE is not currently evaluating standards for that product.
- Q5d. Is there any appliance you can think of that wouldn't be appropriate to regulate?
- A5d. DOE's statutory authority is very clear in terms of what consumer products could be subject to coverage and standards based on the energy use of these consumer products. Please see the response to question a, above.

QUESTIONS FROM REPRESENTATIVE H. MORGAN GRIFFITH

- Q1. Last May, you requested a National Coal Council review of the value of the agency's carbon capture and sequestration program. The advisory panel makes some troubling observations about the status of DOE's clean coal research. It notes, for example, that "it is impossible to objectively assess progress against the DOE program goals" – that program goals need "far greater clarity." We are a decade and \$6 billion into the CCS related research and we are no closer to achieving CCS deployment on a commercial scale. DOE has to do something to reform the management of this program.
- Q1a. I don't see anything in your budget about reforming the program measures and goal. What are you going to do about the advisory panel recommendations?
- A1a. The Department of Energy's (DOE) Carbon Capture and Storage (CCS) Program goals are established as guidelines and performance metrics for the conduct of research and development of advanced technologies that are baselined against current, commercial technologies. These goals are established based on systems and techno-economic analyses conducted by the Department's National Energy Technology Laboratory.

The CCS program, along with all DOE programs, conducts periodic peer reviews and assessments of its research and development (R&D) portfolio to ensure activities are aligned with and meeting program, DOE, and Administration goals. These reviews are conducted by panels consisting of experts from industry, academia, and national laboratories which make recommendations to improve program and project activities. For example, the most recent review of the Regional Carbon Sequestration Partnerships (RCSPs) "concluded that the RCSP Initiative is a world leading initiative that is generating valuable results and experience."¹ DOE programs also consider recommendations from advisory committees such as the National Coal Council (NCC) to help guide and direct future activities.

With regard to CCS progress, the NCC review also states, "To date, the DOE has been a world leader in advancing CCS technologies.there is no question that the dollars spent thus far have advanced and will continue to advance CCS." Some examples of the Department's CCS successes include six RCSPs that continue to inject or have injected

¹ IEAGHG R&D Programme, <http://ieaghg.org/publications/blog/119-meetings-and-conferences/453-ieaghg-2013-peer-review-of-us-rcsp-phase-iii-projects>.

carbon dioxide (CO₂) and monitor it to understand the factors that influence storage in geologic formations. Four large-scale CCS demonstration projects are either in operation or construction, and second generation carbon capture technologies are proceeding to large pilot-scale tests. These efforts are catalyzing research, development, and demonstration activities that bolster the goal of widespread commercial deployment.

Q1b. Will you commit to working with the Committee to ensure this program is managed so that it may achieve measurable results?

A1b. The Department follows good management practices in all of its programs and looks forward to working with the Committee to ensure good results. CCS technology is necessary for the Nation to continue to use its fossil fuels (over 80% of our primary energy comes from fossil fuels) while meeting our commitment to reduce CO₂ emissions. As Secretary of Energy, my office will continue to maintain an open line of communications with your office.

Q2. Over the past four or five budget requests, DOE has consistently requested cuts in funding for coal related research and development (R&D), and each year, Congress has to put money back into the program. This year, you appear to be requesting an increased budget for the coal carbon capture and sequestration (CCS), but nearly all of the requested increase would fund CCS for natural gas systems.

Q2a. Can you explain this shift in focus to CCS for natural gas power plants?

A2a. DOE's Fiscal Year (FY) 2016 funding request for post-combustion capture will continue to focus on developing second generation and transformational CCS technologies for coal fired power systems. FY 2016 funding will also leverage the portfolio to conduct additional tests on existing and future R&D field test units using flue gas from a natural gas power system. These tests will address specific natural gas-related carbon capture issues such as higher oxygen (O₂) content and lower CO₂ concentration in flue gas, and higher flow rates of flue gas. Most R&D will address shared challenges for both coal and natural gas capture such as energy penalty, capital and operation cost, and plant integration. This will ensure activities efficiently use funding and are aligned with second generation capture targets.

- Q2b. Given EPA's approach to require CCS on all new coal units and NOT on natural gas systems, why is DOE funding CCS for gas – and doing so out of funds that could otherwise be for the coal R&D program budget?
- A2b. While it is true EPA's regulatory approach does not require CCS on natural gas based systems today, many studies — including the International Energy Agency's recent Energy Technology Perspectives report — have suggested that CCS on natural gas power systems will be necessary to achieve deep carbon reductions in the power sector. We believe that natural gas will continue to play an important role in energy generation for some time to come, so it is prudent — and in fact critical — for the Department to develop and assess carbon capture technology options for natural gas that can be advanced long into the future. Furthermore, many of the technology advancements that have been developed — advanced solvents and sorbents, compression methods, and sub-surface research and development — are likely to be applicable to both coal and natural gas systems, and thus the advancements in both areas are mutually beneficial.
- Q2c. Why are you cutting back on coal funding?
- A2c. Overall, the FY 2016 Budget Request for Coal CCS and Power Systems is an increase of \$66 million above the FY 2015 Budget Request and the FY 2016 Request for Carbon Capture, specifically, is nearly \$40 million higher. The FY 2016 Budget Request continues the Carbon Capture Program's support for existing research and development (R&D) for coal and will leverage a subset of the existing coal-related R&D activities at the laboratory-, bench-, and pilot-scale for natural gas activities. The additional funding in the carbon capture budget would be used to identify CO₂ capture technologies developed for coal-fired power systems and test, where feasible, these existing R&D field test units on natural gas flue streams. This does not reduce the level of effort and DOE's commitment to lowering the cost of CCS for coal-fired power plants.
- Q3. Your budget proposes cutting funding in important coal related R&D areas, such as Advanced Energy Systems program, where technologies are being developed to explore significantly new and transformational coal conversion technologies. One such technology that I am particularly hopeful about is chemical looping, a new way to “burn” carbon-based fuels such as coal and natural gas. However, this budget would drastically reduce funding for the development of technologies like chemical looping.

- Q3a. Why is the Administration cutting back funding for new, transformational technologies like chemical looping that will ensure continued coal use with significantly lower GHG emissions?
- A3a. The decrease in Advanced Energy Systems represents a natural transition from 2nd generation to transformational technologies. Pilot scale work is being completed and our focus is now on the next generation of technologies capable of higher efficiencies and lower costs (i.e., a transition from higher cost pilot test to lower cost lab and bench work). In advanced combustion (chemical looping and oxycombustion), we have prioritized the most promising technologies for the next round of pilot testing.
- Q4. Another alternative that your budget appears to dismiss is algae, which can be used to convert CO₂ from a waste to an economic opportunity by using captured CO₂ to produce fuels, fertilizers, and other valuable products. Your budget request for the Fossil Energy Carbon Use and Reuse subprogram that supports these technologies is zero.
- Q4a. Can you explain the rationale for not funding this subprogram?
- A4a. The Office of Fossil Energy's Carbon Storage Program is utilizing \$2 million of FY 2015 appropriated funds to study the integration of biological CO₂ conversion technologies, such as algae, with fossil energy systems. The FY 2016 funding request for Carbon Storage maintains priority on addressing the critical issues associated with geologic storage of CO₂. Under the American Recovery and Reinvestment Act (ARRA), DOE's Office of Fossil Energy also invested approximately \$100 million into CO₂ utilization projects.

