ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR 2017

HEARINGS

BEFORE A

SUBCOMMITTEE OF THE

COMMITTEE ON APPROPRIATIONS

HOUSE OF REPRESENTATIVES

ONE HUNDRED FOURTEENTH CONGRESS

SECOND SESSION

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PART 7

DEPARTMENT OF ENERGY

Secretary of Energy

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ENERGY AND WATER DEVELOPMENT, AND RELATED AGENCIES APPROPRIATIONS FOR 2017

TUESDAY, MARCH 1, 2016.

DEPARTMENT OF ENERGY

WITNESS

HON. ERNEST MONIZ, SECRETARY, DEPARTMENT OF ENERGY

Mr. SIMPSON. The hearing will come to order. We have a lot to discuss today, so I will keep my remarks brief. The President's budget proposes numerous spending gimmicks to avoid the discretionary budget caps established by the Bipartisan Budget Act. I think it is unlikely that any of these gimmicks can be enacted. While, in some cases, that is fine, since the funding proposed is for the Presidential initiatives of an administration in its final year; in other cases, important activities will be drastically curtailed and hundreds of jobs could be lost if this committee does not budget for these funding needs.

Equally disappointing is that, even with the $747 million increase in your budget request, the budget funds administration priorities at the expense of nuclear and fossil energy—accounts that can help secure our Nation's energy security both now and in the future. And while the Mission Innovation initiative claims to advance all clean energy solutions, even the most casual review of the budget indicates that the new funding is intended almost entirety for EERE.

We will need to use the hearing process to conduct careful review of the entire request so that we can construct a budget that provides a true "all-of-the-above" strategy.

Secretary Moniz, I look forward to your testimony today and further discussions on all of these items. Please ensure that the hearing record questions for the record and any supporting information requested by the subcommittee is delivered in final form to us no later than 4 weeks from the time that you receive them.

Members who have additional questions for the record will have until close of business Thursday to provide them to the subcommittee office.

Mrs. Lowey.

Mrs. LOWEY. I guess Mr. Rogers is on his way? Thank you.

Mr. SIMPSON. Mr. Rogers is on his way, and Ms. Kaptur is on her way also.

Mrs. LOWEY. Well, thank you very much, Mr. Chair.

And welcome. It is really a pleasure, Secretary Moniz. I thank you for coming before this subcommittee.

The Department of Energy plays a critical role in America's national security and economic prosperity. Its focus on research, development, deployment of clean energy, efficient technologies makes the Department a leader in scientific innovation, job growth, and the battle against climate change.

Mr. Secretary, your budget request for $30.2 billion in discretionary spending, an increase of $747 million from the fiscal year 2016 enacted level would fund robust investments in major initiatives that provide the foundation for the domestic energy revolution in our Nation and help better prepare for our future energy needs.

It is critical we take real steps to address climate change. The science is conclusive: human activity is contributing to a change in the world's climatic patterns. And, unfortunately, those who still doubt the science refuse to act to prevent further damage to our global ecosystems and environment.

Investing in clean energy saves money down the line by mitigating the impact climate change will have on our Nation and the world. That is why the Department of Energy's focus on clean energy, including carbon capture technology, is so important.

Additionally, I appreciate your efforts during the negotiations of the Joint Comprehensive Plan of Action with Iran, and I know we agree that Iran must never be permitted to develop nuclear weapons. Today, I look forward to hearing your assessment of Iran's compliance to date, the IAEA's verification safeguards, and inspectors' access to key sites throughout Iran.

Lastly, as domestic energy production has steadily increased, so has the frequency of trains carrying crude oil through communities in my district. Everyday, upwards of 80 rail tank cars carry highly volatile Bakken crude oil through Rockland County, New York, endangering homes, schools, and businesses near the tracks. While progress is being made on the safe transport of crude oil, we need to act faster to guarantee the security of Americans who live near America's extensive railways. I look forward to hearing about the progress Department of Energy has made in studying the characteristics of crude oil and methods to reduce volatility prior to and during shipment.

Mr. Secretary, I thank you for your service and look forward to your testimony.

And I thank you, Mr. Chairman.

Mr. SIMPSON. Thank you.

And when Chairman Rogers and Ms. Kaptur arrive, we will allow them to make their opening statements.

Mr. Moniz, Secretary, go ahead.

Opening Statement
Chairman Simpson
Hearing on the Department of Energy's
Fiscal Year 2017 Budget Request
March 1, 2016

The hearing will come to order.

Secretary Moniz, it's good to see you again, and welcome back.

We have a lot to discuss today so I will keep my remarks brief.

The President's budget proposes numerous spending gimmicks to avoid the discretionary budget caps established by the Bipartisan Budget Act. I think it is unlikely that any of these gimmicks can be enacted. While in some cases, that is fine, since the funding is proposed for Presidential initiatives of an administration in its final year; in other cases, important activities will be drastically curtailed and hundreds of jobs could be lost if this Committee does not budget for these funding needs.

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energy security both now and in the future. And while the Mission Innovation initiative claims to advance all clean energy solutions, even the most casual review of the budget indicates that the new funding is intended almost entirely for EERE.

We will need to use the hearing process to conduct a careful review of this entire request so that we can construct a bill that provides a true "all of the above" strategy.

Secretary Moniz, I look forward to your testimony today and further discussion on all of these issues.

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With that, I will turn to my Ranking Member, Ms. Kaptur, for her opening statement.

Secretary MONIZ. Thank you, Mr. Chairman, Ranking Member Lowey, and members of the committee. I appreciate the opportunity to talk here with you today about the DOE fiscal year 2017 budget proposal. The request totals $32.5 billion, an increase of $2.9 billion, or 10 percent, from the fiscal year 2016 appropriations. But, unlike previous budgets, the fiscal year 2017 budget has three major components.

First, a request for annual appropriations totaling $30.2 billion, an increase of 2 percent above the fiscal year 2016 enacted appropriation. And I note that both the national security appropriations request and the total domestic appropriations request would each be a 2-percent increase in appropriated funds. It is supplemented by a request totaling $2.3 billion in new mandatory spending. These requests are under the jurisdiction of the authorizing committees but are integral to our appropriations funding. It includes $750 million for R&D and $674 million for uranium enrichment D&D, to which we will return.

Turning to the major mission areas, the first going to the science and clean energy mission. This totals $11.3 billion in appropriations funding; $1.6 in the new mandatory. The fundamental driver for the science and energy budget is Mission Innovation, for the increase. I will return to this initiative in more detail in a moment.

Second mission area, ensuring nuclear security, the fiscal year 2017 budget includes $12.9 billion for NNSA, a 3-percent increase with three broad programmatic objectives: maintaining a safe, secure, and effective nuclear weapons deterrent without nuclear testing now and well into the future; reducing the threat of nuclear proliferation, including support for implementation of the Joint Comprehensive Plan of Action, referred to by the ranking member, and proposing a major shift in our plutonium disposition strategy; and, third, supporting the safe and reliable operation of our nuclear Navy.

Our third major mission area, organizing, managing, and modernizing the Department to better achieve its enduring missions, the fiscal year 2017 request provides for $6.8 billion for these activities, including $6.1 billion for the Office of Environmental Management, $300 million above the fiscal year 2015 enacted and fiscal year 2016 request levels, but roughly $100 million below the fiscal year 2016 enacted level.

The $6.1 billion budget includes $5.45 billion in new appropriations and a proposal to authorize $674 million in new mandatory spending authority from the USEC fund. The $1.6 billion USEC fund is an existing—not new—mandatory spending account, and our proposal is in keeping with the spirit of the current authorization that revenues from the beneficiaries of past uranium enrichment services, rather than taxpayers at large, be used to pay the cost of D&D of the now shuttered facilities. The USEC fund is one of three Federal funds totaling nearly $5 billion that can be used in this manner.

Finally, I want to acknowledge that underpinning all of these priorities is stewardship of the Department as a science and technology powerhouse for our Nation with an unparalleled network of 17 national laboratories harnessing innovation to successfully address national security, boost manufacturing competitiveness, miti-

gate and adapt to climate change, and enhance energy security. We are working hard to strengthen these strategic relationships between the Department and our national laboratory network.

I also want to highlight the crosscutting R&D initiatives in the budget. Among these, our largest increase is for grid and modernization, which we increase by $83 million to $378. As part of this initiative, the Grid Modernization Lab Consortium will accelerate the pace of innovation in this area. Our second largest crosscut increase is for the energy and water nexus initiative, which we increase by $68 million to $96 million.

The supporting budget details for each of these areas are provided in a 40-page statement for the record that previously had been submitted to the committee, and I request that it be inserted into the record.

Mr. SIMPSON. Without objection.

[The information follows:]

Secretary MONIZ. Thank you.

Now, turning to our Mission Innovation and why we believe it certainly merits the support of this committee and the Congress, within the total science and energy budget, we have identified the subset of clean energy research and development described as Mission Innovation. The fiscal year 2017 budget includes $5.86 billion in appropriations funding, an increase of 21 percent for clean energy R&D activities that support the U.S. Mission Innovation pledge, and that pledge made with 19 other countries is to seek to double public support for clean energy research and development over a 5-year period. The Mission Innovation countries represent over 80 percent of global government investment in clean energy R&D, so this is leveraging a major investment, increase in investment, in energy technology innovation.

We believe Mission Innovation is long overdue. In 2010, the American Energy Innovation Council, comprised of CEOs from multiple U.S. business sectors, recommended that the government triple its investment in clean energy R&D. The council made three key points, and I will quote: "First, innovation is the essence of America's strength. It has been our Nation's economic engine for centuries. Second, public investment is critical to generating the discoveries and inventions that form the basis of disruptive energy technologies. Private companies cannot capture the full economywide value of new knowledge and, thus, systematically underinvestment in research and development relative to the benefits it produces. And, third, the costs of RD&D are tiny compared with the benefits. But today's investments are simply too small. They will not offer an expanded range of economic security and environmental options in the future."

That concludes the statements from the AEIC.

Now, the pledge to seek to double the level of government investment over 5 years is ambitious but needed. Bill Gates, who was a leader of the AEIC, has recently met with a number of Members of Congress and has reiterated publicly the need for greatly increased government-sponsored energy R&D. The objective of Mission Innovation is to greatly expand the suite of investable opportunities in clean energy technologies needed to support economic growth and competitiveness; strengthen energy security; increase

access to clean, affordable energy; and enable the global community to meet environmental goals.

The scope of Mission Innovation spans the entire innovation cycle from the earliest stage of invention through initial demonstration with an emphasis on growth in early stage R&D. Mission Innovation also includes all clean technologies, renewables, energy efficiency, nuclear and coal, with carbon capture. Mission Innovation is complemented by the Breakthrough Energy Coalition, an independent initiative launched simultaneously with Mission Innovation. The coalition is spearheaded by Bill Gates and includes 28 investors from 10 countries, another major leveraging opportunity. The coalition is committed to providing investment in new technologies originating from the innovation pipelines in the Mission Innovation countries with the intent of taking these opportunities from early stage R&D through ultimate market deployment. These investors are committed to higher risk tolerance and patience for returns on their capital than compared to normal investors, usual investments, but also combined with a willingness to take the most promising innovations all the way past the finish line to deployment.

The fiscal year 2017 budget proposal of $5.8 billion represents a 21-percent increase, as I said earlier, above fiscal year 2016, a critical first step in a 5-year doubling pathway. This increase will support, again, a broad-based portfolio of new initiatives and expanding existing across all DOE science and energy technology program offices and spanning six separate appropriation accounts under the subcommittee.

In particular, I want to single out the fiscal year 2017 budget proposal for $110 million to establish Regional Clean Energy Innovation Partnerships. We propose to establish up to 10 regional partnerships as not-for-profit consortia competitively selected to manage regional clean energy R&D programs focused on the energy needs, policies, resources, and markets of the individual regions. The program design and portfolio composition for each partnership will be based on regional priorities. As research portfolio managers, not performers, the partnerships will connect resources and capabilities across universities, industry innovators, investors, and other regional leaders to accelerate the innovation process within each region.

This approach tracks recommendations from the National Research Council's "Rising to the Challenge," which noted that, quote: "Until very recently, U.S. Federal agencies have done little to support State and regional innovation cluster initiatives. This is not the case abroad. Clusters have been embraced globally as effective vehicles for mobilizing and coordinating public and private activities to spur economic growth" end of quote.

To address these growing global challenges and enhance the competitiveness of local and regional economies in our country, the NRC recommended that regional innovation cluster initiatives by State and local organizations should be assessed and, where appropriate, provided with greater funding and expanded geographically, and that is what we are proposing.

The fiscal year 2017 budget also supports increased investments in successful ongoing innovation programs, including initiatives

with the national laboratories supported in previously appropriations acts. These include: ARPA–E, Energy Frontier Research Centers, advanced manufacturing centers, bioenergy centers, advanced transportation technologies, advanced nuclear reactor technologies, and next-generation carbon capture technologies, to name a few.

Finally, I would just highlight the overall budget for the DOE Office of Science, which is the largest Federal sponsor of basic research in the physical sciences and a major driver of discovery science, supporting more than 24,000 investigators and over 300 U.S. academic institutions and our laboratories. The fiscal year 2017 budget provides $5.67 billion for science, an increase of $325 million, or 6 percent; $5.57 billion is requested as appropriations funding, and $100 million is proposed as new mandatory spending authority to support a competitive grant program for university researchers that can open up new directions for the Office of Science. Some of the use-inspired research programs within the Office of Science, like EFRCs, are counted in the Mission Innovation pledge.

That concludes my summary. Thank you for your patience. And, in closing, I want to thank the subcommittee, again, for its interest and its support, and I look forward to our discussion. Thank you.

[The information follows:]

Testimony of Secretary Ernest Moniz
U.S. Department of Energy
Before the
U.S. House Committee on Appropriations
Energy and Water Development Subcommittee
March 1, 2016

Chairmen Rogers and Simpson, Ranking Members Lowey and Kaptur, and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the Department of Energy's (DOE) Budget Request for fiscal year (FY) 2017. I appreciate the opportunity to discuss how the Budget Request advances the Department of Energy's missions.

Advancing Nuclear Security, Science & Energy, and Environmental Cleanup

The Department of Energy requests $32.5 billion for FY 2017, an increase of $2.9 billion from the FY 2016 enacted level of $29.6 billion. The FY 2017 Budget Request consists of $30.2 billion in discretionary funding—$640 million above the FY 2016 enacted appropriation—and $2.3 billion in new mandatory spending proposals requiring new legislation.

The DOE Budget Request supports a broad portfolio of programs, including support for the National Laboratory system of 17 laboratories to carry out critical responsibilities for America's security and economy in three areas:

- Building the Future through Science and Clean Energy;
- Ensuring Nuclear Security; and
- Organizing, Managing and Modernizing the Department to Better Achieve its Enduring Missions.

Underpinning all of these priorities is stewardship of the Department as a science and technology powerhouse, with an unparalleled network of national laboratories, harnessing innovation to successfully address national security, create jobs and increase economic prosperity, boost manufacturing competitiveness, mitigate and adapt to climate change, and enhance energy security.

Energy has been an important driver for recent U.S. economic growth, due to expanded domestic energy production and reduced petroleum imports; increased energy efficiency and productivity; and significant cost reduction and expanded market application of a variety of clean energy generation and energy-efficient industrial, commercial and consumer energy products. DOE has advanced this technology-based energy revolution by supporting the scientific foundations of energy sciences and technology, clean energy and manufacturing technological innovation, early commercial demonstration and deployments, and new technologies and standards to enhance end use energy efficiency. For example, because of DOE technology successes, favorable policies, and other factors, the cost of utility-scale photovoltaic solar power fell 59 percent and power purchase agreements for wind power fell 66 percent from 2008 to 2014. Yet work remains to enhance energy security and U.S. clean energy competitiveness while enabling global climate goals.