QUESTIONS FROM REPRESENTATIVE BILL FLORES

- Q1. Part of the stated goal of the White House "Strategy to Reduce Methane Emissions" is to stop leaks of methane from natural gas pipelines. This Committee is drafting legislation to modernize infrastructure, and one of our goals is to bring certainty to the natural gas permitting process.
- Q1a. Do you agree that it's difficult to build new pipelines to reduce flaring or upgrade existing sections to eliminate leaks with a complicated and unpredictable regulatory regime in place?
- A1a. According to a recent report prepared by ICF International for the Interstate Natural Gas Association of America (INGAA) Foundation titled "North American Midstream Infrastructure through 2035: Capitalizing on Our Energy Abundance," approximately 322,000 miles of natural gas transmission and gathering pipelines will be added through an estimated \$123 billion in capital expenditures between 2014 and 2035.

Recent analysis by DOE found that there has been significant investment in new interstate natural gas transmission pipeline capacity: over the last 18 years for which data are available, more than 133 billion cubic feet per day (Bcf/d) of capacity additions and \$65 billion in capital expenditures.

The public and private sectors share a common interest in minimizing the financial, public safety, and environmental costs of natural gas flaring and methane leakage. Natural gas flaring and methane leakage are, however, separate issues that occur for different reasons and therefore different solution sets apply. In the case of flaring, one solution is the construction of natural gas gathering pipelines to connect oil production wells to natural gas processing facilities and interstate pipeline networks. While the Federal Government plays a role in permitting and siting of some gathering pipelines – for instance, if a pipeline crosses state lines, or is located on federal or Tribal lands, or has impacts to wildlife, cultural and historic resources– most onshore oil and gas production in the U.S. occurs on non-federal lands and therefore falls within the purview of state and local governments. Furthermore, it is worth noting that where natural gas gathering line capacity is either limited or underutilized, it may be due to a number of factors, including: the large investment and lead time needed to construct new facilities; the

proximity of the wells and gas treatment plants; obtaining rights of way or easements; county and township zoning delays; challenging topography and geography; limited construction crews; the proper sizing of facilities to accommodate dramatic changes in production volumes; or other physical or mechanical limitations resulting from well and pipeline system operations. A North Dakota Petroleum Council (NDPC) Flaring Task Force identified securing landowner permissions as the biggest challenge in constructing gathering lines.

In the case of methane leakage, this occurs at a range of points throughout oil and natural gas infrastructure and challenges associated with permitting new pipeline facilities do not appear to be a barrier to emissions abatement. Chapter VII of the Quadrennial Energy Review (QER) discusses this issue and related policy recommendations in some detail. For more information regarding major sources of methane emissions from natural gas infrastructure, we recommend the EPA's Greenhouse Gas Emissions Inventory report, which was recently updated with 2013 data.

Q1b. Will DOE's Quadrennial Energy Review propose ways to streamline the federal permitting process to accelerate the modernization of our natural gas supply infrastructure?

A1b. Siting energy infrastructure in the U.S. is a complex, multi-jurisdictional, and multidimensional process, with no two projects facing the same set of issues. The QER discusses some of the barriers to timely and efficient siting and permitting of infrastructure, in addition to highlighting steps that this Administration has taken both across and within Federal agencies to reduce the aggregate permitting and review time for infrastructure projects, while improving environmental and community outcomes.

Chapter IX of the QER recommends the following steps for this Administration to work with Congress to further expedite infrastructure siting, improve communication and engagement among stakeholders, and modernize tools available to policymakers:

- i. Appropriate adequate resources to key Federal agencies involved in the siting, permitting, and review of infrastructure projects.

- ii. Prioritize meaningful public engagement through consultation with Indian Tribes, coordination with state and local governments, and facilitation of non-Federal partnerships to help reduce siting conflicts.
- iii. Expand landscape- and watershed-level mitigation and conservation planning so that agencies can locate mitigation activities in the most ecologically important areas.
- iv. Enact statutory authorities to improve coordination across agencies by authorizing and funding the Interagency Infrastructure Permitting Improvement Center in the Department of Transportation, as set forth in Section 1009 of the Administration's draft legislation: the GROW AMERICA Act.
- v. Adopt Administration proposals to authorize recovery of costs for review of project applications, consistent with the proposal in the President's FY 2016 Budget Request.

Furthermore, Chapter II of the QER recommends a substantial competitive grant program that would leverage state programs and private investments to help to accelerate the replacement of distribution pipelines that are constructed with leak-prone materials, to implement directed inspection and maintenance programs, and to implement other innovative approaches to distribution system upgrades. This would help to increase public safety, enhance natural gas deliverability and reduce emissions from the system.

- Q2. Your budget requests an increase of 83% for your Office of Electricity; a 42% increase for the Office of Efficiency and Renewables; a 16% increase for ARPA-E; and a 9% increase for the Office of Nuclear Energy. All increases. And yet the Office of Fossil Energy R&D is a net loser, with a decrease in funding, particularly coal funding.
- Q2a. You say DOE supports an all of the above energy strategy. Yet the budget request paints a very different picture. How do you reconcile what you and the President say publicly versus what's in your budget? The numbers don't lie.
- Q2b. Your budget requests nearly \$500 million for wind and solar programs but only \$34 million for advanced (non-CCS) coal technologies. That's a big difference. What is the basis for the disproportionate treatment?
- A2. Fossil energy is a critical component of the Department of Energy's (DOE) all-of-the-above energy strategy, and DOE's FY 2016 Budget Request reflects a commitment to

fossil energy as well as to wind and solar programs. The FY 2016 Request funds fossil energy research and development (R&D) at roughly the same level provided by Congress in FY 2015. In fact, the FY 2016 Request is \$85 million (+18 percent) above the FY 2015 Budget Request for fossil energy R&D. While the request for fossil energy R&D is roughly even with the FY 2015 enacted level, the budget includes significant increases in key technology areas like carbon capture, carbon storage, methane emissions mitigation, natural gas carbon capture, work under the Federal Multiagency Collaboration on Unconventional Oil and Gas Research, and supercritical CO₂ technologies.