The DOE FY 2017 Budget Request includes a programmatic level of $12.9 billion for energy, science, and related programs, an increase of $2.8 billion from the FY 2016 enacted level. The FY

2017 Budget includes $11.3 billion in discretionary funding—$1.2 billion above FY 2016—and $1.6 billion in mandatory spending proposals to support increased investment in leading-edge science and technology; new research facilities to advance the frontiers of science; advanced manufacturing institutes; implementation of the Administration's strategy for nuclear waste management; and crosscutting initiatives to further technological innovation using an enterprise-wide approach to research efforts. The Budget Request takes steps to implement recommendations from the first installment of the Quadrennial Energy Review (QER), released in 2015, to strengthen U.S. energy infrastructures and enhance our collective energy security.

The Request supports ongoing implementation of the President's Climate Action Plan and builds on the systems-based analysis of the Quadrennial Technology Review (QTR) released in 2015. The FY 2017 Budget Request also takes a significant first step toward fulfilling the United States' pledge to seek to double federal clean energy research and development investment over the next five years as part of Mission Innovation, an initiative launched by the U.S. and 19 other countries to accelerate widespread clean energy technology innovation and cost reduction. The Request provides a total of $5.86 billion in discretionary funding for clean energy activities that span the full range of research and development from use-inspired basic research to demonstration, representing an increase in discretionary funding of over 21 percent above the FY 2016 baseline of $4.82 billion. DOE's funding is 76 percent of the $7.7 billion government-wide Mission Innovation investment in FY 2017.

The FY 2017 Budget Request also includes mandatory funding for clean energy R&D that complements activities supported by discretionary funding. The Request includes $150 million in mandatory funding for the Advanced Research Projects Agency—Energy (ARPA-E) as part of the ARPA-E Trust proposal that seeks $1.85 billion in mandatory funding over five years to reliably increase the program's transformational clean energy technology R&D. In addition, as part of the $1.3 billion mandatory proposal for the DOE portion of the Administration's 21st Century Clean Transportation Plan, the Request includes $500 million in FY 2017 to scale-up clean transportation R&D through initiatives to accelerate cutting the cost of battery technology; advance the next generation of low carbon biofuels, in particular for intermodal freight and fleets; and establish a mobility systems integration facility to investigate systems level energy implications of vehicle connectivity and automation.

The FY 2017 Budget Request provides a programmatic level of $12.9 billion for the National Nuclear Security Administration (NNSA), $357 million above the FY 2016 enacted level, to support DOE's nuclear security responsibilities. The Budget Request includes funding to maintain a safe, secure, and effective nuclear deterrent without underground nuclear explosive testing, including life extension programs for major weapons systems and modernization of the Nation's research and production infrastructure.

The Request also ensures that the United States is ready to respond to nuclear and radiological incidents at home and abroad and supports programs that reduce the threats of nuclear proliferation globally, including supporting implementation and monitoring of the Joint Comprehensive Plan of Action with Iran to verifiably prevent Iran from obtaining nuclear weapons. Finally, DOE's Request for nuclear security supports activities that provide safe and effective propulsion for the U.S. nuclear Navy.

The FY 2017 Budget Request includes $6.8 billion for Departmental management and performance programs, including environmental cleanup programs to meet the nation's Manhattan Project and Cold War legacy responsibilities. The Request includes $6.1 billion, which includes $5.4 billion in

discretionary funding and proposes $674 million in mandatory spending from the United States Enrichment Corporation Fund, to uphold the U.S. Government's commitment to states and communities to remediate the environmental legacy of over six decades of nuclear weapons and nuclear research, development, and production. The Request supports major management reforms, including new project oversight, assessment, and cost estimation initiatives as part of ongoing efforts to strengthen effective project and program management across the enterprise. The Request also supports continued implementation of a new and improved Human Resource Management service delivery business model and efforts to improve information technology management and further strengthen cybersecurity.

Science and Energy

The FY 2017 Budget Request provides a programmatic level of $12.9 billion for science, energy, and related programs, which is $2.8 billion above the FY 2016 enacted level and includes $11.3 billion in discretionary funding and $1.6 billion in mandatory spending. The Department's science and energy programs invest in all stages of innovation across a diverse portfolio of clean energy technologies to enhance economic competitiveness in a low-carbon world and secure America's long-term energy security. The Request takes the first step in fulfilling the U.S. Government's pledge to Mission Innovation, an unprecedented global initiative across 20 nations to double public clean energy research and development (R&D), in conjunction with commitments for private investments led by a coalition of 28 private investors from ten countries. The Request also continues to implement the President's Climate Action Plan through the development and deployment of clean energy technologies that reduce carbon pollution. Following COP-21, these investments will be a critical next step in enabling the transition to a low carbon energy future through innovation and cost reduction.

The FY 2017 Budget Request sustains DOE's role as the largest federal sponsor of basic research in the physical sciences and constructs and operates cutting-edge scientific user facilities at the National Laboratories to maintain the nation's preeminence in science and innovation. The Request supports transformational R&D in critical technology areas, including advanced manufacturing, renewable energy, sustainable transportation, energy efficiency, electricity grid modernization, advanced nuclear reactors, and fossil energy with carbon capture and storage. The Request builds on the analytical foundation provided by the Department's 2015 Quadrennial Technology Review (QTR), as well as the recommendations of the 2015 Quadrennial Energy Review (QER), by funding measures to strengthen U.S. energy infrastructures and enhance our collective energy security posture.

Mission Innovation: Enabling a Clean Energy Future

The President's FY 2017 Budget Request takes a significant first step toward fulfilling the U.S. pledge to seek to double federal clean energy research and development investment over the next five years as part of Mission Innovation, an initiative launched by the U.S. and 19 other countries to accelerate widespread clean energy technology innovation and cost reduction. It is a widely-shared view that innovation is essential for economic growth by providing affordable and reliable energy for everyone, is critical for energy security, enhances U.S. competitiveness, and is the key to a transition to a clean energy future. Each of the 20 participating countries, which together represent over 80 percent of global governmental clean energy research and development, will seek to double its governmental investment in clean energy research and development over five years. While each country will determine its own doubling plan and portfolio, the collection of countries will provide new opportunities for synergies and collaboration.

The need for a substantial investment in clean energy research and development is clear. Many studies have examined the contribution of technological innovation to U.S. economic growth. In 2010, the American Energy Innovation Council, comprised of Chief Executive Officers from multiple industries, called for the tripling of energy research and development, citing the need for a dramatic expansion of the energy innovation pipeline to meet critical national priorities. Another report that same year from the President's Council of Advisors on Science and Technology also recommended accelerating the pace of technology innovation to meet economic competitiveness, environmental and energy security needs. The need for greater regional innovation efforts was highlighted in a 2012 National Research Council report calling for the establishment of regional innovation cluster initiatives that build upon existing knowledge clusters and comparative strengths of a geographic region.

The President's FY 2017 Budget takes a significant first step toward fulfilling the U.S. pledge to seek to double federal clean energy research and development investment over the next 5 years by providing $7.7 billion across 12 federal agencies, with DOE responsible for approximately 76 percent of that government-wide total. The DOE FY 2017 Request provides a total of $5.86 billion in discretionary funding for clean energy research and development. This funding represents an increase of over 21 percent above the FY 2016 baseline of $4.82 billion of appropriated funds.

The Budget supports clean energy activities that span the innovation spectrum from use-inspired basic research to demonstration, and encompasses all clean energy technologies, including renewable energy, energy efficiency, sustainable transportation, nuclear energy, fossil energy, and the electricity grid of the future. The DOE program components supporting Mission Innovation include elements of use-inspired basic research sponsored by the Office of Science, ARPA-E and portions of the applied energy programs that support clean energy research, development, and demonstration activities. Overall, programs supporting Mission Innovation comprise slightly more than half of the total President's FY 2017 Budget Request for science and energy, including ARPA-E.

The increased investments proposed in the FY 2017 Budget support a broad-based strategy for accelerating the innovation process. The strategy emphasizes investments strategically targeted to support innovative platforms for early stage research and technology development, as well as development and demonstration activities that target cost-reduction and advance transformational concepts that can achieve meaningful scale. For example, the President's FY 2017 Budget supports an expansion of promising existing programs, such as Energy Frontier Research Centers, ARPA-E, Clean Energy Manufacturing Institutes, the BioEnergy Research Centers, SuperTruck II, and advanced carbon capture technology pilot projects. The FY 2017 Budget also supports new initiatives, such as $110 million to establish regional clean energy innovation partnerships, $45 million to expand R&D collaborations between innovators and small businesses and the DOE National Laboratories, and an advanced materials crosscutting initiative.

The President's FY 2017 Budget also includes mandatory funding for clean energy R&D that complements activities supported by discretionary funding. The FY 2017 Budget Request includes $150 million in mandatory funding for ARPA-E as part of the ARPA-E Trust proposal for $1.85 billion in new mandatory spending authority over five years. The mandatory spending authority will complement annual appropriations by enabling ARPA-E to support projects of a different character than can otherwise be funded under the current program. For example, the mandatory funding will support projects that are larger in scale and address more complex energy challenges that have large transformative potential. As part of the Administration's 21st Century Clean Transportation Plan, the President's FY 2017 Budget Request also includes $500 million in mandatory funding at DOE in FY

2017 to scale-up clean transportation R&D through initiatives to accelerate cutting the cost of battery technology; advance the next generation of low-carbon biofuels, in particular for intermodal freight and fleets; and establish a smart mobility research center to investigate systems level energy implications of vehicle connectivity and automation.

Mission Innovation investments will be leveraged by private capital that drives innovation and clean energy deployment. The initiative is complemented by a separate private sector-led effort, the Breakthrough Energy Coalition (Coalition), as increased government investment, while necessary, is insufficient by itself. This parallel initiative includes over 28 investors from 10 countries and will supplement the large and growing private sector investment in commercialization of clean energy technologies by targeting new investments at an earlier stage of the innovation cycle and managing these investments through the completion of the innovation process, including the formation of new companies and the commercial introduction of new products and processes. The Coalition will be investing in technologies and projects originating in the Mission Innovation participating countries.

Together, these initiatives will drive innovation essential for economic growth enabled by affordable and reliable energy, for energy security, for U.S. competitiveness, and for a transition to a low carbon energy future.

Integrating Science and Energy Programs across the DOE Enterprise

The FY 2017 Budget Request further strengthens DOE and its national missions by fully integrating across its science and energy programs, and across the DOE enterprise with the national laboratories as strategic partners.

DOE has continued to strengthen and institutionalize its strategic relationship with the National Laboratories through organizations and forums such as the Laboratory Policy Council, the Laboratory Operations Board, and the annual National Laboratories Big Ideas summits, which convene DOE and the Laboratories on a regular basis. DOE is sustaining this strategic partnership through these ongoing collaborations and through new efforts, such as a comprehensive report on the National Laboratories. The Request also outlines how DOE will implement recommendations of the Secretary of Energy Advisory Board (SEAB) taskforce on the national laboratories and the Commission to Review the Effectiveness of the National Energy Laboratories (CRENEL). Last week, the Department submitted its detailed response to the final CRENEL report that addresses the Commission's findings and recommendations.

The FY 2017 Budget also supports DOE's crosscutting initiatives that leverage the science, technology, and engineering capabilities across programs and National Laboratory partners. DOE first proposed the crosscutting initiatives in FY 2015 to enhance enterprise-wide planning and improve collaboration across organization boundaries for key science and technology areas with impact across DOE's missions. Each crosscutting initiative reflects a comprehensive and integrated work plan to optimize programmatic objectives and efficiently allocate resources. The crosscutting initiatives help bolster DOE's efforts to institutionalize enhanced program management and coordination across program offices, while accelerating progress on key national priorities.

DOE has two years of experience with integrated planning and program management across program offices, enabling accelerated progress on key national priorities. The FY 2015 and FY 2016 appropriations have provided DOE with funding for the crosscutting initiatives, including $1.1 billion in FY 2016 coordinated across all three Under Secretaries. Moving forward, the FY 2017 Budget Request continues six existing crosscutting initiatives, and proposes a new initiative, Advanced

Materials for Energy Innovation. Together, the initiatives closely coordinate the $1.5 billion request, a $330 million increase, in crosscutting R&D across the enterprise in seven technology areas:

- Electricity grid technology modernization accelerates the development of the technologies and tools to enable modernization of the grid to support U.S. economic growth, environmental quality and security objectives.
- Subsurface science, technology, and engineering coordinates efforts to develop next-generation technologies for energy generation, storage, and disposal applications through mastery of the subsurface, with a science-based focus on advanced imaging of geophysical and geochemical signals.
- Supercritical carbon dioxide technology enables large-scale commercialization of the supercritical carbon dioxide (sCO2) power cycle, which has the potential for higher thermal efficiencies with lower capital cost compared to steam-based power systems and can provide significant benefits for electric power generation, including reducing the costs of carbon capture and storage.
- Energy-water nexus accelerates the Nation's transition to more resilient and sustainable coupled energy-water systems, including a new effort on desalination technology and regional data, modeling and analysis test beds.
- Exascale computing, a joint Science-NNSA collaboration, significantly accelerates the development and deployment of capable exascale computing systems, applications and software infrastructure to meet national security needs and to provide next-generation tools for scientific discovery;
- Cybersecurity protects the Department of Energy enterprise from a range of cyber threats and improves cybersecurity in the electric power and oil and natural gas subsectors; and
- Advanced materials for energy innovations, which have the potential to revolutionize entire industries by employing advanced synthesis, modeling, and characterization to accelerate and reduce the cost of materials qualification in a wide variety of clean energy applications.

Science: Providing the Backbone for Discovery and Innovation

DOE's Office of Science is the largest federal sponsor of basic research in the physical sciences, supporting more than 24,000 investigators at over 300 U.S. academic institutions and the DOE laboratories. The Office of Science provides the backbone for discovery and innovation, especially in the physical sciences, for America's research community.

The FY 2017 Budget Request provides $5.67 billion for Science, $325 million above the FY 2016 enacted level, to lead basic research in the physical sciences and develop and operate cutting-edge scientific user facilities while strengthening the connection between advances in fundamental science and technology innovation. The FY 2017 Budget Request includes a proposal for $100 million in mandatory funding for university grants that will be made available through a competitive, merit-based review of proposals solicited from and provided by the university community in the Office of Science mission areas.

The Budget Request provides major increases for advanced scientific computing research, basic energy sciences, and biological and environmental research, and funding to operate the Office of Science's scientific user facilities at optimal levels in support of more than 31,000 researchers from universities, national laboratories, industry, and international partners.

Sustaining Leading-Edge Discovery Science

The FY 2017 Budget Request sustains leading-edge discovery science through support for the High Energy Physics and Nuclear Physics programs, a 14% increase in investments in Scientific Laboratories Infrastructure, and the new $100 million mandatory proposal for university grants.

In these discovery science programs, Office of Science has contributed to many major recent accomplishments, including collaborating with two international experiments that led to the Nobel Prize in physics for discovering oscillations in neutrinos (fundamental building blocks of our universe that remain poorly understood); contributing to the discovery of three of the four new superheavy elements in the periodic table; opening the most advanced storage-ring-based light source facility, the National Synchrotron Light Source II (NSLS-II); and continuing effective execution of major ongoing science construction projects—the Linac Coherent Light Source II (LCLS-II) and the Facility for Rare Isotope Beams (FRIB)—on schedule and within budget.

For High Energy Physics, the request provides $818 million, $23 million above the FY 2016 enacted level, to understand how the universe works at its most fundamental level by discovering the most elementary constituents of matter and energy, probing the interactions among them, and exploring the basic nature of space and time. The Request implements activities and projects based on the High Energy Physics Advisory Panel (HEPAP) May 2014 strategic plan, including $45 million, an increase of $19 million, to support design for a reconfigured international Long Baseline Neutrino Facility hosted at Fermilab and initial construction for the Deep Underground Neutrino Experiment in South Dakota.

For Nuclear Physics research, the Budget includes $636 million, $19 million above the FY 2016 enacted level, to discover, explore, and understand nuclear matter in a variety of different forms, including continued construction of the Facility for Rare Isotope Beams (FRIB).