In addition to the funding in the FY 2016 Request, the Department is also now receiving applications for an \$8 billion advanced fossil energy loan guarantee solicitation for projects that are innovative and reduce carbon emissions.

The budget for advanced coal technologies R&D at the National Energy Technology Laboratory (NETL) has gone down in the FY 2016 Request compared to the FY 2015 appropriation due to the completion of work on assessing and analyzing the feasibility of economically recovering rare elements from coal and coal byproduct streams such as fly ash, coal reuse, and aqueous effluent.

Expanded funding in the FY 2016 Request for energy efficiency, renewable energy, and advanced transportation R&D reflects the importance of continued investment to develop technologies that will enhance the competitiveness of our domestic industries in a rapidly-evolving global marketplace. These technologies are also critical to our long-term energy independence and our efforts to address climate change.

- Q3. The U.S. is currently the world's largest producer of natural gas and oil.
- Q3a. Would you agree that this new age of energy abundance will significantly benefit our global competitiveness, and allow the U.S. to position itself as a global energy superpower?
- A3a. Yes. Relatively low domestic natural gas prices increase the competitiveness of several U.S. industries: for example, the chemical and petroleum refining sectors. Increased domestic petroleum production helps improve our balance of payments since our offshore

oil expenditures are being sharply reduced. Increased U.S. oil production has also, over the last few years, replaced significant lost Middle Eastern and North African oil supplies keeping the world oil market relatively stable. More recently, in the fall of 2014, U.S. oil production caused a major correction in world oil prices that, which had been at historically high levels, resulting in significant savings to American consumers.

- 3b. Under your leadership, how will DOE facilitate this energy transition in a manner that takes full advantage of the nation's new energy abundance, including development of offshore resources?
- A3b. The QER discusses several opportunities to improve U.S. energy security as the U.S. is becoming a net energy exporter instead of a net energy importer. The management of offshore resources is the responsibility of the Department of Interior and, as such, we defer to the Department of Interior to articulate their plans to manage the development of the nation's offshore resources.
- Q4. A recent EIA report asserted that "The effect that a relaxation of current limitations on U.S. crude oil exports would have on U.S. gasoline prices would likely depend on its effect on international crude oil prices, such as Brent, rather than its effect on domestic crude prices."
- Q4a. Would increasing the global supply of oil, by lifting the crude oil export ban, bring Brent prices down?
- A4a. Exporting U.S. crude oil would, as shown by several independent studies, exert a very slight downward pressure on Brent crude prices. Other things equal, this would reduce the price of oil.
- Q4b. If Brent prices come down as a result of lifting the ban, is it your opinion that gasoline prices might also come down as well?
- A4b. Since domestic product prices are influenced by international crude prices, the slight downward pressure in Brent prices would have a similar impact on U.S. petroleum product prices (all other factors remaining the same).
- Q4c. Do you believe that lifting the ban on U.S. crude exports could strengthen U.S. energy security and support our allies?

A4c. The effect of eliminating the current crude oil export ban could have complex effects on U.S. energy security. While there could be advantages to domestic oil producers since domestic crude prices could increase, some U.S. refiners, particularly on the East Coast, might face smaller refining margins. Since the refining capacity in the East Coast has declined in the last several years by more than one-third, if there were additional refinery closures, the U.S. East Coast could become even more dependent on petroleum product imports. On the other hand, if crude oil export laws caused a large separation of domestic and international oil prices, U.S. crude oil production could be shut in, causing the U.S. to be more reliant on crude petroleum imports.

The effect of exporting U.S. crude oil on our allies would be relatively small since U.S. crude oil exports would cause a relatively small decrease of international oil prices compared to the increase of domestic crude prices. Growing U.S. oil production lowers the international price of oil by increasing global supply, regardless of whether U.S. crude oil is processed by domestic refineries or, with a lifting of oil export restrictions, by foreign refineries. Nonetheless, certain foreign refiners might benefit if lifting the U.S. crude oil export ban caused lower net U.S. petroleum product exports.

Q5. The FY 2016 DOE Budget Request includes substantial increases in the Electricity Delivery and Energy Reliability Program (increase of \$123 million), much of which is designed to better protect our electrical grid. One university in my district, Texas A&M University, a leader in grid security research and development, received ample feedback from industry about the need for such test beds. With so many research programs underway nationally in this area, does DOE plan to fund a large-scale test bed with heavy participation of the industry to examine the interconnected vulnerabilities of our grid?

A5. Dozens of test beds are located throughout the national laboratories, academia, and industry, as well as specialized environments that increase the detail and integrity of test scenarios. They are a mix of physical and virtual assets, operating independently of each other. DOE and other organizations, including the Electric Power Research Institute and National Institute of Standards and Technology, are considering techniques that allow the virtual connection of existing test bed capabilities. For example, renewable energy generation assets at National Renewable Energy Laboratory could feed realistic signatures and behavior to a control system test bed at Pacific Northwest National

Laboratory, and cybersecurity threats could be introduced to both systems under test from a third test bed resource in Texas.

- Q6. The DOE Budget proposes a substantial increase (+\$23 million, +146%) for a multi-program research effort on the Energy-Water Nexus. Such research has the potential to be very useful to Texas and other states with severe water scarcity issues. Please explain what specifically will be the research focus of this initiative and how DOE is coordinating its initiative with the Food-Energy-Water Nexus research in the National Science Foundation and USDA.
- A6. In June 2014, the Department released a report entitled *The Water-Energy Nexus: Challenges and Opportunities*, which established a framework and identified opportunities for the DOE to leverage its capabilities and infrastructure for the Nation's benefit in better characterizing coupled energy-water systems and improving their resiliency. This framework is the foundation for the FY 2016 proposal for coordinated investments to advance data, modeling and analysis; technology development; and policy analysis and stakeholder engagement.

This crosscut emphasizes a data, modeling, and analysis platform to further improve understanding and inform decision-making for a broad range of users. Largely funded through the Office of Science, the data, modeling and analysis focus is a means to understanding current energy system vulnerabilities while exploring complex systems dynamics for subsequent applications in planning the resilience, efficient, and competitive energy-water systems of the future. Efforts will advance foundational models, produce and analyze modeled output, and integrate data sets at spatial and temporal scales that matter to decision-makers at Federal, regional, state, and municipal levels and enable them to understand the interplay among energy, water, and other systems at various scales.

Moving forward, the platform will help DOE to target future technology R&D and technology assistance efforts to the greatest challenges and opportunities in improving resiliency of coupled energy-water systems.