Expanding Use-Inspired Research

The Office of Science funds basic science programs that support use-inspired research towards energy and other applications. The Budget Request provides funding to increase operation of the National Laboratory user facilities to optimal levels to accommodate increases in Mission Innovation work. The Request also expands investments in foundations for key technology crosscutting areas, including advanced materials, the subsurface, and the energy-water nexus.

The FY 2017 Budget Request includes $1.94 billion for Basic Energy Sciences, $88 million above the FY 2016 enacted level, to provide the foundations for new energy technologies, to mitigate the environmental impacts of energy use, and to support DOE missions in energy, environment, and national security by understanding, predicting, and ultimately controlling matter and energy. The Budget Request provides $143 million, an increase of $33 million, to initiate five new Energy Frontier Research Centers (EFRCs) and continue to support the existing EFRCs.

The Request provides $662 million for Biological and Environmental Research, $53 million above the FY 2016 enacted level, to support fundamental research and scientific user facilities to achieve a predictive understanding of complex biological, climatic, and environmental systems for a secure and sustainable energy future, including an expanded focus on regional energy-water systems. The Request provides $90 million, a $15 million increase, to expand technology transfer activities during the last year of a ten-year program at the three existing Bioenergy Research Centers (BRC). The Request also includes $10 million for a new initiative in microbiome research that builds on the

Department's experience in fundamental genomic science of plants and microbes to understand the fundamental principles governing microbiome interactions in diverse environments.

For Fusion Energy Sciences, the FY 2017 Budget Request includes $398 million, $40 million below FY 2016. The Request will continue to support research to understand the behavior of matter at high temperatures and densities and to develop fusion as a future energy source. The Budget Request also includes $125 million for the U.S. contribution to the ITER project, a major fusion research facility being constructed by an international partnership of seven governments. The Department submitted in mid-February an interim report to Congress on the status of ITER, and we are scheduled to deliver a report in early May with recommendations related to the project.

Investing in High Performance Computing to Support Frontier Science

The Budget Request provides $663 million for Advanced Scientific Computing Research (ASCR), $42 million above the FY 2016 enacted level, to support research in advanced computation, applied mathematics, computer science and networking, as well as development and operation of high-performance computing facilities.

Under this program, DOE has implemented the President's Executive Order on National Strategic Computing Initiative through a multi-year joint program between the Office of Science and NNSA to achieve capable exascale computing. As part of the President's national initiative, DOE announced a $200 million supercomputer award for Argonne National Laboratory, part of a joint Collaboration of Oak Ridge, Argonne, and Lawrence Livermore (CORAL) initiative to develop supercomputers that will be five to seven times more powerful than today's fastest systems in the United States.

The FY 2017 Budget includes $190 million across three Office of Science programs, joined by $95 million in NNSA, to accelerate development of capable exascale computing systems with a thousand-fold improvement in performance over current high-performance computers in support of the President's National Strategic Computing Initiative. Within the Request, the Office of Science will transition exascale funding to a formal Exascale Computing Project, which will follow DOE project management guidelines under DOE Order 413.3b. The Budget also provides $46 million to re-compete the SciDAC partnerships, with new activities to include accelerating the development of clean energy technologies.

The Request funds research on high-performance computing applications unique to the biomedical research community, including $9 million for the President's BRAIN Initiative, in close coordination with the National Institutes of Health. This funding will bring to bear DOE national laboratory capabilities in big data analytics, modeling and simulation and machine learning to support biomedical research challenges in cancer and BRAIN. In other DOE science programs, the Request also enables development of accelerator applications, including advanced proton and ion beams for the treatment of cancer, in coordination with NIH.

Energy Research, Development, Demonstration, and Deployment

The FY 2017 Budget Request provides a programmatic level of $6.6 billion for energy research, development, demonstration, and deployment activities, of which $5.2 billion is discretionary funding—an increase of $928 million from FY 2016. The Request supports a diverse portfolio of energy technologies, including renewable electricity, energy efficiency and advanced manufacturing, sustainable transportation, fossil energy, nuclear energy, and a modernized grid.

DOE recently completed the 2015 Quadrennial Technology Review (QTR), a systems-based analytical foundation to inform program research priorities across DOE's entire portfolio of energy and science programs by examining the most promising research, development, demonstration, and deployment (RDD&D) opportunities across energy technologies to effectively address the nation's energy needs. The 2015 QTR builds upon the first QTR conducted in 2011 by describing the nation's energy landscape and the dramatic changes that have taken place over the last four years and identifying the RDD&D activities, opportunities, and pathways forward to help address our national energy challenges.

Improving Cost and Performance of Renewable Electricity Technologies

DOE's FY 2017 Budget Request for Energy Efficiency and Renewable Energy (EERE) invests $621 million in renewable energy generation technologies, an increase of $143 million from FY 2016. Innovations, favorable policies, and other factors have led to significant cost and performance improvements across the spectrum of renewable energy technologies, as documented in Revolution...Now[1] report. To name a few examples, the cost of utility-scale photovoltaic solar power fell 59 percent from $5.70 per watt in 2008 to $2.34 per watt in 2014; power purchase agreements for wind power fell 66 percent from 7 cents per kilowatt-hour in 2008 to 2.4 cents per kilowatt-hour in 2014; and the median installed price of residential photovoltaic solar power fell 51 percent from $8.80 per watt in 2008 to $4.30 per watt in 2014.

The Request provides $285M, an increase of $44M, to continue the SunShot Initiative on a path to achieve solar cost parity without subsidies by 2020. The Budget includes $156 million for Wind Energy, an increase of $61 million, to continue efforts to achieve a 16.7 cents per kilowatt-hour cost target for offshore wind by 2020, including $30 million for offshore wind demonstration projects and $25 million to establish an Offshore Wind R&D Consortium.

The Budget Request provides just under $100 million, $29 million above FY 2016, for geothermal technologies, including $35 million to select the final site and team for FORGE, a field laboratory for enhanced geothermal systems, beginning with a down-selection from five to three teams.

The Request also provides $80 million for water power technologies, a $10 million increase, including $25 million to continue the HydroNEXT initiative focusing on innovative, low-cost water diversion technologies to enable new stream reach hydropower, to progress to a cost target of 10.9 cents per kilowatt-hour by 2020 from small, low-head new stream developments. The Request also includes $55 million, $11 million above FY 2016, to support marine and hydrokinetic technologies, including a grid-connected open-water test facility and development of concepts for revolutionary wave-energy converters.

Improving Energy Efficiency and Advanced Manufacturing Technologies

The FY 2017 Budget for EERE includes $919 million, $198 million above FY 2016, to invest in the development of manufacturing technologies and enhanced energy efficiency in our homes, buildings and industries.

In 2015, DOE issued 13 final energy efficiency standards as part of the Administration's goal to reduce carbon pollution. Standards issued to date will achieve cumulative reduction of 2.3 billion metric tons cumulatively by 2030. To accelerate innovation in energy efficiency and manufacturing

[1] http://energy.gov/sites/prod/files/2015/11/f27/Revolution-Now-11132015.pdf

programs, DOE continues to fund R&D at the Manufacturing Demonstration Facility, funds continuing work at the Critical Materials Institute, and is implementing a total of five Clean Energy Manufacturing Institutes in FY 2016 as part of the National Network for Manufacturing Innovation.

The FY 2017 Budget Request provides $14 million in EERE for the sixth Clean Energy Manufacturing Institute and $25 million to establish a new Energy-Water Desalination Hub to serve as a focal point for enabling technologies for de-energizing, de-carbonizing, and reducing the cost of desalination.

The FY 2017 Budget provides $169 million, an increase of $83 million, for emerging technologies that reduce building energy consumption, including $40 million for an R&D effort to transition to refrigerant technologies with low global warming potential, and the Budget provides $15 million for a new metropolitan systems initiative to use new sensing, communication and computation capabilities to create actionable information for decision-makers on clean energy issues. The Request also provides $230 million, an increase of $15 million, to support weatherization retrofits to approximately 35,700 low-income homes nationwide; $70 million to support state energy offices; and $26 million for a new Cities, Counties, and Communities Energy Program to provide support to local governments, public housing authorities, non-profits and other stakeholders to catalyze more extensive clean energy investments in revitalization efforts.

Advancing Sustainable Transportation

The FY 2017 Budget provides $853 million in discretionary funding, $217 million above FY 2016, for sustainable transportation including vehicle, bioenergy, and hydrogen and fuel cells technologies.

In FY 2016, DOE will achieve high-volume modeled costs for batteries of $250 per kilowatt-hour—down from the current cost of $289 per kilowatt-hour—towards a goal of $125 per kilowatt-hour in 2022 as part of the EV Everywhere Grand Challenge. EERE will initiate SuperTruck II, with up to four new competitively awarded projects to improve freight efficiency of heavy-duty vehicles. The programs will achieve at least 1.15 billion gallons per year savings from Clean Cities' initiatives and fund, with the Departments of Agriculture and Defense, three commercial-scale biorefineries to produce military specification drop-in fuels.

The FY 2107 Budget includes $469 million for vehicle technologies, $159 million above FY 2016, including $60 million to fully fund the multi-year SuperTruck II program to double freight truck efficiency by 2020, and $283 million, an increase of $102 million, for continuing the EV Everywhere program to enable domestic production of plug-in electric vehicles that are as affordable and convenient as gasoline vehicles by 2022. The Budget provides $279 million for bioenergy technologies, $54 million above FY 2016, including $52 million to continue R&D efforts on converting cellulosic and algal-based feedstocks to bio-based gasoline and diesel.

The FY 2107 Budget Request includes an additional $1.3 billion mandatory proposal for DOE to expand investments in low-carbon transportation technologies and fueling infrastructure as part of the Administration's 21st Century Clean Transportation Plan. The proposal for DOE would invest $500 million in clean transportation R&D, $750 million in regional fueling infrastructures for low-carbon fuels, and $85 million in the deployment of clean vehicle fleets for local governments and first responders.

Crosscutting Innovation Initiatives for Energy

The Request for EERE includes $215 million for new crosscutting innovation initiatives to enable the acceleration of clean energy innovation and commercialization in the United States by strengthening regional clean energy innovation ecosystems, accelerating next-generation clean energy technology pathways, and encouraging clean energy innovation and commercialization collaborations between our National Laboratories and American entrepreneurs.

The Request includes $110 million to support Regional Energy Innovation Partnerships, a new competition to establish regionally-focused clean energy innovation partnerships around the country. These regionally focused and directed partnerships will support regionally relevant technology-neutral clean energy RD&D needs and opportunities to support accelerated clean energy technology commercialization, economic development, and manufacturing.

The FY 2017 Budget Request also includes $60 million for a Next-Generation Innovation funding opportunity to accelerate next-generation clean energy technology pathways by supporting research, development, and demonstration (RD&D) projects with the greatest potential to change the trajectory of EERE core program technology pathways. The Request includes $20 million for a new Small Business Partnerships program to competitively provide technology RD&D resources to small businesses through the DOE's National Labs to support their efforts to commercialize promising new clean energy. The Request also includes $25 million for Energy Technology Innovation Accelerators that will leverage the technical assets and facilities of the National Laboratories to enable American entrepreneurs to conduct RD&D that leads to the creation of new clean energy businesses.

Expanding Transformational ARPA-E Programs

The FY 2017 Budget Request provides $500 million for the Advanced Research Projects Agency—Energy (ARPA-E), which fills a unique role in identifying scientific discoveries and cutting-edge inventions and accelerating their translation into technological innovations. Of this, $350 million is requested in discretionary funding, $59 million above the FY 2016 enacted level, to fund additional early-stage innovative programs as well as to exploit the technological opportunities developed in previous ARPA-E programs.

ARPA-E has achieved considerable results to date. Through early 2015, 141 ARPA-E project teams have completed funded work. Thirty four ARPA-E projects attracted more than $850 million in private sector follow-on funding, and over 30 ARPA-E teams formed new companies. Eight companies had commercial sales of new products resulting from ARPA-E projects, and more than 37 ARPA-E projects partnered with other government entities for further development. At the annual ARPA-E Summit being held this week, we will be announcing updated numbers demonstrating further success with ARPA-E's portfolio of projects.

The FY 2017 Budget Request will expand support for the current core portfolio of early stage innovation programs, including the release of 7-8 funding opportunity announcements (FOA) for new focused technology programs. Possible areas of focus for these FOAs include advanced sensors and analytics for energy management and improved light metals production to transform vehicle light-weighting. The Request also supports the continuation of the Innovative Development In Energy-Related Applied Science (IDEAS) FOA, which provides a continuing opportunity for the rapid support of early-stage applied research to explore innovative new concepts with the potential for transformational and disruptive changes in energy technology. Across all activities, ARPA-E will continue to emphasize supporting commercial readiness for highly successful projects.

In addition, the FY 2017 Budget Request includes a new legislative proposal for the Advanced Research Projects Agency—Energy Trust, which provides $150 million in FY 2017 and a total of $1.85 billion in mandatory funds over five years to add a new focus on innovative systems level development that will deliver larger, more rapid benefits to the economic, environmental, and energy security of the United States. These projects are of a different character than can otherwise be funded with annual discretionary appropriations, and include, for example, potentially transformative technologies facing significant technical challenges in scale-up, projects that integrate multiple technical advances, and projects that address system-level transformation of energy cycles. The proposed new mandatory spending authority will accelerate transformational changes on energy systems.

Revitalizing the Nuclear Fuel Cycle

The FY 2017 Budget Request provides $994 million for Nuclear Energy, $8 million above the FY 2016 enacted level, to help meet energy security, proliferation resistance, and climate goals. These funds will to support the diverse civilian nuclear energy programs of the U.S. Government, leading federal efforts to research and develop nuclear energy technologies, including generation, safety, waste storage and management, and security technologies.

In 2015, the program funded the second 5-year program of the Consortium for Advanced Simulation of Light Water Reactors (CASL) Hub and new R&D programs for two advanced reactor technologies, pebble bed and chloride fast reactors. The FY 2017 Budget Request provides $73.5 million for ongoing R&D in advanced reactor technologies and continued R&D support for light water reactors (LWR), $59 million for accident tolerant fuels, and $35 million for LWR sustainability. Funding is also requested to continue the GAIN initiative to provide streamlined access for advanced reactor developers to access the world-class nuclear energy R&D capabilities at the national laboratories. The Request includes $89.6 million to continue funding for a cost-shared cooperative agreement for licensing technical support of a small modular reactor design, including support for a small modular reactor design (SMR) certification application to the Nuclear Regulatory Commission (NRC) by December 2016, for application review by the NRC, and to continue development of permit and license applications for the first domestic SMR deployments.

In 2015, DOE's nuclear energy program awarded a contract for a deep borehole field characterization test and issued an Invitation for Public Comment to initiate the dialogue on a consent-based siting process to support a consolidated commercial used fuel storage, a permanent repository and a separate disposal path for defense waste. The Request continues implementation of the Administration's Strategy for the Management and Disposal of Used Nuclear Fuel and High Level Radioactive Waste by providing $76.3 million, an increase of $53.8 million, for integrated waste management system activities in the areas of transportation, storage, disposal, and consent-based siting. The Request includes $39.4 million for consent-based siting, including $25 million for grants to states, Tribes, and local governments. The Request also includes $26 million to complete characterization of a field test borehole and to initiate drilling.

Enabling Fossil Energy to Compete in a Low-Carbon Energy Future

The Budget Request provides $600 million for Fossil Energy Research and Development ($240 million of which is available through repurposing of prior-year balances), $32 million below the FY 2016 enacted level, to advance research and development in carbon capture and storage, advanced energy systems, cross-cutting areas, and fuel supply impact mitigation.

In FY 2016, DOE is reaching several milestones in its support for carbon capture, utilization and storage (CCUS). DOE completed funding of two large-scale industrial CCUS projects that are in operation to demonstrate the feasibility and economics of carbon capture on an ethanol facility and the technology for carbon capture on a hydrogen production unit. Through cost-shared cooperative agreements, DOE is supporting two large-scale, coal-based CCUS demonstration projects utilizing coal gasification and post-combustion carbon capture technologies, with construction to be completed in 2016.

The FY 2017 Budget Request provides $50 million, an increase of $20M, to support initial construction of three large-scale pilot projects of advanced, second generation, post combustion carbon capture technologies critical to reducing cost and increasing efficiency of CCUS technologies. The Request includes $24 million to initiate the design and construction of a supercritical carbon dioxide (CO_2) pilot plant test facility at the 10 megawatt-electric (MWe) scale, and $31 million to initiate design of a natural gas combined cycle (NGCC) demonstration facility employing CCUS technology.

The budget includes the reallocation of funding from CCUS demonstration projects that have not reached financial close to fund other projects and new initiatives, including the use of $240 million in prior-year balances.

Also in support of CCUS technologies, the President's FY 2017 Budget Request makes available $5 billion in proposed investment and sequestration tax credits for qualified commercial CCUS projects. These tax credits are complemented by an existing $8.5 billion available through DOE's loan guarantees for advanced fossil energy projects to help provide critical financing to support new or significantly improved advanced fossil energy projects, and additional mixed-use authority for loan guarantees in the FY 2017 Budget that can be used for advanced fossil and other technologies.

Expanding Technology Commercialization and Deployment

Significant advances have been made in recent years in commercializing and deploying innovative technologies have been made. In 2015, DOE received 30 out of 100 R&D Magazine awards for outstanding technology developments with promising commercial potential, and the Administration announced new investment commitments from the institutional investment community of $4 billion for deployment of clean energy technologies. The renewable energy production tax credits were also extended by the Congress in December 2015.

To expand the commercial impact of DOE's portfolio of research, development, demonstration, and deployment activities in the short, medium and long term, DOE established the Office of Technology Transitions (OTT) in 2015 to oversee and advance DOE's technology transfer mission. The FY 2017 Budget Request provides $8.4 million for the OTT to expand the commercial impact of the DOE portfolio of activities. The Request provides for coordination of technology-to-market activities across the Department and the implementation of the Technology Commercialization Fund (TCF), approximately $20 million in FY 2017, to catalyze seed-stage funding for collaborations with private sector partners on high potential energy technologies at the National Laboratories. The Budget Request for OTT also supports implementation of the Clean Energy Investment Center (CEIC) to provide better information on investable opportunities resulting from DOE R&D.

DOE's Loan Programs Office, in its role accelerating the domestic commercial deployment of innovative and advanced clean energy technologies, has maintained a financially sound portfolio of loans and loan guarantees. The $32 billion portfolio of loans, loan guarantees, and conditional

commitments has been supported by $18 billion in financing from project sponsors, and 22 projects with DOE-backed loans and loan guarantees have now successfully completed construction and initiated operation. DOE has received new applications seeking over $20 billion in Advanced Technology Vehicles Manufacturing (ATVM) and Title XVII loans and loan guarantees

The FY 2017 Budget Request supports the Department's continued oversight of more than $30 billion in loans, loan guarantees, and conditional commitments, as well as its administration of remaining loan and loan guarantee authority to finance projects in the areas of advanced nuclear energy, renewable energy and efficient energy, advanced fossil energy, and advanced technology vehicles manufacturing. The FY 2017 Request also proposes an additional $4 billion of mixed-use loan guarantee authority for innovative energy projects that reduce greenhouse gas emissions.

The FY 2017 Request also includes $23 million for the Office of Indian Energy, $7 million above the FY 2016 enacted level, to support DOE's partnership with the Department of the Interior to address the need for clean, sustainable energy systems on Indian lands through expanded technical assistance and grant programs.

Enabling Secure, Modern, and Resilient Energy Infrastructures

The Department's energy programs also support a secure, modern and resilient energy infrastructure, including for the electric power grid. The FY 2017 Budget Request continues a focus on this mission by providing increased investments in the electricity grid of the future.

DOE has also taken major steps in implementing the Grid Modernization Initiative, supported by a Grid Modernization National Laboratory Consortium comprising 400 partners, including the release of DOE's new comprehensive new Grid Modernization Multi-Year Program Plan and the announcement of a $220 million funding opportunity for the National Labs and partners.

The FY 2017 Budget Request includes $262 million for Electricity Delivery and Energy Reliability, $56 million above the FY 2016 enacted level, for grid modernization research to support a smart, resilient electric grid for the 21st century and the storage technology that underpins it, as well as funding critical emergency response and grid physical security capabilities. The Request provides $14 million to establish a new competitively-selected Grid Clean Energy Manufacturing Innovation Institute as a part of the multi-agency National Network for Manufacturing Innovation, to focus on technologies related to critical metals for grid application, and advances will be broadly applicable in multiple industries and markets.

The Request for Electricity Delivery and Energy Reliability also provides $45 million for energy storage R&D, an increase of $24 million, and $30 million for smart grid R&D. To fortify grid security and resilience, the Request includes $46 million to advance cybersecurity technologies and $18 million for infrastructure security and energy restoration activities. The Request provides $15 million for a new state energy assurance program that supports regional and state activities to continually improve energy assurance plans, improve capabilities to characterize energy sector supply disruptions, communicate among the local, state, regional, federal, and industry partners, and identify gaps for use in energy planning and emergency response training programs. The Request also provides $15 million to launch a new state distribution-level reform program for competitive awards to states to utilize a grid architecture approach to address their system challenges.

The Budget Request also includes $257 million for the Strategic Petroleum Reserve (SPR), $45 million above the FY 2016 enacted level, to increase the system's durability and reliability and

ensure operational readiness. The Bipartisan Budget Act of 2015 requires the Department to submit to Congress a Strategic Review of the SPR by May, 2016. The Act also authorized DOE, subject to appropriation, to sell up to $2 billion in SPR oil to fund SPR infrastructure modernization. The results of the SPR Strategic Review will inform SPR infrastructure modernization and shall result in an FY 2017 budget amendment related to SPR modernization.

The FY 2017 Budget Request provides $31 million for Energy Policy and Systems Analysis to continue serving as a focal point for policy coordination within the Department on the formulation, analysis, and implementation of energy policy and related programmatic options and initiatives that could facilitate the transition to a clean and secure energy economy.

EPSA also serves as the Secretariat of the multi-agency Quadrennial Energy Review (QER), and provides systems analysis to support this Administration's initiative. The Administration expects to complete the second installment of the QER in 2016, focused on the electricity sector.

The Budget Request also includes $84 million for the power marketing administrations, including the Western Area, Southeastern, Southwestern, and Bonneville Power Administrations.

Enhancing Collective Energy Security in Global Energy Markets

While DOE's work in global energy security is not a major budgetary issue, it is an important issue for the Nation. DOE has pursued an increased global focus on collective energy security—energy security for the United States and its allies—in the last several years.

For example, as part of this effort and supported by our Office of International Affairs, the G-7 recently reached an agreement to enhance cybersecurity assessments of energy systems. The FY 2017 Budget Request supports DOE's efforts to enhance collective energy security by providing $19 million for the Office of International Affairs, which coordinates the Department's activities to strengthen international energy technology, information and analytical collaborations.

In the area of energy exports, DOE has released a two-part LNG export study for public comment evaluating the impact of increasing LNG exports from 12 billion cubic feet per day (Bcf/d) to 20 Bcf/d. The study will be used in the public interest evaluation of pending applications to export LNG to non-FTA countries. DOE also chaired the International Energy Agency Ministerial resulting in a plan to assess energy security implications of natural gas supply.

Following the North American ministerial in 2014, Canada, Mexico, and the United States have worked together to produce new integrated mapping and information products. The Budget Request for the Energy Information Administration provides $131 million, a $9 million increase, to build upon enhancements like these in carrying out EIA's data collection and analysis mission. The increase will provide greater regional detail and analysis of petroleum data, enhance commercial building energy efficiency data. The Budget will also extend analysis of international data to include Canada-Mexico collaboration and Asia and expand collection of transportation energy consumption data.

Nuclear Security

The President's 2015 National Security Strategy, the 2010 Nuclear Posture Review (NPR), and the ratification of the New Strategic Arms Reduction Treaty underscored the importance of the DOE's nuclear mission and the lasting mandate for DOE to maintain a safe, secure, and effective stockpile

for as long as nuclear weapons exist. DOE advances the President's vision to eliminate and secure nuclear material, reduce nuclear stockpiles, and increase global cooperation.

The FY 2017 Budget Request proposes $12.9 billion for the National Nuclear Security Administration (NNSA), $357 million above the FY 2016 enacted level, to invest in our nuclear security by modernizing and maintaining our nuclear security enterprise, refurbishing and extending the life of our nuclear deterrent, reducing the threats of nuclear proliferation, and supporting the safe and reliable operation of our nuclear Navy. As part of an overall focus to modernize nuclear security research and production infrastructure, the overall NNSA budget includes a total of $1.8 billion in proposed infrastructure investments, including $575 million for the new Uranium Processing Facility.

The Request for NNSA includes $413 million for NNSA Federal Salaries and Expenses for the salary, benefits, and support expenses of 1,715 federal full-time equivalents (FTEs) to provide appropriate federal oversight of the nuclear security enterprise responsible for managing and executing NNSA's weapons activities and nonproliferation missions.

Stewardship of the Nuclear Deterrent

August of 2015 marked the 20th anniversary of President Bill Clinton's announcement that the United States would pursue negotiations for the Comprehensive Nuclear-Test-Ban Treaty and maintain the U.S. nuclear arsenal without nuclear explosive tests. This was an important milestone for a science-based Stockpile Stewardship Program that successfully pushed the limits of modern science and engineering to maintain the stockpile without underground nuclear explosive testing.

The FY 2017 Budget Request includes $9.2 billion for Weapons Activities, $396 million above the FY 2016 enacted level, to build on these accomplishments as NNSA sustains a credible and effective nuclear deterrent while continuing to reduce the size of the active stockpile. The Budget Request supports the work, as laid out in the Stockpile Stewardship and Management Plan, of the science-based Stockpile Stewardship Program to ensure a safe, secure and effective nuclear stockpile in the absence of underground nuclear explosive testing through a sustained, long-term research program.

NNSA has achieved major accomplishments in that mission, such as substantial progress on its Life Extension Programs (LEPs), including those for the B61-12, W76-1, W80-4, and W88 Alt 370 with conventional high explosive (CHE) refresh. The Inertial Confinement Fusion Ignition and High Yield Program increased the number of experiments, or "shot rate," at Lawrence Livermore National Laboratory's National Ignition Facility from 191 in 2014 to 356 in 2015. NNSA received the first hardware delivery for Trinity, NNSA's next generation high performance computer, and completed the first subproject for the Uranium Processing Facility, Site Readiness, on time and under budget.

The FY 2017 Request includes $1.3 billion for LEPs and major alterations (Alts), $38 million above FY 2016. In particular, the Request continues timely execution of the B61-12 LEP and the W80-4 LEP. These are the first two steps in implementing the Nuclear Weapons Council-approved "3+2" strategy to consolidate the stockpile to three ballistic missile warheads and two air delivered systems, reducing the number of weapons in the deployed stockpile and simplifying maintenance requirements.

The Request provides $223 million to support completing production of the W76 by 2019 and $616 million to deliver the B61-12 first production unit by 2020. It also supports transitioning the W88 Alt 370 with CHE refresh to Production Engineering in February 2017 with $281 million and provides $220 million, an increase of $25 million, to maintain the schedule of the first production unit for the

W80-4 LEP by 2025. The Budget Request also provides $69 million, $17 million above the FY 2016 enacted level, to make progress towards meeting the President's commitment to accelerate dismantlement of retired U. S. nuclear warheads by 20 percent.

The Budget Request for Weapons Activities provides $2.7 billion for Infrastructure and Operations, $443 million above FY 2016. The Request ensures no increase in the backlog of deferred maintenance. The Request will dispose of the Kansas City Bannister Federal Complex, and upgrade aging infrastructure to address safety and programmatic risks, improve productivity, and lower operating costs. The Request for Infrastructure and Operations also provides $575 million, $145 million above FY 2016, to continue the phased approach for constructing the Uranium Processing Facility, including completion of the design and continued construction on approved subprojects. The request also provides $160 million to continue work on the Chemistry and Metallurgy Research Replacement project to support the plutonium strategy.

As part of the Office of Science-NNSA collaboration on the Exascale Computing Initiative, the Budget includes $95 million for exascale computing, $31 million or 48 percent above FY 2016, to develop exascale-class high performance computing to meet the needs for future assessments, LEPs, and stockpile stewardship.

The Request for Weapons Activities also includes $283 million for Secure Transportation Asset, $46 million above FY 2016, to continue asset modernization and workforce capability initiatives including conceptual design and systems prototyping of the new Mobile Guardian Transporter.

Controlling and Eliminating Nuclear Materials Worldwide

The FY 2017 Budget Request includes $1.8 billion for Defense Nuclear Nonproliferation, $132 million below the FY 2016 enacted level, to continue the critical missions of securing or eliminating nuclear and radiological materials worldwide, countering illicit trafficking of these materials, preventing the proliferation of nuclear weapon technologies and expertise, ensuring that the United States remains ready to respond to high consequence nuclear and radiological incidents at home or abroad, and applying technical and policy solutions to solve nonproliferation and arms control challenges around the world. Note that while the overall program level for DNN is down, the programmatic funding level in the FY 2017 Budget Request is roughly flat with FY 2016 due to the availability of prior-year carryover balances and termination of the Mixed-Oxide (MOX) Fuel Fabrication Facility Project.

DOE has taken major steps in the nuclear threat reduction missions. We recently issued the first nonproliferation strategic plan, *Prevent, Counter and Respond—A Strategic Plan to Reduce Global Nuclear Threats*[2], to define and describe our missions.

Supported largely by the DNN program and capabilities, we also provided scientific technical analysis to support the U.S. delegation during the Joint Comprehensive Plan of Action (JCPOA) negotiations. Following finalization of the agreement, twenty nine scientific leaders deeply familiar with nuclear issues (familiar names such as Garwin, Drell, Dyson, Hecker, Richter, and others), focusing on the agreement's nuclear dimensions, wrote to the President: "This is an innovative agreement, with much more stringent constraints than any previously negotiated nonproliferation framework." These experts were referring to aspects of the agreement such as weaponization constraints and bans on nuclear weapons R&D that mark an unprecedented approach to such

[2] http://nnsa.energy.gov/sites/default/files/NPCR%20Report_FINAL_4-14-15.pdf

agreements—and highlight the critical role that DOE plays in providing unparalleled scientific and technical capabilities.

As part of NNSA's goal to minimize and, when possible, eliminates weapons-usable nuclear material around the world, we have also recently completed removal or confirmed disposition of fissile nuclear material, bringing the number of countries free of all highly enriched uranium (HEU) to 28, plus Taiwan. We have also down-blended additional HEU to achieve a cumulative total of 150 metric tons of U.S. excess, weapons-usable HEU.

And in the area of nuclear counterterrorism and incident response, NNSA realigned its counterterrorism and counterproliferation functions to more efficiently respond to nuclear or radiological incidents worldwide and to sustain counterterrorism capabilities through innovative technology and policy-driven solutions. The program continues to train and exercise to strengthen emergency preparedness and response capabilities, including nuclear forensics operations, domestically and worldwide.

Looking ahead, the FY 2017 Budget Request will support continued successful execution of the mission to control and eliminate nuclear materials worldwide. NNSA will support the President's fourth and final Nuclear Security Summit in March-April 2016, continuing the President's aim to achieved tangible improvements in the security of nuclear materials and stronger international institutions that support nuclear security.

DOE and its national laboratories will continue to provide technical support to the International Atomic Energy Agency (IAEA), including to implement the JCPOA, and will remain highly engaged in providing training and technologies and other support to support the IAEA. The Request includes $13 million to support implementation of the JCPOA, including $10M to support JCPOA material management activities and $3 million for technical and in-kind support for the U.S. interagency process and the IAEA.