Based on analysis completed thus far, the crosscut also strategically targets two areas of technology R&D:

- Treatment, Management, and Beneficial Use of Non-Traditional Waters in Energy Systems will advance treatment technologies for producing potable water through carbon capture and storage and develop technologies and management practices for hydraulic fracturing to reduce the volume of freshwater demand, produce less water that requires disposal, and recycle flowback water as alternatives to the use of 100 percent freshwater for oil and gas extraction.
- Sustainable Low Energy Water Utilities will pursue processes, technologies, and systems that increase energy efficiency and energy recovery for water and wastewater treatment. This will include both enhanced technical assistance and R&D in areas such as more energy efficient pre-treatment for anaerobic digestion processes, gasification, and pyrolysis; reductions in the energy intensity of denitrification, and more energy efficient biosolid to energy conversion processes.

The crosscut proposal also funds policy analysis, outreach, and stakeholder engagement to better target and leverage DOE investments in unique regional, state, and local contexts.

Both the National Science Foundation and U.S. Department of Agriculture are approaching the water-energy-food nexus more broadly in their FY 2016 Budget Requests. DOE's focused attention on the connections between energy and water technologies and systems is a unique contribution within the interagency. DOE has had numerous conversations with both agencies to explore collaboration in modeling, water treatment, cooling technologies, and other topics.

QUESTIONS FROM REPRESENTATIVE JERRY MCNERNEY

Q1. Is energy storage for intermittent power sources keeping up with the demand and use of these innovations? What is DOE doing in this area?

A1. The Energy Storage program in Department of Energy's (DOE) Office of Electricity Delivery and Energy Reliability (OE) has been in the forefront of research and development of the technology. Among the cost-shared projects funded through the 2009 American Recovery and Reinvestment Act (ARRA), DOE has been involved in major projects increasing grid resilience and improving renewable integration. For example, a 20 megawatt (MW) flywheel project in Pennsylvania showed that frequency regulation using energy storage is twice as effective as using fossil fuel generation. A 36MW facility in Texas, using advanced lead acid technology, showed effectiveness for wind smoothing. A 500 kilowatt (kW)/5 hour lead-carbon facility in Arizona provides smoothing and load shifting for 500kW of photovoltaic (PV) power generation. And in California, DOE cost shared an 8MW/4 hour lithium ion installation to help integration of the Tehachapi wind farm.

Through research at three national laboratories, DOE has developed innovative new storage technologies. For example: DOE work resulted in the development of a bench top redox flow battery with four times the power and operating at a 50 percent greater current density compared to FY 2013, resulting in a cost equivalent of \$400 per kWh for a projected 4-hour system. A polymer membrane developed at the Sandia National Laboratories for use in batteries is expected to be two orders of magnitudes less expensive than current technology. Other advanced technologies are being explored and developed towards commercialization.

A new initiative of the DOE program addresses deployment in different states. In Vermont a cost-shared project combining 4MW of storage with 2MW of PV is being completed. The system can be islanded in a microgrid to provide continuous power to a community shelter during emergencies. A similar project is under construction in Washington State; 3MW of storage using a technology developed at the Pacific Northwest National Laboratory (PNNL) is being deployed to strengthen the grid and

allow increased renewable integration. DOE is also aiding California and Hawaii utilities in developing the business cases of their mandated storage deployment.

In addition, DOE is leading an industry-wide safety initiative to develop codes, standards, and best business practices for the new industry. The DOE-sponsored Global Energy Storage Database contains over 1,200 entries and is one of the most used tools for the industry freely available on the internet. The DOE/Electric Power Research Institute (EPRI) Energy Storage Handbook is generally considered the state-of-the-art authority in the field.

To further leverage work done by various DOE offices on this issue, DOE has developed a crosscutting effort involving OE, the Office of Energy Efficiency and Renewable Energy (EERE), and the Office of Energy Policy and Systems Analysis called the Grid Modernization Initiative. EERE is working on energy storage across several offices including solar, vehicles, fuel cells, and wind and water power. Much of the work is focused on vehicles and behind-the-meter storage. EERE is also involved in pumped storage hydro and thermal energy storage combined with concentrating solar power.

In addition, OE activities are complemented by efforts from the Advanced Research Projects Agency-Energy (ARPA-E) and the Office of Science (SC). For example, ARPA-E has efforts in grid storage, such as the “Grid-Scale Rampable Intermittent Dispatchable Storage” (GRIDS) and “Agile Delivery of Electrical Power Technology” (ADEPT) programs. SC, through its Basic Energy Sciences program, supports a portfolio of fundamental research to provide scientific understanding of the physical and chemical phenomena underpinning the properties of batteries, fuel cells, and supercapacitors, including the Joint Center for Energy Storage Research. The Grid Energy Storage report further describes the roles each office plays in the energy storage field.

DOE activities in energy storage are outlined in the DOE Grid Energy Storage report available on the OE website¹ and well documented in numerous technical publications and frequent presentations at utility conferences. The DOE energy storage program is a leader in developing new cost effective storage technology and driving it to

¹ <http://energy.gov/oe/downloads/grid-energy-storage-december-2013>

commercialization, spearheading cost shared deployments to facilitate increased renewable penetration, and helping the industry to develop viable business cases.

- Q2. The DOE crosscut budget includes money for its Water-Energy Tech Team.
- Q2a. Do you believe there could be better coordination across federal agencies in addressing the energy-water nexus?
- i. Is there an opportunity for additional coordination with states on this effort?
- A2a. It is important to clarify that the DOE budget request is entirely within existing Congressional funding lines in the offices of Science, Energy Efficiency and Renewable Energy, Fossil Energy, Indian Energy, Energy Policy and Systems Analysis (EPSA), and International Affairs. DOE activities related to the energy-water nexus are coordinated through the Water-Energy Tech Team, but DOE offices retain final authority and accountability for how they spend their appropriated funds.

The Department released a report entitled *The Water-Energy Nexus: Challenges and Opportunities* in June 2014, which established a framework and identified opportunities for the DOE to leverage its capabilities and infrastructure for the Nation's benefit in better characterizing coupled energy-water systems and improving their resiliency. This report was closely coordinated with other federal agencies with interests in the energy-water nexus, and the framework presented in this report, which forms the basis of the DOE's FY 2016 Budget Request, has benefitted from substantial interagency input.

In addition, the National Science and Technology Council (NSTC) Subcommittee on Water Availability and Quality is an important forum for interagency exchange on water issues. DOE and other participants are coordinating on a food-energy-water nexus framework through the NSTC, and derivative interagency working groups exist around a variety of energy-water topics.

The energy-water nexus continues to emerge as an increasingly critical issue for the Nation and on the international stage, and there are always opportunities for improved coordination, not only within the Federal Government but also with other stakeholders.

Enhanced regional, state and local engagement is an important component of the DOE's FY 2016 Energy-Water Crosscut Budget Request.

Q2b. Should DOE take the lead federal role in the energy-water nexus effort?

A2b: DOE is uniquely positioned to tackle energy-water nexus challenges by leveraging its portfolio of research programs and national laboratory data modeling and analysis capabilities. There are several federal agencies with a strong role in water aspects of the energy-water nexus.