In the area of plutonium disposition, the Budget Request will terminate the Mixed Oxide (MOX) approach and move to a dilute and dispose approach that will be faster and significantly less expensive than the MOX option. Specifically, the FY 2017 Budget Request provides $270 million, $70 million below FY 2016, to terminate the MOX Fuel Fabrication Facility, and an additional $15 million to pursue a dilute and dispose (D&D) approach that will disposition surplus U.S. weapon-grade plutonium by diluting it and disposing of it at a geologic repository. The Department will complete pre-conceptual design for the D&D option and begin conceptual design in late FY 2017.

In other nonproliferation areas, the Request includes $272 million, $37 million above FY 2016, to sustain emergency response and nuclear counterterrorism capabilities that are applied against a wide range of high-consequence nuclear or radiological incidents and threats. It proposes $394 million for the Defense Nuclear Nonproliferation Research and Development program to advance technical capabilities to monitor foreign nuclear weapons program activities, diversion of special nuclear material, and nuclear detonations. The Request provides $341 million for Material Management and Minimization to support HEU and plutonium disposition, the conversion of research reactors and medical isotope production facilities from the use of HEU to the use of low enriched uranium (LEU) fuels and targets, and removal of excess HEU and separated plutonium. The Request also provides $337 million for Global Material Security to build international capacity to secure, and prevent smuggling of, nuclear and radiological material through equipment installations and upgrades, and capacity-building workshops and trainings. In addition, the Request provides $125 million for the Nonproliferation and Arms Control program to strengthen the nonproliferation and arms control

regimes by enhancing international nuclear safeguards; controlling the spread of nuclear material, equipment, technology, and expertise; and verifying nuclear reductions and compliance with nonproliferation and arms control treaties and agreements.

Advancing Navy Nuclear Propulsion

Finally for NNSA, the Naval Reactors program continues its tradition of providing the design, development and operational support required to provide militarily effective nuclear propulsion plants and ensure their safe, reliable and long-lived operation. In carrying out this mission, the Naval Reactors program has marked many major accomplishments.

The program continues to provided technical support and 24/7 reachback support for the Navy's nuclear fleet of 73 submarines and 10 aircraft carriers. The program successfully achieved criticality in the first reactor of the new Gerald R. Ford-class aircraft carrier, and continued reactor plant design for the Ohio-class submarine replacement and advanced technology development in refueling of S8G land-based prototype reactor, including the insertion of new materials and technology for the Ohio-class submarine replacement. Naval Reactors also operated the MARF (Modifications and Additions to a Reactor Facility) and S8G land-based prototype reactors, delivering 2,832 trained nuclear operators to the fleet—a 17 percent increase over FY 2014.

The Request includes $1.4 billion for Naval Reactors, an increase of $45 million from the FY 2016 level, to support U.S. Navy nuclear propulsion. The Request provides $214 million to continue development of the Ohio-class submarine replacement reactor, and $124 million to continue refueling of the Land-Based Prototype reactor.

In support of necessary facilities for handling naval spent nuclear fuel, including the capability to receive, unload, prepare, and package naval spent nuclear fuel, the Request provides $100 million to complete design and initiate construction of a new Spent Fuel Handling Recapitalization Project at Naval Reactors Facility in Idaho.

Management and Performance

The FY 2017 Budget Request provides $6.8 billion for Departmental management, performance, and related corporate support activities to position the Department to meet the nation's Manhattan Project and Cold War legacy responsibilities and to continue institutionalizing an enterprise-wide focus on improving the efficiency and effectiveness of DOE programs through the effective management of DOE's infrastructure and workforce.

Strengthening Project Management

The Department is aggressively pursuing implementation of a Secretarial initiative to improve project management. We have made progress to that end through several recent initiatives and reforms, including establishing independent project review capabilities within each Under Secretary organization, as well as a central Project Management Risk Committee (PMRC). We have also formalized the role of the Energy Systems Acquisition Advisory Board (ESAAB) and instituted process changes to ensure that the ESAAB takes a proactive role in reviewing major projects. In addition, we established a new independent office on project management oversight and assessments.

It is notable the Government Accountability Office (GAO) has narrowed the focus of its watch list to DOE's major projects, and we continue to work towards improving our implementation of those

projects. The Department's continuing goal is to control costs to within 10 percent of the baseline estimate for at least 90 percent of our construction projects.

The FY 2017 Budget Request includes several proposals to further implement these project management improvements. The Request provides $18 million for the independent office of Project Management Oversight and Assessments (PMOA). With senior management focus on DOE's total project portfolio, DOE will be able to hold contractors and programs accountable for large and at-risk projects, receiving early warning notifications and quarterly updates.

The Budget Request also includes $5 million to establish an independent office, similar to that at the Department of Defense, to set cost estimating policy and provide timely unbiased program evaluation analysis and cost estimation.

Cleaning up Nuclear Legacy Waste

The FY 2017 Budget Request includes $6.1 billion for Environmental Management (EM), $99 million below the FY 2016 enacted level, to address its responsibilities for the cleanup of large quantities of liquid radioactive waste, spent nuclear fuel, contaminated soil and groundwater, and deactivating and decommissioning excess facilities used by the nation's nuclear weapons program. The $6.1 billion Request includes $5.4 billion in discretionary funding and proposes $674 million in mandatory funding from the USEC Fund, for Uranium Enrichment Decontamination and Decommissioning (UED&D) Fund activities.

While difficult challenges lie ahead with some of our remaining Environmental Management projects, it is important to note that when the program started, there were 107 sites to be closed—and today we have cleaned up all but 16 sites. The remaining sites will not be simple to remediate, but we started with over 3,000 square miles to remediate, and only 300 square miles remain.

In our ongoing efforts to remediate our legacy sites, we have continued construction activities necessary to initiate direct feed of Low Activity Waste (LAW) at Hanford, and we have continued technical issue resolution of the Pretreatment and High Level Waste facilities at the same site. We have cleaned up and demolished more than 800 facilities at Hanford, and we have remediated over 1,200 waste sites along the River Corridor. At the Savannah River Site, we have closed the seventh waste tank, and we have revitalized the EM Technology Development and Deployment Program in response to a Secretary of Energy Advisory Board (SEAB) recommendation.

Looking forward, the FY 2017 Budget Request includes $271 million to maintain critical progress toward resuming waste emplacement in the underground at the Waste Isolation Pilot Plant (WIPP) by the end of 2016. WIPP, the Nation's only mined geologic repository for the permanent disposal of defense-generated transuranic waste, suspended operations following a February 5, 2014 fire involving an underground vehicle and an unrelated radioactive release that occurred February 14, 2014. The Request for WIPP includes activities to resume waste emplacement operations by the end of 2016, including continued implementation of corrective actions and safety management program improvements, completion of Operational Readiness Reviews and commencement of waste emplacement operations. Activities include mine stabilization, mining, mine habitability activities in all underground areas, continued decontamination of contaminated areas, and upgrades, support for completion of repairs of New Mexico Roads used for the transportation of DOE shipments of transuranic waste to WIPP, and community and regulatory support. The budget supports the Central Characterization Project and maintains shipping capability between the generator sites and WIPP.

The Request also includes funding to support progress in design of a new permanent ventilation system that is needed to support normal operations.

The FY 2017 Budget Request provides $1.5 billion for the Office of River Protection, $86 million above the FY 2016 enacted level, to support the Department's proposal to amend the Consent Decree between DOE and the State of Washington for completion of the Waste Treatment and Immobilization Plant and retrieval of waste from 19 Single Shell Tanks. The Budget Request would enable construction of a new facility to allow DOE to begin treating low level waste by the end of 2022, avoiding the need to wait for completion of other facilities affected by the technical issues. The Request continues construction of the low activity waste (LAW) facility, the analytical laboratory, and balance of facilities while addressing technical issues with the pretreatment facility and the high-level waste facility as well as support for the planning and design of the LAW pretreatment system at the tank farms.

The Request also provides $800 million for cleanup of the Richland Site. Cleanup activities include soil and groundwater remediation, facility decontamination and decommissioning, stabilization and disposition of nuclear materials and spent nuclear fuel, and disposition of waste other than the tank waste managed by the Office of River Protection. The FY 2017 Request for Richland will provide for continued achievement of important cleanup progress required by the Tri-Party Agreement. The Budget Request for Richland supports completion of cleanup at the Plutonium Finishing Plant, planning and initiation of procurement in preparation for cleanup of the 324 site, and other activities. The decrease of $191 million from FY 2016 is attributed to completed scope and facility modifications to prepare for installation of sludge removal systems for the K West Basin, as well as purchase of the engineered containers for sludge repackaging; and completion of remediation in the 300 area, 100K area and 618-10 trenches.

The Request provides $1.5 billion, $111 million above FY 2016, for the Savannah River Site to support remaining construction and commissioning of the Salt Waste Processing Facility, processing 19 million gallons of salt waste and nuclear materials in H-Canyon, and site-wide infrastructure. The Request will ramp up commissioning of the Salt Waste Processing Facility to enable start-up in 2018. The Request devotes significant funding to support the Liquid Tank Waste Management Program, as the liquid waste tanks pose the highest public, worker, and environmental risk at the site. The Request also supports the Savannah River Site to operate H Canyon in a safe and secure manner, provides safe, secure storage for spent (used) nuclear fuel in L-Area, and supports continuity of K-Area operations to include maintaining K-Area to store special nuclear material safely and securely. The increase over FY 2016 provides additional support leading to startup of Salt Waste Processing Facility in 2018; supports tank closure and bulk waste removal activities to meet FY 2016 enforceable milestones; and provides additional funding for Salt Disposal Unit #7 design activities.

The FY 2017 Budget Request includes $370 million, $32 million below FY 2016, for the Idaho Site to support key requirements to continue progress in meeting the Idaho Settlement Agreement commitments. The Idaho Cleanup Project is responsible for the treatment, storage, and disposition of a variety of radioactive and hazardous waste streams, including removal and disposition of targeted buried waste sitting above the Snake River Plain Aquifer. The project is also responsible for removing or deactivating unneeded facilities, and removing DOE's inventory of spent (used) nuclear fuel and high-level waste from Idaho. The Request will continue retrieval and processing of transuranic waste via the Advanced Mixed Waste Treatment Project and the Remote-handled Waste Disposition Project. It will also support continued progress toward closing the tank farm, including continued treatment and disposition of sodium bearing waste and progress toward buried waste

exhumation under the Accelerated Retrieval Project. The decrease from the FY 2016 level is attributed to progress in treatment, packaging, and certification of Idaho Settlement Agreement remote-handled transuranic waste, delays in processing waste at the Integrated Waste Treatment Unit, and a one-time funding increase in FY 2016 for procurements.

The FY 2017 Budget Request provides $391 million for cleanup at the Oak Ridge site, including $178 million in proposed mandatory funding, to support direct shipments of Uranium Solidification Project material, continue design and construction of the Mercury Treatment Facility, continue contact- and remote-handled debris processing at the Transuranic Waste Processing Facility, and continue the K-27 Decontamination and Decommissioning project. The Request will maintain the facilities in a safe, compliant, and secure manner as well as operate waste management facilities. The Request will continue development of Comprehensive Environmental Response, Compensation and Liability Act documentation for the new On-Site Disposal Facility. The processing of legacy transuranic waste debris will continue at the Transuranic Waste Processing Center and technology maturation and design will continue for the Sludge Processing Facility Buildout project. Additionally, the Request supports direct disposition of Consolidated Edison Uranium Solidification Project material from Building 3019, assuming resolution of stakeholder concerns.

The Budget Request includes $323 million, including $258 million in proposed mandatory funding, to support the deactivation and decommissioning project at the Portsmouth Gaseous Diffusion Plant in Piketon, Ohio. In addition to supporting deactivation and decommissioning of gaseous diffusion plant facilities and systems, disposal of waste, small equipment removal, and other related activities, the request also includes funding for design and construction of a potential on-site landfill for the disposal of waste generated from the demolition of the Portsmouth Gaseous Diffusion Plant and associated facilities. In addition, the Request will continue the safe operation of the DUF6 Conversion facility that converts depleted uranium hexafluoride into a more stable depleted uranium oxide form suitable for reuse or disposition. The Request for the Portsmouth is supplemented by continuing transfers of uranium for cleanup services at the Portsmouth Gaseous Diffusion Plant.

The Request provides $272 million for the Paducah site, including $208 million in proposed mandatory funding, for a multifaceted portfolio of processing and cleanup activities. In addition to ongoing environmental cleanup and DUF6 operations, the Budget Request supports activities to continue the environmental remediation and further stabilize the gaseous diffusion plant, including uranium deposit removal, facility modifications, surveillance and maintenance, and activities to remove hazardous materials. The Request supports the design of the Paducah potential On-Site Waste Disposal Facility project, if the project is selected as the appropriate remedy.

The FY 2017 Budget Request includes $30 million to expand the technology development program through carefully targeted projects to develop and demonstrate new technologies and approaches tailored to the specific contamination issues at individual sites. The FY 2017 Budget Request includes an emphasis on robotics research and development of test beds in support of DOE's cleanup mission.

Refinancing Uranium Enrichment Decontamination and Decommissioning

Continued progress towards decontaminating, decommissioning, and remediating the former gaseous diffusion uranium enrichment sites, and towards meeting our uranium/thorium reimbursement commitments, remains a priority for DOE. We have made significant strides at the Oak Ridge, Portsmouth, and Paducah sites, but we have an estimated $22-24 billion in remaining cleanup costs.

Throughout the history of these sites, the government has collected funds from the public and private entities that utilized the enriched uranium produced at the facilities to pay for operation, privatization, and cleanup of these three sites—some provided by utility fees, and others provided by Congress. Three government accounts—Uranium Enrichment Decontamination and Decommissioning Fund, Uranium Supply and Enrichment Activities Account, and the United States Enrichment Corporation (USEC) Fund—hold nearly $5 billion of these funds.

The FY 2017 Budget Request proposes to make progress on our cleanup missions at Paducah, Portsmouth, and Oak Ridge, and the Title X Uranium/Thorium Reimbursement Program by harnessing some of these funds through a mandatory proposal to make available $674 million from the United States Enrichment Corporation Fund.

Through the Energy Policy Act of 1992, Congress authorized annual deposits to the Uranium Enrichment Decontamination and Decommissioning (UED&D) Fund from an assessment on nuclear utilities for 15 years—from fiscal years 1993 through 2007. The Budget Request proposes to reinstate these fees to offset proposed new mandatory spending for uranium enrichment cleanup. The Budget also includes $155 million of defense funding for deposit into the UED&D Fund, reflecting the shared responsibility of both industry and the federal government for these costs.

Investing in Departmental Infrastructure

The FY 2017 Budget Request supports safe and reliable world class facilities by investing in new infrastructure in all mission areas and establishing a sustainable trajectory for the Department's existing infrastructure.

As part of our effort to manage the enterprise's infrastructure in a sustainable manner to support DOE missions, beginning in FY 2016, we have implemented a policy to halt increases in deferred maintenance across the DOE complex. We have also taken steps to bolster DOE's enterprise-wide inventory by compiling the first uniform assessment of general purpose infrastructure at all National Laboratories and NNSA plants and sites through the National Laboratory Operations Board (LOB), and forming a LOB working group to assess and prioritize the disposition of excess facilities.

Building on these efforts, the FY 2017 Budget Request continues a comprehensive program of infrastructure modernization and improved maintenance across the complex, including expanded funding for general purpose infrastructure projects. The Budget proposes, for example, $200 million for the disposal of the Kansas City Bannister Federal complex. Finally, we are seeking to improve the energy efficiency and sustainability of government facilities, including use of Energy Savings Performance Contracts.

Building and Supporting the Energy Workforce

DOE's continues to work to attract, manage, train and retain the best workforce to meet its future mission needs.

In support of managing the workforce and hiring new personnel, we have activated two Consolidated Human Resources (HR) Service Centers, at Cincinnati and Oak Ridge, as part of a new service delivery model to consolidate 17 current HR service centers to five, which should allow for a more efficient and effective HR model across DOE. The FY 2017 Budget Request completes the HR Shared Services Centers consolidation and invests in implementing recommendations resulting from a talent management study conducted in FY 2016, which will help to develop a corporate approach to

talent acquisition in order to consistently and effectively attract, develop, and retain the best workforce to meet mission needs.

The DOE Office of the Chief Information Officer (CIO) and related offices continue to build the information technology (IT) infrastructure in support of DOE's mission needs. DOE is expanding Multifactor Authentication Program for improved cyber security. The FY 2017 Budget Request strengthens cybersecurity across the enterprise with an investment of $285 million, an increase of $23 million across 13 offices and the Working Capital Fund.

The $93 million FY 2017 Budget Request for CIO, $20 million above FY 2016, also supports several critical IT improvements, including implementation of Federal Information Technology Acquisition Reform Act (FITARA) requirements to provide a common baseline for roles, responsibilities, requirements, and authorities for the management of IT in federal civilian agencies. The Request also includes efforts to modernize and further secure the Department's IT infrastructure, including core networking layers, data centers, and access technologies.

The Department has established a Labor-Management Forum to further encourage opportunities for collaboration and partnership between contractors and management.

The Department has established the Office of Energy Jobs Development, consolidating ongoing activities across the Department formerly coordinated via the Jobs Strategy Council. The Request includes $3.7 million to support the office and to compile survey data and deliver the energy jobs and workforce report that would detail job growth/shifts in the energy and advanced manufacturing industries; fill the gaps that currently exist in data gathering on renewable energy, energy efficiency, and advanced manufacturing jobs; and compile data on energy job skill needs of employers and public agencies.

Advancing DOE's Critical Missions

In conclusion, the FY 2017 Budget Request of $32.5 billion invests in its science and technology capabilities, its workforce, and its critical infrastructure to advance DOE's core missions.

The Request supports the Department's efforts in science and energy to enable a clean energy future through innovative lower-cost energy technologies; to support secure, modern and resilient energy infrastructure and emergency response capabilities; and to provide the backbone for discovery and innovation, especially in the physical sciences, for America's research community.

The Request invests in the Department's nuclear security missions to maintain a safe, secure, and effective nuclear deterrent without nuclear explosive testing; to modernize the nuclear security research and production infrastructure; to reduce global nuclear security threats; and to propel our nuclear Navy.

And the Request continues taking steps to further the Department's management and performance missions to clean up from the Cold War legacy of nuclear weapons production; to manage infrastructure in a sustainable manner to support DOE missions; and to attract, manage, train and retain the best workforce to meet mission needs.

Thank you, and I would be pleased to answer your questions.

Mr. SIMPSON. Thank you, Mr. Secretary.

Ms. Kaptur, do you have an opening statement you would like to make?

Ms. KAPTUR. Thank you, Mr. Chairman, very much. I thank you for your courtesy and say to the Secretary: I am sorry I wasn't here for your full testimony; I had a truly conflicting event. But I thank you, Mr. Chairman, and thank you, Secretary Moniz for being here today and for your exemplary leadership.

Secretary MONIZ. Thank you.

Ms. KAPTUR. In recognition that this may be your last appearance at this hearing, although no matter who wins in November, I think they would be very well served by keeping you on.

I would like to recognize the exceptional job——

Mrs. LOWEY. He is shaking his head.

Mr. SIMPSON. Is that a no?

Ms. KAPTUR. Your family may not agree, but I am your chief lobbyist. I will tell you that.

Secretary MONIZ. Correct about that.

Ms. KAPTUR. I would like to recognize the exceptional job you have done at the Department of Energy and in service to our country. It has been a pleasure to work with you. Too few Americans realize just what an enormous energy revolution is happening around our world, but it is a credit to your work and concerted effort at the Department, as well as those who filled your position before you, all the way back to President Jimmy Carter, who created your Department. Americans who saw the need for our country's energy independence and what could happen if we didn't pay attention to fundamentals on energy supplies to our people.

Please, let me present two charts that make it clear how far America has come toward restoring an independent energy America. And I hope that all of my colleagues have this. But as you can see, between 2008 and 2014, the amount of crude oil we produce here at home has increased by 50 percent, while our dependence on OPEC has been cut almost in half. This is an extraordinary achievement in energy security for our country. We in the world will have to adjust to these positive trends.

America's long-term commitment to science and basic energy research has really started to yield results that matters strategically and economically. And I am very pleased to see in your budget request a significant push toward increasing research and specifically toward ARPA–E's funding. I also note how pleased I am about the private-public partnership, the dynamic relationship that you are building through Bill Gates' Mission Innovation initiative. As Mr. Gates has become fond of saying, if we are going to truly tackle climate change, we need an energy miracle, and that miracle can only be possible with continued large investments in the highest level research that I know our people are capable of.

I am specifically interested in hearing from you today about the Department's work in energy storage and distributed generation as well as—and you addressed this a bit—the energy-water nexus and the, also, energy-water food nexus, which people are talking about more and more, as well as efforts toward grid modernization and, obviously, upgrading our nuclear capacities. Now, as great as this American energy revolution is for the climate, our economy, and for

our national security, we must not forget that when a dynamic economy—a dynamic economy can only grow through innovation. And many of my colleagues like to point out the fact there are now more Americans working in the solar industry than there are in the coal industry.

I am pleased to put on the record the company in my region, First Solar, that is truly a leader in photovoltaic—I thank you, Secretary visiting there personally—a company based on technologies of the future.

While we are encouraging new industries, it is vital that we don't forget about the people who are losing their jobs across our country in this transition and to think forward with them. Beyond the miners in Ohio, West Virginia, and Kentucky, there has also been the women who work on the coal trains and in the coal plants and on the docks, who ship coal, who are struggling. Economists like to say that markets will adjust and capital will go toward its best use, but human capital is not quite as flexible. When people have worked hard in one industry for generations, they can't just snap their fingers and adjust to another job. So I think it is important for all of us to remember and to respect their hard work, and America simply must fashion a smoother pathway to energy transition for these workers who face job loss, healthcare loss, pension loss, and many times the loss of their homes. Surely, this country can do better than this.

With that, I will close my remarks. I thank you, Mr. Chairman, again, and Mr. Secretary, for your remarkable work as well as for being with us today, and we look forward for the questions, and I thank my colleagues for their courtesy.

Mr. SIMPSON. Mrs. Lowey.

Mrs. LOWEY. Question?

Mr. SIMPSON. Yes.

Mrs. LOWEY. Thank you for your courtesy, Mr. Chair.

And thank you, again, for your important testimony. I saw that smile when there was a question as to whether you would remain. We all do appreciate the service to your country. Thank you.

Secretary MONIZ. Thank you very much. I appreciate it.

Mr. SIMPSON. That is a happy smile he is giving.

Ms. KAPTUR. Relief.

Mrs. LOWEY. Mr. Secretary, it has become increasingly clear that our Nation's electricity grid requires transformation to address reliability and security issues. This challenge was crystalized in the wake of Superstorm Sandy when more than 8.5 million households and businesses—that is tens of millions of people—experienced power outages, and in some places, restoring power took weeks. This will be a monumental challenge given the grid is arguably the most complex and critical infrastructure in our Nation. I would be interested in your sharing with us the most pressing issues in securing the electricity grid that Congress should be addressing, in particular, should there be baseline standards to protect our electricity grid or better coordination between the public and private sector? The budget request includes funding for a grid institute to focus on technologies related to critical metals for grid applications. Why do you believe this is such a critical investment? Is it so important that it should displace other activities?

Secretary MONIZ. Thank you, Congresswoman Lowey. First of all, as I said in my opening remarks, we have emphasized a significant increase in grid funding precisely because of the importance that you have just described. Indeed, in our Quadrennial Energy Review published last April, which looked at all energy infrastructure, we noted that the grid had a special role because most of the other infrastructures require its operation for them to function. So that is one point.

So, in terms of our challenges, I think we have several challenges. One, certainly, is modernizing the grid to include advanced technologies. The grid institute is one piece of that, by no means the only one. For example, we also have a manufacturing institute that was competitively awarded in North Carolina on what is called wide band gap semiconductors, another technology that is very critical for the kinds of power and electronics we need. We need to do a much better job integrating IT into the grid all the way from the distribution system, including going behind the meter into people's homes to allow much better energy efficiency programs all the way to the big grid that—in which we need to have early warning systems about problems, a program, by the way, that our Recovery Act funds did a lot to advance. So there is a whole set of technologies that we need to develop and deploy on the grid.

Second, beyond the individual technologies, it is a big systems issue. It's all got to work together, obviously, especially the electric grid, because of its real-time nature. And to succeed there, ultimately—we are developing in our proposal—we would do a lot of tool development there as well, but then interfacing that with both the private sector and with the State regulatory authorities is absolutely critical.

A third issue is we need to harden the grid against a bunch of risks. Some of those risks are weather. And, unfortunately, we anticipate more extreme weather with the warming. Some of those risks are things like cyber, where we have an extensive interaction with the private sector with utilities in terms of advancing cyber protection. And make no mistake about it: the attacks on the energy infrastructure from cyber are continuing to escalate.

I will just mention on the hardening, I did visit, a month and a half ago, Florida Power & Light down in Florida where, of course, they have both wind and sea surge challenges, and it is impressive to see what is happening, actually, in terms of hardening the grid and taking every opportunity while hardening it to add intelligence at the same time.

So that is kind of the picture. Ultimately, we want a grid that—oh, I should have added one more, because you mentioned Sandy. Another one is, in response to Sandy, with our laboratory Sandia in the State of New Jersey, we are, I think, out in front in terms of putting a rather large microgrid into the system to protect public safety in key transportation corridors while having that integrated into the larger grid.

So there are many, many directions here, but they all aim to a—really, a complete modernization of the grid that will in some sense have, through more intelligence, be integrated all the way from the consumer all the way up to the high-voltage grid that you need to move, say, renewables over a large distance.

Mrs. LOWEY. I have one other question on a local issue, although it affects many communities. But I hope, Mr. Chairman, at some point, we can continue this discussion on cybersecurity, because I think this is what most of us fear the most.

On oil produced in the continental United States, one out of every seven barrels is shipped by rail, and as a result, it is critical that the public regulators and industry understand the safety implications of such a vast quantity of volatile liquid moving through our communities. The omnibus included 2.7 million for the Department to complete this second phase of the crude oil volatility study. Recognizing that the study is not complete, are there any conclusions you can share with us today, and when should we expect the final results? And do you believe there is followup work from the phase 2 study that would be valuable to our understanding the issue? If yes, what agencies should be responsible for that additional work?

Frankly, I look forward to your response and the continued work, because I have watched these trains come through right next to waterways. They haven't all modernized, so we hope they are moving in that direction. So I would be most interested in your commenting, responding to my question.

Secretary MONIZ. Thank you. One thing I would note, by the way, is that in one year, in the last year, there has been roughly a 20-percent decrease in the movement of oil by rail. So that trend has been a number of reasons, including additional pipeline infrastructure, but also some decreased production, for example, in—say, in the Bakken Shale in North Dakota. Nevertheless, 20 percent reduction is mined, but there is still 80 percent left, so we still need to address the issues that you have raised.

I am afraid I have to say that the Sandia study, which is cofunded by DOE and DOT, will be still nearly a year in completion, including the physical combustion tests that remain to be done. So sometimes one can get impatient, but it is research, and it will be roughly a year.

I think going forward, after that, the specific programs will depend upon the outcome, but I do emphasize that the partnership with DOT is very important. I mean, frankly, I think our Sandia lab in this case provides a lot of the technical oomph, but you would like that, then, to influence the regulatory responses. And, of course, that is where having a partnership really helps.

So—but I am afraid it will be next—early next year before we can have the final results.

Mrs. LOWEY. Well, I look toward to hearing about them, and hopefully, there won't be any dangerous accidents before that time, because once it occurs and it affects our streams and rivers, as you know, I have been told that you just can't clean it up. So I thank you, and I look forward——

Secretary MONIZ. Well, it is expensive. It is expensive, certainly. But, also, of course, we have had a lot of—we had some time back now, fortunately, but considerable loss of life as well through these accidents.

Mrs. LOWEY. Thank you.

And thank you, Mr. Chairman.

Mr. SIMPSON. Mr. Valadao.

Mr. VALADAO. Thank you, Chairman.

Welcome, Secretary Moniz. It is always a pleasure to have you here.

Last year, I had an opportunity to tour Berkeley lab, and I was actually very impressed with a lot of the work they do, with specifically ag and drought-resistant crops, something that, obviously, has very close ties to my life and my district. So I appreciate the effort being put there. And I also want to thank you for your work improving the national user facilities, like those at Berkeley lab, to make them more networked, more efficient, and better able to capture scientific creativity.

But my question specifically is, the President's fiscal year 2017 budget request includes 68 million, increases across several programs for the energy and water nexus. As you know, we are facing a historic drought, historical water and energy challenges in California, and as a farmer, I am well aware of the close connection between energy and water and understand that research could be helpful in coming up with some solutions. I would like to see the increase in research and development that provides solutions for California and the entire Nation. With many worthwhile programs, the committee is faced with difficult decisions regarding funding. My question is: Why should we fund the increase, and how will this research impact my district, State, and the Nation? And, more specifically to that, especially with the movement we see in anti-GMOs and a lot of the technology that goes into food production and the efficiencies that can be gained through those, are there real opportunities out there that the public will receive well coming from these labs? And how does the planned research leverage existing resources and expertise such as those in Berkeley lab?

Secretary MONIZ. Thank you. First of all, I would just note, though—well, thank you for the comments about Berkeley lab, and I am very pleased that you were able to visit. I would just note that today is the first day of the new director of the Berkeley lab. Paul Alivisatos was an outstanding director, and Michael Witherell is taking over today. So it is a big day at Berkeley.

Two things. I mean, you mentioned, obviously, the impact upon crops and farming, and I would just note, quite apart from the energy water work, the very strong work in genomics going on in the Department, including at Berkeley, is quite important for looking at vital crops for a variety of purposes, including, of course, bioenergy, in our case, being an important one. The energy-water nexus, we think, is a tremendously important area, and that accounts for our substantial increase. I would note that I think it would have an impact—it could have an impact in terms of your State and your region quite substantially. For one thing, it will be looking at a lot of wastewater issues and the opportunity of reusing, recycling water in many contexts. It will be looking at—we have proposed a new hub for desalination. We will propose system studies about minimizing water use and tradeoffs between different approaches. We will be looking at, for power plants, things like dry—advanced dry cooling, trying to reduce the energy penalty in those. And I might also add—by the way, on the biology side, we also proposed a small program, a $10 million biome project that

would be looking at, essentially, the microbial communities associated with plants.

But I would just also note—and this is very premature—but, recently, last week, I spoke with Minister Steinitz from Israel, who as you know, Israel has a tremendously advanced water management approach for agriculture and for other uses. And I will be visiting there in early April, and we are talking about trying to maybe get a joint energy, water, food program going there. So that is just something that we are just tossing around. But that could be very, very interesting and certainly, they have tremendous experience and great, great technologies.

Mr. VALADAO. Mr. Secretary, the budget request proposes 190 million for the exascale initiative within the Office of Science. Developing exascale computing represents the next technological lead in high-performance computing, but many challenges remain.

What is the current timeline for developing an exascale system in the United States, and do you believe the Department will achieve that target? And where does the United States currently stand in relation to the international development of exascale systems, and what role do these computers play in protecting our grid and other types of technology?

Secretary MONIZ. The exascale initiative——

Mr. VALADAO. I am glad you are struggling with that word too.

Secretary MONIZ. I am struggling, because I think I need some water, is what I need.

The exascale initiative, I should first note, is 190 million in science and an additional nearly 100 million in NNSA. It is a joint project.