Q2c. Are there concrete milestones or accomplishments that DOE is working toward, or is the WETT team more in the early stages of pinpointing the issues?

A2c: The DOE's FY 2016 Budget Request emphasizes a data, modeling, and analysis platform to further improve understanding and inform decision-making for a broad range of users. Largely funded through the SC, the data, modeling and analysis focus is a means to understand current energy system vulnerabilities while exploring complex systems dynamics for subsequent applications in planning the resilience, efficient, and competitive energy-water systems of the future. Efforts will advance foundational models, produce and analyze modeled output, and integrate data sets at spatial and temporal scales that matter to decision-makers at Federal, regional, state, and municipal levels and enable them to understand the interplay among energy, water, and other systems at various scales.

Moving forward, the platform will help DOE to target future technology R&D and technology assistance efforts to the greatest challenges and opportunities in improving resiliency of coupled energy-water systems.

Based on analysis completed thus far, the crosscut also strategically targets two areas of technology R&D:

- Treatment, Management, and Beneficial Use of Non-Traditional Waters in Energy Systems will advance treatment technologies for producing potable water through carbon capture and storage and develop technologies and management practices for hydraulic fracturing to reduce the volume of

freshwater demand, produce less water that requires disposal, and recycle flowback water as alternatives to the use of 100 percent freshwater for oil and gas extraction.

- Sustainable Low Energy Water Utilities will pursue processes, technologies, and systems that increase energy efficiency and energy recovery for water and wastewater treatment. This will include both enhanced technical assistance and R&D in areas such as more energy efficient pre-treatment for anaerobic digestion processes, gasification, and pyrolysis; reductions in the energy intensity of denitrification, and more energy efficient biosolid to energy conversion processes.

Finally, the crosscut proposal funds policy analysis, outreach, and stakeholder engagement to better target and leverage DOE investments to unique regional, state, and local contexts.

As part of its stakeholder outreach and development of a data, modeling and analytical platform, the DOE will be working to identify milestones for federal investments and metrics to measure impact at various scales (regional, state and local).

- Q3. Do you believe additional funding is needed, both from an R&D and a systems analysis perspective in order to advance electric grid technological innovations as well as management approaches?
- A3. The FY 2016 Budget Request calls for significantly increased funding for grid technological innovations through advanced R&D, systems analysis, and support to states, enabling a solid integrated systems foundation for the future grid. R&D is needed in controlling, modeling, planning, sensing, and securing the future grid. Because it is an integrated system, concurrent advances in several areas are needed throughout the grid system.
- Q4. What can the Department do to translate all it has learned from the Smart Grid Investment Grants and Smart Grid Demonstration Projects into actionable information for electricity providers and state utility commissions?

A4. The Department's OE, through the Smart Grid Investment Grants (SGIG) and Smart Grid Demonstration Program (SGDP), partnered with electric utilities, equipment manufacturers, and others to help electricity providers and states make more informed decisions and accelerate grid modernization across the U.S. We are currently conducting analysis and producing reports and case studies on the costs and performance of smart grid technologies, and on consumer responses that are important for understanding business cases and reducing uncertainties about the cost-effectiveness of investments in various smart grid technologies and systems. Several states are using SGIG and SGDP project results as the foundation to expand grid modernization investments by introducing new business and regulatory models and incentives for achieving cost recovery and attracting capital.

DOE, through OE, is publishing case studies and reports that focus on grid impacts, benefits, and lessons learned by the utilities in four areas of interest to electric power industry stakeholders and decision makers: transmission systems and synchrophasor applications; distribution systems and distribution automation and automated controls for voltages and reactive power management; Advanced Metering Infrastructure (AMI) and improvements in operational efficiencies; and customer systems and responses to time-based rates, in-home displays, and programmable communicating thermostats. These reports and other materials are posted on the <http://www.smartgrid.gov> website, which is OE's focal point for sharing project results. As reports are published and other website materials are posted, updates and alerts are routinely sent to several thousand utility smart grid practitioners, state utility commissions, consumer advocates, and equipment manufacturers. Those interested can sign up for email updates when new information is posted at http://www.smartgrid.gov/email_alerts.

In addition to publishing and web-posting SGIG reports, we also communicate information on SGIG impacts, benefits, costs, and lessons learned with key stakeholders through major industry conferences, trade shows, meetings, workshops, and trade publications. We have also provided briefings to the National Association of Regulatory Utility Commissioners, National Association of State Energy Officials, Electric Power

Research Institute, American Public Power Association, National Rural Electric Cooperative Association, and other electric industry stakeholder groups.

Q5. What do you see as some of the top barriers to modernizing our electric grid for the 21st Century? What do you think a 21st century grid should look like?

A5. Change is needed in institutional regulations and business practices. This includes re-evaluating state and federal rules and operations that prevent full valuation of technologies and their impact on grid operations. Another barrier is the lack of uniform standards and interoperable systems. Devices like solar photovoltaics, electric vehicles, and building components need clear integration rules and costs. Other barriers to grid modernization include lack of understanding of the complexity of the distribution system as expectations for consumer engagement grow and new devices are connected. Technical solutions for two way power flow, cost-effective energy storage, solid state transformers and other technologies are lacking cost effective technology options for transmission, distribution and end use load integration.

The future grid must be sophisticated as increased flow of electricity and communications are utilized from transmission through distribution to consumer buildings and operations. That grid should predict operating parameters and self-heal, allow complex array of islanding for critical needs and control of outages or threats, have maximum flexibility, and provide a basic operating platform that states and regions could build on to meet local and state policy and consumer needs. The future grid needs to build on our legacy system without compromising safety, reliability, security, and affordability.

Q6. Can you please discuss how we can better engage stakeholders as we move forward in developing the electric “Grid of the Future” and developing the framework for a future grid that is “actionable” for local stakeholders, and undergo the transition between now and 2030 and beyond?

A6. There are a number of ways to not only engage stakeholders but allow active participation in grid modernization. Common terminology and understanding of grid principles is needed. DOE’s OE has had success in informing state regulators, energy constituents, consumers, and others on grid functionality in partnership with states. Credible information and analysis should be available to all, providing independent

verification of technology options and performance. Basis models for decision makers, as requested in the OE budget, would allow state and local entities to study options for their special circumstances and choices. Encouraging states to support training for students to advance into the energy field will create increased awareness throughout communities. Lastly, open access to information and facilitating discussions will promote informed decision-making.

Q7. Do you view the Interagency Rapid Response Transmission Team (RRTT), which aims to improve the quality and timeliness of transmission infrastructure permitting, a success?