The target for exascale is mid next decade to have a functioning system. As you said, there are many challenges, energy management being one of the great ones. What I want to emphasize is that we are always taking major steps, and right now, we are implementing something called CORAL at Oak Ridge, Oregon, and Livermore, which will, within a few years, be operating in, let's call it the 200 petaflop scale, so 0.2 exascale region, and so that is already, you know, presenting a number of challenges we will have to address.

And then we will go on to exascale, as I said. There are going to be very interesting challenges for various applications. Grid is one of them, big modeling of energy systems, but also, of course, our national security needs really depend upon these cutting-edge computers. I might say with Congressman Fleischmann in Oak Ridge, we recently renewed a major hub that simulates light-water reactors, looking at higher efficiency, more safety, et cetera, so many applications. But we are getting into a region now where—it certainly can't be thought of as simply a hardware challenge. There are machine learning issues. There are big data analytics, lots of issues in terms of how you manage the storage and the flow of information that is really a new frontier. So I think we are still, you know, 7 or 8 years away from exascale, but we will be a good chunk of the way there over the next 2 or 3 years.

Mr. VALADAO. All right. Thank you, Chairman.

Mr. SIMPSON. Ms. Kaptur.

Ms. KAPTUR. Thank you, Mr. Chairman.

Mr. Secretary, on page 3 of your testimony, you reference transformational clean energy technologies for transportation, and you talk about intermodal freight and fleets. And, boy, I represent a lot of those in our region of the country. You don't specifically mention public fleets, and as you proceed, assuming the budget is approved, budget request is approved, I would hope that you would pay some attention to the fleets, for example, in our city public transit systems that are big energy users and probably short-changed in terms of new technology. Also, the postal service is a massive user of energy across this country. So I just wanted to mention that in reading—I don't expect any reply, but I did want to note the absence of those publicly.

Secretary MONIZ. One comment?

Ms. KAPTUR. Yes.

Secretary MONIZ. The comment I would make is that public fleets do have a very special role in what we are looking at, and one reason is that for public fleets, the issues of managing what you might call an alternative fuels infrastructure are relatively easier in other contexts, so they are an important focal point.

Ms. KAPTUR. I am moving to another topic.

On the energy-water nexus, terms that I hear very carefully and with great deal of interest, with climate change, if you come to our region of the country, our fresh water region of the country, around the Great Lakes and U.S. and Canada, you will see unmet potential to save enormous amounts of energy in the four season canopies that actually raise a great deal of the fruits and vegetables that are consumed. Over the last, oh, 100 years, 80 years, because California had special climatic conditions and certain availability of water, a lot of that fruit and vegetable production—in fact, over half of it—moved to the State of California from places like Ohio. And what we are finding is that because we have the water now, but we don't have necessarily the most modern production facilities, we need some attention here. And let me give you an example.

Recently—and I want to put this on the record—a company from Canada, called Nature Fresh, located in Ohio, and they are building a 200-acre first wing of a production facility using the waste heat off of North Star Steel. So the CO_2 is going to come in and feed the plants. But even till today, with the so-called latest technology, a third to a half of the bottom line of these operations is energy. We simply have to perfect the material science, the energy science, and link it to very careful use of water and nutrients in these facilities. I think we could have a rebirth in the Great Lakes, and you can see it happen on the Canadian side. I am not quite sure why it is not happening completely on the American side at the same robust level. But if we could cut that energy cost, we could absolutely give rebirth. And we are much closer to markets, three quarters of the population of the country, and we don't have the heavy carbon footprint of moving all that across the country. So I just wanted to bring that to your attention.

And one of our greatest impediments is that we are having trouble finding where the waste heat sources are for CO_2. I don't know if anybody's got infrared shots or something on some satellite somewhere, but it would sure be nice to know where this waste heat exists so that we could focus it on this very important industry that

is nascent, that could really green up in our part of the country. I think material science is important, because people look at conventional materials, but, actually, with light, you can raise—in a room like this, you can raise a lot of product in a room like this. So the energy equation on this one is really critical. And I know that members of your Department are thinking about this. The first reaction we got from Energy is: Oh, we can't look at that; that is agriculture. Take my word for it: the energy issue is not an agriculture issue. It is a Department of Energy issue, and the material science is a Department of Energy issue. So I am very, very excited about your energy-water nexus pathway here.

And I also wanted to mention, and I know you have listened to us, but as we think about energy-water nexus, as you look across the Great Lakes, at our sewage treatment facilities, which have nutrients as an end product, and if you look at our water treatment facilities, they are mammoth energy users. For every city that I represent, Cleveland, Lorain, Sandusky, Toledo, if you look at the energy bill, it will blow your hat right off.

And the question is, how can we link the energy water theme to helping these big cities save millions of dollars on their treatment costs for water and wastewater? What does the Department of Energy have to, offer in this regard? I just pose the question. I know you are open to it. You are open to all ideas that could help us on the energy front, and I would only challenge, as we think about grid and you come to older industrial communities where you have automotive, steel, rail, all these older treatment facilities—Flint, Michigan, being the most recent disaster that we had in the country on the water side—but if you look at these communities and say, what can the Department of Energy do there that is transformational? I don't have the answer, but I know there is something in your tool kit that if we fashioned it the right way and did some pilots around the country, where we could really help these places. And so when I think of energy-water nexus, I think about where people live and the systems that keep them alive through fresh water and our wastewater treatment. So I just wanted to put that on the record. Now, if you want to comment, please do. I don't expect an answer, just an openness.

Secretary MONIZ. Well, just a brief comment, because I share your enthusiasm for the energy-water challenge. As I mentioned already earlier, the whole issue around wastewater will certainly be an important part of what we are doing. The second point I want to make is that the energy and water discussion that we have generated at DOE has from the beginning been a multi-agency discussion. So partnering with other agencies on specific problems is certainly something that we intend, and the USDA, for example, could be one of those.

The other point I would make, because I want to stay on message with one of my favorite themes, is the kind of energy efficiency opportunities that you raise in this kind of urban water context is a good example of what a Regional Innovation Partnership might focus on, because it is something that region, really thinks is important. And it is exactly one of our motivations that different regions will focus on different important problems that maybe others

aren't thinking about in the same way. So in the upper Midwest, the industrial area, they have some very, very specific challenges.

Ms. KAPTUR. Thank you, Mr. Chairman.

And I just wanted to say that when the Secretary goes to Israel, I wish I could go back there with you, but I will just put on the record that the Cleveland Jewish Federation along with many others have worked very hard to develop a relationship in Beit She'an, which is near the Jordanian crossing, and we have actually, brought scientists from there who have developed the most incredible production facilities for food, that I think have application here. And so we think we have some knowledge in our part of the country and have visited parts of Israel where natural partnerships exist, and we would love to share information with you on that. And I will wait for the second round.

Thanks, Mr. Chairman.

Secretary MONIZ. We would appreciate getting that information, yes.

Mr. SIMPSON. Mr. Honda.

Mr. HONDA. Thank you, Mr. Chair.

And welcome, Secretary Moniz.

Before I get started, I just want to make a quick comment about my thanks to you for your role in the U.S.-Iran agreement. I think that the President put together a great team. But without your background, without your experience, without your presence, I don't think that the confidence in the public in what we what was developed would have never have been able to be understood or confirmed, and I think you lent that credibility.

And to President Obama, I think that him appointing to the Department of Energy scientists—first scientist was Steven Chu; the second was yourself—both of whom have wonderful, not only policy but also research and intelligence in terms of application of what you know into your society and how we can better use whatever it is that is coming out of the Department of Energy, and I think your presence answers the question about how well we can expend research and development moneys into the fabric of the society. And I think the shifting of leadership of the Berkeley labs from Paul to—what is it, Michael?

Secretary MONIZ. Mike, yes.

Mr. HONDA [continuing]. Should be a transition that should be smooth, and also we are going to be celebrating that Molecular Foundry very soon, which is also another investment we have made in this country that has been able to deploy a lot of things that we take for granted in our lives.

Having said that——

Secretary MONIZ. Thank you.

Mr. HONDA [continuing]. I would like to shift towards utilizing the technology into what we every day call weatherization. And, you know, the science—you know, really, the science is a foundation for our technology and our innovation. And I would like to invite you to my district, Silicon Valley, where we are developing a lot of clean energy technologies. But let me start off with the access to renewable energy. Renewable technologies can provide households with clean power, lower utility bills, and have the potential to unlock economic growth across the country, if not just, you

know, regionally, but many people can't get these technologies because due to cost of bringing in these technologies or unsuitable space in their living areas or not owning their own living space either.

Last year, the President launched a National Community Solar Partnership headed by the DOE, and I was wondering what the status of the partnership is?

What progress have you been making so far at improving access to solar energy? If you have any suggestions for what we in Congress can do either through appropriations or through authorization to help accelerate that progress, and how has the private sector responded to the need for investments in the community solar projects?

Secretary MONIZ. Well, thank you. And, by the way, in terms of your Silicon Valley district, I would just note that June 1 and 2, we will be in that region hosting a Clean Energy Ministerial of 23 countries and the EU, so that might be a chance to interact there.

Mr. HONDA. Great.

Secretary MONIZ. First of all, the solar deployments, distributed solar in houses, is really dramatically increasing. In fact, earlier, it was said about the number of jobs. I would just note that at the end of November, there were 208,000 direct solar jobs in the United States.

So it is really quite impressive. And the job growth in solar is at 12 times the pace of job growth of the economy as a whole. We are adding about 2 million jobs a year in the economy, the pace is enormous.

Now, in terms of what we are doing in terms of advancing this, obviously, a very important part is the continued driving down of costs. That is clear. The cost of solar panels, et cetera, is going along very well. However, very importantly is working with the communities and the cities in terms of what are sometimes called the soft costs. Those can dominate the cost of a system for a consumer.

So, in our SunShot Program, we bring that in as a key element. You know, we don't have, of course, the regulatory capacity, but we do technical assistance. We try to share best practices, and we are seeing, I think, those soft costs come down.

Frankly, in the United States, those costs at one point were about two and a half times as great as the costs in, for example, Germany, so a lot of streamlining and working with the communities, I think, is quite important. But we are seeing dramatic increases. I forget exactly, but I think we are now up to something like 9,000 megawatts of home solar systems.

Mr. HONDA. If I may, Mr. Chairman, a followup question would be in that light of driving the costs down, making it more accessible, increasing more jobs, the issue of weatherization is a policy we have where we go into homes of low-income, fixed-income seniors to reduce their costs of energy and through insulation. What does it take for us to add solar to this program, and how do you see that happening? Because we have been working with the green energy initiative and, you know, trying to pinpoint how we can do this with these communities. If we are truly going to drive down the costs of energy, I think adding solar to it will increase that pos-

sibility and, also, for them, you know, reduce dependency on fossil fuels.

Secretary MONIZ. Right. I may need to get back to you with a more detailed suggestion, but I think we would need authorization to, for example, integrate that into the weatherization program, which, I believe—and I am speaking a little bit outside of my lane—can only be used for lowering energy use—insulation, windows, et cetera—versus actually providing generation.

But I completely agree with you that it is the integrated look that makes the most sense.

Mr. HONDA. But the idea that you are increasing, again, another source of energy, does that not reduce the cost of utility for the homeowner?

Secretary MONIZ. Well, sure. To the extent to which it is generating and potentially even selling back to the grid.

Mr. HONDA. Right.

Secretary MONIZ. That gets to the whole net metering thing. But I think an important point is that looking in a system way at decreasing the amount of energy needed and then bringing in things like solar and LEDs, for example, really makes a sensible system. The LED, for example, requires only one-sixth of the electricity. So integrating solar, efficient appliances, like LEDs, and addressing the building efficiency altogether, I think, makes a lot of sense, and that would be a great program to put forward.

Mr. HONDA. If I may ask, if we can work with your staff in developing this approach.

Secretary MONIZ. Great idea.

Mr. HONDA. Thank you, Mr. Chairman.

Mr. SIMPSON. Thank you.

Mr. Fortenberry.

Mr. FORTENBERRY. Thank you, Mr. Chairman.

Mr. Secretary, good morning. Pleasure to see you again. Thanks for coming before the committee, and thank you for your leadership as well.

Mr. Secretary, I ran track in high school. I was a triple jumper, long jumper, but one night——

Mr. SIMPSON. Really?

Mr. FORTENBERRY. Yes. Unbelievable.

There is a relevant point here, I hope. One night I got put in a mile relay. Several people were probably hurt. I don't remember the exact circumstances, but I was in, I think, lane 8. And in a longer relay—back then it was the mile relay—the lanes are staggered. So, to our ongoing point about nonproliferation, we have various lanes of this throughout the government. Now, I started the race way out front. By the second curve, everyone had pulled even, and because I didn't have sprinter speed, by the end of that turn, people were passing me by.

The echo system in which we are considering nonproliferation concerns me, in the sense that we, again, have separate lanes between agencies. Perhaps you are the one most out front in the Energy. Defense, State, to a degree Treasury, Homeland Security, and then I think the National Security Council has coordinating responsibilities as well. But if we are all in our separate lanes, is there enough cross-pollination communication to begin to really press for-

ward and discern whether or not the current architecture, the current definitions of our programs, the emphasis areas are meeting the potential threats that are out there?

The reality is you have spent enormous energy on this Iran agreement. I assume that was, of course, an appropriate diversion for your resources but a very big diversion.

As we move into the future, where technology is more available, where the threats of nonproliferation grow with nonstate actors, is the current ecosystem for our nonproliferation efforts in the government sound? And what are we doing to think through the policy of potential changes that could achieve the goal of what we all want to see—as close to a probability of zero that something goes wrong in this arena?

Secretary MONIZ. Well, as we have discussed now for a couple years, I think we both share a strong commitment to nuclear nonproliferation as really an overarching responsibility and a big threat.

First, let me just say that I do think that this is an area where I feel that the interagency coordination actually is pretty good. Lots of meetings at the National Security Council drawing upon particularly DOE, State, Defense, and Homeland Security. So I feel pretty good about that.

Second, I think the report—that it was the first time the NN Program provided to Congress, last March or April was a comprehensive report that did a little bit of kind of over-the-horizon looking in terms of threats. And that is something that we could come back and discuss in much more depth.

Mr. FORTENBERRY. I think we ought to do that.

Secretary MONIZ. OK. That would be great.

Mr. FORTENBERRY. Mr. Chairman, I know you are interested, as well, in this question. I think this is so absolutely critical, that if we could concretize some—realistic time in the short term, that would be helpful.

Secretary MONIZ. No, we would be delighted to do that. In fact, the whole point of the report, was to stimulate discussion. And, in fact, part of the origin of that was we are required by statute to submit every year a report on our weapons program. And it is a good, comprehensive report. And then we felt we should do the same thing with nonproliferation.

Third, I would just say that I think it touches a little bit on what you were saying—there are a variety of threats. Obviously, we have seen in the press recently things about ISIS, for example, possibly having some interest in radiological materials. There is an example of a focal point where we really have to look at it.

And there, I will just say that—I am going to be honest—while we continue to have some good collaborations with Russia on nonproliferation issues and securing materials, particularly in the former Soviet Union, the reality is the current situation with Russia does not make our collaboration quite as robust as it was some years ago.

The implications of that relationship, the strain in that relationship, are not often carried over to what it means for nonproliferation.

Mr. FORTENBERRY. Yes. I think in previous testimony you had said that, although there is significant stress in the relationship, the science-to-science, technical-to-technical cooperation continues as one of the remaining threads of any kind of relationship. I hear what you are saying now; even that is under duress.

Secretary MONIZ. It has probably gone a little bit south.

Mr. FORTENBERRY. Let me go to a specific point, though, that is a particularity in regards to your comments and our ongoing discussion, particularly given that there is a decrease of $62 million in your current request for nonproliferation programs. Can you explain that?

Secretary MONIZ. The decrease is largely associated with the——

Mr. FORTENBERRY. Russian.

Secretary MONIZ [continuing]. Proposed shift in the MOX program.

Mr. FORTENBERRY. OK. But outside of MOX, that is my understanding, that non-MOX proliferation programs, there is a decrease of about $62 million relative——

Secretary MONIZ. I see.