A7. The Rapid Response Transmission Team (RRTT) is a pilot program and it is premature to declare whether it is a success. However, there are some highlights I'd like to mention. The RRTT has made several strides in improving the permitting process for transmission lines requiring multiple Federal authorizations. First and foremost, the RRTT established consistent points of contact at the headquarters level at each agency that can be called upon as issues arise with a particular project. The RRTT holds regular calls with the sponsors of the remaining RRTT pilot projects to identify and find resolution to emerging issues. Second, the RRTT, pursuant to a June 7, 2013 Presidential Memorandum, developed a draft Integrated, Interagency Pre-Application (IIP) process for transmission line projects that would be utilized prior to the formal application phase and requested comments on it via the Federal Register. DOE analyzed the comments received in response to the request for information (78 FR 168; August 29, 2013) and shared its analysis with the RRTT agencies, as well as DOE's proposed modifications to the draft IIP process based on that comments analysis. Shortly thereafter, DOE staff developed draft regulatory language to implement the IIP process as modified. DOE in coordination with the Council on Environmental Quality (CEQ) requested interagency comments from the RRTT on DOE's proposed regulatory language for implementing the IIP in the fall of 2014. DOE is currently reviewing and addressing these interagency comments. Following this comment resolution, DOE intends to finalize its regulatory language to implement the IIP process and issue a Notice of Proposed Rulemaking using its authority in section 216(h) of the Federal Power Act that would formally implement the IIP process in Summer 2015. If implemented, DOE would act as the lead agency to coordinate all

activities for the other agencies during the IIP process for transmission line projects requiring multiple authorizations.

DOE is currently piloting elements of the IIP while reviewing the Presidential permit application for Minnesota Power's proposed Great Northern Transmission Line (GNTL) project, a 500kV transmission line that would run from Manitoba to the Mesabi Iron Range in northern Minnesota. The GNTL project is a 220-mile, 500kV high-voltage alternating current, overhead transmission line that has an agreed-upon 18-month environmental review schedule. This review is a combined Federal-state environmental analysis (and environmental impact statement) with the involvement of a number of Federal and state agencies. It is intended to identify inefficiencies in the review process and capitalize on early information sharing.

Finally, the RRTT has identified institutional changes that could be made to improve the permitting process in transmission, and perhaps other areas of major infrastructure. These include early pre-application interagency coordination activities and developing a clear escalation process when issues that threaten to stall the review and permitting process cannot be resolved at the staff level between agencies.

The RRTT has a clear responsibility in identifying and exploring lessons learned from the pilot projects as they progress and reviews are completed.

Q7a. Please provide how many projects the RRTT team has worked on and the average timelines for completion.

A7a. As part of the RRTT, DOE tracks and coordinates schedule information with the Federal agencies designated as "lead" under the National Environmental Policy Act (NEPA). Shortly after its creation in 2009, the RRTT selected eight pilot projects to identify challenges and efficiencies in inter-agency coordination that could improve early information sharing and review efforts for transmission projects requiring multiple Federal authorizations. Environmental review and permitting efforts for each RRTT pilot project is coordinated by the Federal NEPA lead agency.

One project was withdrawn by the sponsor, and four of the seven remaining projects have completed the NEPA process. Of these, two are under construction: the Susquehanna to Roseland project is anticipated to be in-service by June 2015 and the CapX2020 Hampton-Lacrosse project is targeted for service in 2016. The Sunzia Southwest Transmission Project concluded the NEPA review and is in the process of obtaining state permits. NEPA review for segments one through seven and ten of the Gateway West project was completed in 2013. On a separate track, NEPA is being conducted on the remaining segments eight and nine.

Three projects are at various stages of the NEPA process, having experienced project sponsor delays and permitting difficulties.

Q8. Can deployment of smart grid technologies and practices make our grid more resilient and adaptive with respect to extreme weather events?

A8. Deploying smart grid technologies will substantially help grid resilience and adaptability. We saw the important role microgrids played in resiliency during Superstorm Sandy in October 2012, when a hospital, university, and building facility (South Oaks Hospital in Long Island, New York University in NYC, and the Brevoort, an apartment high-rise building in Manhattan) equipped with microgrids were able to provide essential power to critical loads during week-long grid outages. Other cases are documented in a November 2014 DOE report, titled “Smart grid investments improve grid reliability, resilience, and storm responses.”² Among improvements in utility storm responses, deployment of automated feeder switches—a smart grid technology—by Electric Power Board in Chattanooga, Tennessee reduced total restoration time by up to 17 hours and prevented power loss or instantly restored power to 40,000 customers following a July 2012 storm. And, even having smart meters deployed to only 10 percent of customers helped PECO, headquartered in Philadelphia, Pennsylvania, reduce service restoration times by two to three days following Superstorm Sandy. Other smart grid technologies and practices are being transitioned to local and tribal governments for implementation in their

² <http://energy.gov/oe/downloads/smart-grid-investments-improve-grid-reliability-resilience-and-storm-responses-november>

communities to improve climate preparedness and resiliency of the electricity delivery infrastructure (REDI).

Q8a. Is this something that DOE is looking at?

A8a. Yes, these examples involve partnerships between DOE and utilities, industries, and state and local governments.

Q9. What does DOE need to do to improve the department's systems approach to energy policy analysis? What has been lacking in this area to date?

A9. The DOE has made great strides in improving its systems approach to energy policy. In October 2013, the Department created the Office of Energy Policy and Systems Analysis (EPSA) bringing key policy staff from program offices, such as EERE, FE, OE, and CFO offices into the new policy office. This helped to consolidate and streamline the energy policy process within the department and created an office dedicated to integrated analysis of energy systems.

In addition to the day-to-day policy analysis that EPSA performs, the office served as the secretariat to the recently-released multi-agency QER. The first installment of the QER is the first-ever review focusing on energy infrastructure and identifies the threats, risks, and opportunities for U.S. energy and climate security, enabling the federal government to translate policy goals into a set of integrated actions.

Q10. Do you judge the Smart Grid Investment Grant Program to have been a success? In what way?

A10. The purpose of the Smart Grid Investment Grant (SGIG) program was to help modernize the electric grid through the deployment of smart grid technologies and systems to increase the flexibility, reliability, efficiency, and resilience of the Nation's electric grid. The program has been very successful in achieving these goals. Benefits from the SGIG program include:

- Reductions in peak and overall electricity demand;
- Reductions in operation costs;

- Improvements in asset management;
- Improvements in outage management and reliability;
- Improvements in system efficiency; and
- Reductions in environmental emissions.

Through SGIG, the Department and the electricity industry jointly invested more than \$7.9 billion in 99 cost-shared smart grid projects across the U.S. since 2009. More than 228 electric utilities and other organizations participated in the SGIG program.

With technology deployments under SGIG nearly complete, utilities are now reporting data on the impacts of the grid modernization technologies and systems. Data and results on technology performance are showing measureable benefits and cost savings that meet or exceed the program goals. Some of these results include:

- Improvements in distribution system reliability of up to 50 percent for select feeder groups;
- Reductions in peak demand of more than 30 percent for customers participating in time-based rate programs;
- Reductions in operational costs of up to 50 percent for system wide deployment of smart meters;
- Improvements in distribution system efficiency by approximately 3 percent for targeted feeder groups employing conservation voltage reduction techniques during summer reporting periods;
- A more efficient system, and lower operating costs keep costs down for consumers;
- Reductions in the frequency and duration of power outages from investments in distribution automation and advanced metering infrastructure;
- Reductions in power outages means a more reliable electric system for customers resulting in fewer and shorter outages; and
- More advanced technologies and increased information allow customers to become more educated and proactive in how and when they use electricity.

As SGIG nears completion³, the program has modernized about 6,500 distribution feeder lines with more than 9,000 automated feeder switches and 11,000 automated capacitors. SGIG-funded transmission and distribution automation projects give operators greater flexibility to improve reliability—resulting in less frequent and shorter duration of customer outages. Techniques include equipment health monitoring, automated feeder switching, and fault location, isolation, and service restoration.

SGIG advanced metering infrastructure (AMI) investments include more than 16.3 million smart meter installations, about a quarter of all smart meters nationwide. By the end of this year, about 65 million of the Nation’s 144 million electricity meters will have been replaced by smart meters. A large number of the AMI projects also involve deployments of customer systems to provide information to customers (such as critical peak prices or notification of critical peak events) so that they can take actions to reduce or shift their consumption of electricity from peak to off-peak periods.

Under SGIG, more than 400,000 utility customers now have load control devices to manage energy use in specific appliances, more than 250,000 have programmable communicating thermostats that adjust thermostat set points, and more than 10,000 have in-home displays that display real-time information on energy use and costs. SGIG projects have shown that combining customer technologies with time-based rate programs such as critical peak pricing can reduce peak demand by more than 30 percent.

The SGIG synchrophasor projects include about 1,360 synchrophasor installations, and these have been augmented by hundreds of additional synchrophasors using only private funds. Thanks to the American Recovery and Reinvestment Act (AARA), North American utilities have seen more than a 10-fold increase in the number of installed, networked synchrophasors. Utilities are using synchrophasor data to improve transmission grid operations, respond quicker to system disturbances, mitigate outages and improve engineering and planning models.

³ A progress report for SGIG was published in 2013 at https://www.smartgrid.gov/sites/default/files/doc/files/SGIG_progress_report_2013.pdf, and updated information is available through <https://www.smartgrid.gov>.”

Additionally, DOE's requirement of cybersecurity plans for SGIG and Smart Grid Demonstration Program (SGDP) projects has motivated utilities to be more proactive with their cybersecurity programs. Utilities have told DOE that the SGIG and SGDP cybersecurity requirements have set the foundation for a more robust response to ensuring proper protections are in place.

Q10a. If you were to receive more funds to use in that program, what would you do differently, if at all, from the last grants you made with funds from ARRA?

A10a. The AARA smart grid projects answered many questions about costs and benefits of investments in smart grid technologies, tools, and techniques and how these accrue to utilities, consumers, and society as a whole. However, many new technical challenges were identified in areas such as systems integration, interoperability, addressing big data, distributed energy resources (DER) integration, microgrids-grid interaction, and needs for advanced solid-state devices based on new materials for power electronics.

The FY 2016 Budget Request supports work to begin to address these challenges and improvements to reliability, system efficiency, cybersecurity, and resilience. In Smart Grid Research and Development, the Advanced Distribution Management Systems effort incorporates systems integration and big data, DER integration is addressed in the Market-Based Controls effort, and microgrid-grid interaction is a part of our larger microgrids effort. The Transformer Resilience and Advanced Components (TRAC) program builds on prior seeded efforts in power electronics and increases the focus on integration of advanced solid-state devices into next-generation grid components.

QUESTION FROM REPRESENTATIVE MIKE DOYLE

Q1. This April will mark two years since the sniper attack on the Metcalf Transmission Substation in California. As you recall, 17 electrical transformers were significantly damaged when unidentified assailants shot over 200 rounds into the utility's power station. Although power was rerouted to avoid a blackout, the shooting occurred for 19 minutes. Upon review, records indicate a significant lapse in time occurred between when the communications system was cut, the physical attack occurred and the police were notified. Do you agree that we should move toward a more integrated approach to security as opposed to looking in the silos of cyber, physical, etc. Do you agree that an integrated approach to security and information sharing, where the information technology, operations technology and physical security efforts are aggregated in real time and systematically shared for a holistic approach to help mitigate threats and/or attacks on the bulk electric system?

A1. I agree we need an integrated and blended approach to security. Looking at things from a cyber-only or a physical-only perspective allows critical pathways to be missed. To address this concern, the Department of Energy and the Electricity Sector Information Sharing and Analysis Center (ES-ISAC) have implemented an integrated information sharing approach through regular electronic communications and during internal secure video teleconferences that occur once a month.

We also serve on the ES-ISAC physical security working group and have, in coordination with our national laboratories, been active in the discussion around best practices, technology, and vulnerability/threat assessments based on a blended approach to security across the entire energy sector.

COMMITTEE: HOUSE ENERGY AND COMMERCE,
SUBCOMMITTEE ON ENERGY AND POWER

HEARING DATE: FEBRUARY 11, 2015

WITNESS: ERNEST MONIZ
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Under Section 202(c) of the Federal Power Act (FPA) (16 U.S.C. § 824a(c)), upon determination that an emergency exists by reason of a sudden increase in the demand for electric energy, or a shortage of electric energy or of facilities for the generation or transmission of electric energy, the Secretary of Energy may require by order temporary connection of facilities and such generation, delivery, interchange, or transmission of electricity as will best meet the emergency and serve the public interest. The Department of Energy (DOE) views the issuance of 202(c) orders as a measure of last resort to be used only during or in the face of imminent emergencies. Historically, such orders have been issued sparingly; they have been exercised for only six events since DOE was formed in 1977.

Section 202(c) orders are not intended to provide a long-term alternative to environmental compliance. Pursuant to applicable DOE regulations, orders issued under FPA Section 202(c) are available only in emergency situations and are temporary solutions to imminent reliability threats. Actions issued under this authority are envisioned as meeting a specific situation. Potential reliability issues are verified by DOE before an order is issued, with appropriate conditions. While extended periods of

insufficient power supply as a result of inadequate planning or the failure to construct necessary facilities may also constitute an emergency under this authority, in such cases, the affected entity is expected to take the necessary steps to resolve the problem to avoid the need for a continuing emergency order. The duration of issued orders range from a few days to a few months, generally. On some occasions, when necessary, orders may be extended when the emergency is not yet resolved at the expiration of the previous order. Entities subject to a 202(c) emergency order will be required to operate in compliance with all other applicable laws to the extent possible. In the case of the Potrero Power Plant Order that DOE issued in 2000 (extended and issued a second time in January 2001), it is our understanding that the Potrero operation violations occurred more than three months after the DOE 202(c) emergency order expired. Therefore, the proposed bill would not have been applicable unless the affected generator could demonstrate the violations were caused by compliance with the 202(c) order.

Under circumstances of potential statutory conflicts, it is the responsibility of the executive branch to administer all statutes in a manner that carefully balances any conflicts that may arise. As demonstrated by the issuance of the Potomac River Generating Station Order in 2005 (extended into 2007) under Section 202(c), DOE recognizes the importance of working closely with environmental authorities to both address the electricity emergency and achieve environmental protection. DOE, in consultation with the Environmental Protection Agency (EPA) and the Virginia Department of Environmental Quality, crafted the terms of the final 202(c) order to ensure environmental compliance while achieving the necessary reliability standards.

Specifically, DOE modified the terms of its final order to align with the terms of the EPA's Administrative Consent Order, which provided that, during a situation in which the Potomac River Generating Station was required to run due to outages of other facilities, Mirant Corporation would operate the station to produce only the amount of power needed to meet the load demand as directed by PJM Interconnection, L.L.C. and that Mirant would take all reasonable steps to limit the emissions of PM-10 (particulate matter), nitrogen oxides, and sulfur dioxide from each boiler. This approach is a valuable example and will be a model to follow should similar situations arise in the future.

Regarding the proposed changes to Section 202(c) of the Federal Power Act, Assistant Secretary Patricia Hoffman testified at your May 9, 2012 hearing on H.R. 4273, the Resolving Environmental and Grid Reliability Conflicts Act. At that time, the Administration had not taken a position on the bill and, to date, there is no Administration position on H.R. 4273; however, Assistant Secretary Hoffman noted some concerns. As written, we still have those concerns. Electricity generation owners must start planning and working with their grid operators and the EPA at an early stage to identify and resolve any reliability issue arising in connection with EPA rules. DOE anticipates most if not all generators are engaged with the regional electric reliability organizations to anticipate and address reliability issues that may emerge. As proposed, the amendment to FPA Section 202(c) could lead some electricity generators to ignore the flexibility that EPA provides in its power sector regulations. DOE's 202(c) emergency authority is one of last resort and should not be viewed as an alternative to

working with EPA on achieving environmental compliance and with grid operators on any potential reliability issues.

The Administration endeavors to ensure that statutory authorities enable both the reliable operation of the electricity system and environmental protection. When tensions arise between those goals in emergency situations, DOE will work with the environmental authorities and affected owners/operators to resolve conflicts to ensure reliability is met and the public interest is served when exercising its 202(c) authority.

COMMITTEE: HOUSE ENERGY AND COMMERCE,
SUBCOMMITTEE ON ENERGY AND POWER

HEARING DATE: FEBRUARY 11, 2015

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Molybdenum-99

Yes. Beginning in 2009, the Department of Energy's National Nuclear Security Administration (DOE/NNSA) entered into cooperative agreements with domestic commercial entities to accelerate the development of a diverse set of technical pathways to produce molybdenum-99 (Mo-99) in the United States without the use of highly enriched uranium (HEU). DOE/NNSA is currently focusing on developing three diverse production pathways with two commercial entities.⁹ The projects are with (1) NorthStar Medical Radioisotopes (neutron capture technology and accelerator technology), and (2) SHINE Medical Technologies (accelerator with low enriched uranium (LEU) fission technology).

The NorthStar neutron capture project is currently scheduled to begin production in October 2016, pending approval of the RadioGenix™ Technetium-99m generator by the U.S. Food and Drug Administration. The NorthStar accelerator project is currently scheduled to begin production in October 2017, assuming the project receives full commercial funding.

⁹ DOE/NNSA also previously entered into cooperative agreements with Babcock & Wilcox to develop low enriched uranium solution reactor technology and General Electric-Hitachi to develop neutron capture technology. Both companies made the business decision to halt progress on the projects due to economic conditions of the Mo-99 marketplace; these projects are currently inactive.

SHINE's baseline schedule indicated that an accelerator-driven aqueous LEU-based system could be developed, built, and licensed to begin commercial production in 2016. This schedule was based on a number of underlying assumptions which have since changed, including the ease of SHINE securing matching funding, thereby impacting the baseline. The current schedule to production is June 2018, assuming the project receives full commercial funding.

The Department of Energy/National Nuclear Security Administration fully expects production of domestic Mo-99 without the use of highly enriched uranium (HEU) to begin before 2018. The biggest risk to meeting this date is the ability of the projects to receive full commercial funding since the cooperative agreements are implemented under a 50 percent - 50 percent cost-share arrangement, consistent with Section 3173(a)(1)(C) of the American Medical Isotopes Production Act of 2012, part of the National Defense Authorization Act for Fiscal Year 2013, and are currently limited to a total of \$25 million of Government funding each. Beyond the Government funding provided under the cooperative agreements, all costs necessary to execute each project are the responsibility of the commercial entity. Therefore, our partners could suffer delays if they do not receive sufficient commercial capital investments.

The world's largest producer, located in Canada, is expected to cease regular production of molybdenum-99 (Mo-99) in October 2016. To mitigate the risk of a Mo-99 shortage in the 2017-2018 timeframe, the Government of Canada issued an announcement on February 6, 2015, confirming that the National Research Universal (NRU) reactor will

cease regular Mo-99 production in October 2016, and will seek regulatory approval to keep the NRU operational until March 31, 2018, for its other scientific missions, and to produce Mo-99 in emergency conditions where shortages cannot be mitigated by any other means. While Canada maintains that new, replacement capacity is necessary to ensure long-term reliability of supply, emergency production from Canada is expected to be a last-resort option to ensure patient needs can be met and the global medical community will not suffer shortages of this important medical isotope.

COMMITTEE: HOUSE ENERGY AND COMMERCE,
SUBCOMMITTEE AND ENERGY AND POWER

HEARING DATE: FEBRUARY 11, 2015

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On September 11, 2013, DOE issued a conditional order granting Dominion Cove Point LNG, LP (DCP) authorization to export liquefied natural gas (LNG) to countries with which the United States does not have a free trade agreement (non-FTA). Separately, the Federal Energy Regulatory Commission (FERC) is reviewing the proposal to construct and operate the facilities that will be used to support the proposed exports in FERC Docket No. CP13-113. DOE's order is conditioned on DCP's satisfactory completion of the environmental review process under the National Environmental Policy Act (NEPA) in the FERC docket. DOE will issue a final order after FERC issues its order. FERC's approval of the facilities is now before the Commission on requests for rehearing.