Mr. FORTENBERRY. Do you want to come back to that?

Secretary MONIZ. Well, in terms of the specifics, yes, I would have to come back to that. But——

Mr. FORTENBERRY. Look, I get it. Spending isn't always necessary to achieve the best outcomes——

Secretary MONIZ. Well——

Mr. FORTENBERRY [continuing]. But in this case——

Secretary MONIZ. But, also, there are considerable uncosted balances right now. So we actually don't see a spending problem in the program.

Mr. FORTENBERRY. That was my understanding, that this would be carryover funds.

Secretary MONIZ. Yes.

Mr. FORTENBERRY. But that also begs the question, what is not being used and for what reason?

Secretary MONIZ. Well, partly is, as you said, some of our programs have gotten dialed back with Russia. I mean, that is just a fact.

Mr. FORTENBERRY. The second issue related to this—I was going through your testimony, and we are moving forward on research, aggressive research, on small modular reactors, again, to the point of, when we look out on the horizon—and I am not talking about next year's budget hearing; I am talking about 30 years—when this technology is pervasive and it has become much smaller and scaleable, the implications for nonproliferation are huge, as well.

Again, this is this delicate line we have between civil, peaceful purposes and weapons programs, in effect. And, you know, you are a couple of switches away, frankly, from moving one intention to the other. That is the reality.

So, as we move forward with scaleable technology that is easier to use, more implementable, that is widespread, this also has proliferation implications I see.

Secretary MONIZ. Certainly, although we should emphasize that the principal nonproliferation risks are associated not with the reactors but with the potential surrounding fuel cycle activities, spe-

cifically enrichment or reprocessing. And I think what we need to do is to continue to encourage any development of nuclear power not to be accompanied by those activities.

And, you know, that was one of the issues with regard to Iran, in terms of the set of fuel cycle activities that was going on, in contrast to most nuclear power countries that buy fuel on the international market, for example.

Mr. FORTENBERRY. But along with that development there will be new pressures to have standalone enrichment, potentially, or a diversion of certain types of fuels. This is just—again, the smaller scale that it gets, the harder that it is to control, I would think.

One of the controls that we have now is that it is such a grand investment of infrastructure that it has to be led by large nation-states. And, without that, I worry, again, as we granulize this technology——

Secretary MONIZ. If I may, I would just argue that there is a counterargument, in fact, that if a country is deploying only a very small amount of nuclear power, there is absolutely no rationale whatsoever for developing the surrounding fuel cycle activities.

Mr. FORTENBERRY. OK. That is fair enough. But I think you understand the trajectory of my question.

Secretary MONIZ. Oh, it is a balance.

Mr. FORTENBERRY. Yeah. All right.

Thank you, Mr. Chairman.

Mr. SIMPSON. Mr. Fleischmann.

Mr. FLEISCHMANN. Thank you, Mr. Chairman.

Good morning, Mr. Secretary.

Secretary MONIZ. Good morning.

Mr. FLEISCHMANN. Before I begin my questioning, I wanted to convey a personal note of thanks to you, sir. When you were sworn in as Energy Secretary, your very first visit was to my beloved city of Oak Ridge. I appreciate that. You took the time to sit with me, go over the issues that were critically important to our community. And I have thoroughly enjoyed working with you and look forward to working with you this year on our endeavors.

Oak Ridge is a special place. It sits in two counties, Anderson and Roane Counties. It has a great history, from the Manhattan Project forward. Its people are outstanding, and they are committed to what we are doing. There is so much there—national security, leading the world in innovation. I think we have the premier lab in ORNL. I know our distinguished chairman might have some other thoughts. But I did get him to visit, and he brought the committee.

Mr. SIMPSON. Not bad.

Mr. FLEISCHMANN. Not bad. That is right. And we brought some potatoes along, too, from Idaho.

But the legacy cleanup activity has been incredible. It is going to be long-term, but we clean up and we reclaim there. But when members of the majority and the minority visit Oak Ridge, as you have done several times, there is a "wow" factor. It is just so critically important.

So I want to thank you again for your dealing with those things with me and working with me. I know there are times when we

agree, there are times when we disagree, but I have appreciated that working relationship, sir.

Secretary MONIZ. Thank you. Me, too.

Mr. FLEISCHMANN. Mr. Secretary, I know you have been closely involved with the decisionmaking on the uranium processing facility, the UPF, that is going to replace Y–12, which has done a great job, given the nature of facility, the age of the facility.

This committee has been very clear on the need for UPF. Would you kindly update me and the committee on the design progress made in the last year, sir?

Secretary MONIZ. I would say quite good. The first part of the project, in terms of some of the site preparations, have been completed. In fact, I just happened to bring a flow sheet. There are six main projects to the end of the project in roughly 2025. The first on-site readiness is completed, and the second on-site infrastructure and services is well underway.

Then we will go into a next stage—and, by the way, in fiscal year 2017, we do request a significant increase for the UPF. It is on the ramp up. Then, in the fourth quarter of 2016, we will have the baseline for stage 3. And then, eventually, in the fourth quarter of 2017, we expect to have the baseline meeting 90 percent design for the last two parts of the project, getting eventually to the main process building.

So we think this modular approach—and, again, the red team that Tom Mason led was very important for that. And we think this is, frankly, a superior approach to the initial design that was having cost challenges. And I think we are just on a good track.

Mr. FLEISCHMANN. Mr. Secretary, thank you——

Secretary MONIZ. And it is very important that we do the UPF.

Mr. FLEISCHMANN. Thank you so much. And I appreciate your commitment to that project.

You alluded to the fiscal ramp-up in fiscal year 2017 for the additional funds. And for the benefit of us all, can you please talk about the funding challenges and how we can keep the project on time and on schedule?

Secretary MONIZ. Well, I think, first of all, keeping the project, you know, on schedule and on budget is clearly very important.

And here I would say a few things. One is, I think our substantial revision of the project management structure at the Department is taking hold, and it is working well. Certainly our target is to keep at least almost all of our projects within, say, 10 percent of the design parameters. We established a new risk committee. We have institutionalized the whole structure. The risk committee meets every week going over projects. Our Associate Deputy Secretary plays a major role.

We need to keep the discipline of not so-called baselining until we have at least 90 percent design completion of projects. I think we just got into so much trouble before with putting out numbers for a schedule and cost that just did not have a basis in design.

Third, I think we need to adopt—and I think the UPF is a good example of it—more the philosophy, if you like, of the Office of Science, which over the years has been by far the most successful in executing major projects among our three major programs. I shouldn't say "executioners"—but science, defense programs, and

environmental management are the three places where very large projects occur.

And what I mean is that, once there is a solid baseline, it doesn't mean that problems don't arise. But when they do, you work to keep the project in the budget box and not just have the automatic reaction, "Oh, okay, well, we'll just keep the project escalating."

So the UPF is an example where a fundamental relook was done and the modular approach introduced. So I think that is what we are doing, and right now I think it looks pretty good.

Mr. FLEISCHMANN. Thank you, Mr. Secretary.

I see that our distinguished full committee chairman has arrived, so I am going to yield back until the next round. But, again, let me thank you again, and the future at Oak Ridge will be bright. Thank you, sir.

Secretary MONIZ. Thank you.

Mr. SIMPSON. Mr. Rogers, the chairman of the full committee.

The CHAIRMAN. Thank you, Mr. Chairman. Sorry to be late, but we have 26 hearings going on this week.

Mr. SIMPSON. That is what I understand.

The CHAIRMAN. And 21 last week, and I am trying to make as many as I can.

Mr. Secretary, thank you for being here and answering questions about your budget request.

The work you do at the Department of Energy has significant implications for our ability to grow our economy. The investments you make in the way energy is sourced, stored, and distributed not only determines the future of our energy security but also whether hardworking Americans can expect to have access to reliable energy at an affordable price. Energy impacts every industry, every sector of our economy, so much so that we can't understate the role it plays in an employer's ability to grow a business or a family's ability to plan and stick to a household budget.

With families now paying more for power and growing unrest in energy-producing countries overseas, the question of how we achieve energy independence is more important than ever. So the question remains, knowing that we have abundant energy resources right here in this country, why is the administration committed to leaving that power in the ground?

This administration's priorities with regard to coal are very clear. Rather than supporting an "all-of-the-above" energy policy, as they claim, their actions suggest that their true intention is to keep coal in the ground, and they do so at a very high cost. Coal is the cheapest and most abundant natural resource in this country. Businesses, schools, and communities can rely on it during storms and record cold temperatures and other unexpected circumstances.

Meanwhile, the administration's war on coal has left 10,000 coal miners in my district laid off. They are trying desperately to find work in some other job when they should be at work providing us with access to the affordable and reliable energy that coal provides. Nevertheless, the administration continues to write rule after rule intended to regulate coal out of the marketplace and my constituents out of work.

Today, you present us with an energy budget that slashes funding for coal research in favor of renewable energy. Congress has re-

peatedly restored funding for coal research development and, in doing so, has sent a very clear message about our priorities for our national energy policy. Yet again, you have ignored congressional direction in favor of the priorities set by extreme environmental groups and the EPA.

The Department has requested a reduction from 2016 levels for CCS and power systems while restructuring it in order to integrate funding for coal and natural gas carbon-capture projects. Congress has separated these funding streams in the past in order to ensure that the funding appropriated to develop clean coal technologies for each resource are utilized as intended.

Furthermore, while you have given renewable energy a sizable $825 million increase, you have reduced fossil energy investments by $272 million. That is a 43-percent reduction, which you propose to make up for with budgetary gimmicks.

You continually state that you are committed to an "all-of-the-above" energy policy and that this begins with a commitment to low carbon. If that were the case, this budget request would make the necessary clean coal technology and coal research investments that seem to be missing in an effort to implement that policy.

With coal generating 40 percent of the electricity in this country, CCS technology and investment in fossil energy research is vital to developing an energy economy that is reliable, affordable, and efficient. This budget request does not make the necessary investments in achieving that goal.

These topics are critical to ensuring the affordability and reliability of the many energy resources we have in the country and important to our national security. I look forward to further hearing your testimony and answering questions.

Thank you, Mr. Chairman.

Mr. SIMPSON. Mr. Secretary, let me state something that you know is the issue we face here with this budget proposal that the administration has presented us.

You state in your opening statement: The request consists of $30.2 billion in discretionary spending, $640 million above the fiscal year 2016 enacted appropriation—that is $640 million above last year—and $2.3 billion in new mandatory spending proposals requiring new legislation.

Is the Department going to propose new legislation to the authorizing committees?

Secretary MONIZ. Yes, sir, our intent is to—at least some of those requests.

Mr. SIMPSON. Even if, as an example, with the $673 million in USEC funds that you plan on transferring over to use in EM, in cleanup, if the authorizing committee authorizes that, it is going to score against them. If we do it in our budget, it is going to score against us. So PAYGO is going to have to go.

So we have a budget that proposes $640 million above last year. It also decreases funding for the Army Corps of Engineers' budget by $1.369 billion, or a 22-percent reduction. You have to remember this is an Energy and Water Committee, so we have to look at the overall budget.

Somehow we are going to have to make up the $1.369 billion in the Army Corps of Engineers' budget, because I can't see this bill

passing Congress without making that up. Everybody has an Army Corps of Engineers project in their district, frankly, and, consequently, Congress is going to insist that we make that funding up.

So now we are down almost $1.4 billion. We are down $673 million that will come out of the USEC fund. Even if we somehow find the $674 million to put in EM, the EM proposed budget at that time is still $100 million below last year's level, which is going to cause some problems. WIPP is $34 million, or 11 percent, below last year's level.

So we are going to have to make some considerable adjustments as we try to fill in these other accounts. And it looks like the place that you are going to find it is the place that has increased the most in your budget, which is one of the ones nearest and dearest to your heart, and that is the research and development initiative that you have suggested for a 21-percent increase. And while I don't disagree with what you are trying to do in this initiative, at this level it is going to be very difficult to make up ground and put funding in there.

I know that you understand this. We have had this discussion. But I just wanted to state that. These are the challenges this committee is going to face in putting together this budget.

Let's talk for a minute, if we could, about a subject near and dear to all of our hearts: MOX. The budget request proposes to terminate the MOX project and begin pursuit of an alternative to dilute and dispose of 34 metric tons at the Waste Isolation Pilot Plant in New Mexico. WIPP is a pilot repository for a certain amount of particular defense waste, and DOE has requested to move forward with a significant expansion in the WIPP mission.

To date, DOE has done a safety assessment for disposal of a relatively small portion of plutonium but has yet to perform a safety analysis for the full 34 metric tons. There was an independent study, a safety analysis, performed by an outside group that warned of safety and regulatory problems that could be encountered with disposing of large amounts of plutonium in WIPP, the most significant of which is the possibility of criticality.

Is the safety analysis DOE has performed thus far truly scaleable, or are there implications to disposing of a much larger amount of plutonium in WIPP? Are you looking at these safety issues now that they have been brought up to you? Do you believe they have merit? And how might the full analysis change the cost to dilute and dispose alternative? For instance, are you currently allowed to ship weapons-grade plutonium to WIPP?

Secretary MONIZ. Thank you, Mr. Chairman.

If the chairman will permit, I just would like to make two brief comments on the last two questions.

Mr. SIMPSON. OK.

Secretary MONIZ. First, for Chairman Rogers, I would certainly welcome the chance to come and talk over the entire coal program and get your perspectives further but, also, to add our perspective, which I think is a pretty robust program. So perhaps we could think about that offline, if you would permit.

Secondly, on the overall budget that Chairman Simpson raised, I do want to note that, first of all, things like WIPP in the big

budget context, that decrease is all part of the plan. I mean, that is a full funding plan for moving towards restart of operations. There was a peak because of some of the capital work that was going on. There will be additional capital work in the future in terms of a new ventilation system. So that is already in there.

And things like the USEC fund, we did propose a specific offset there in terms of restoring the fee. A quarter-mil-per-kilowatt-hour fee over 10 years would more than offset what we would use out of the USEC fund. So I think we do have some—we have addressed part of your problem, at least.

Mr. SIMPSON. At least part of it.

But let me ask you, not on that point, the previous point, at WIPP, if we fund WIPP at 11 percent below last year's level, a $34 million decrease, is it still on schedule at that level to open the latter part of this year?

Secretary MONIZ. Yes, it is. Yes. And—yeah, absolutely. We are committed to that, of course, safely. I mean, doing it safely, that is our plan.

Going to the MOX question and the criticality issue specifically, so we asked Sandia Laboratory to do an analysis of the assertions in the High Bridge report, and, frankly, they concluded that the risk of criticality issues at WIPP are just unfounded.

First of all, we note that, of course, we do have almost 5 tons already there in the same form that would go there if, with the Congress, we are able to change the pathway on the scenario in the High Bridge report with criticality control overpacks containing the diluted plutonium being crushed, et cetera—Sandia evaluated it as rather simplistic and not at all credible.

In addition there are other issues. I mean, there is no separation of the plutonium even in being crushed, so it is not like somehow you assemble a critical mass. I would also add that the chlorine in the salt is a very good neutron absorber. It is actually a very good geological medium for doing this. So we just don't think that that is a valid critique.

I would also add that there are an additional 6 tons of plutonium already at Savannah River that are already, you know, labeled for going to WIPP, which would not have been part of the MOX program. And then another 7 tons, we believe, could certainly be accommodated at WIPP without anything like additional Land Withdrawal Acts or anything.

So, you know, we believe that this is a very sound—a very technically sound pathway.

Mr. SIMPSON. Let me tell you, contrary to popular belief, that the reason Congress has concern about the dilute and dispose alternative is not because of our concern about the South Carolina delegation. There are other issues that cause concern, and that is: We put a lot of money into MOX. Four years from now, when you are gone, I am gone, a new Congress is sitting here and we have moved down a road toward something that we haven't got an approval for yet.

The reason I ask that is, have the Russians agreed to this in more than just "Yeah, we think we could probably go along with that"? Do we have a signed agreement with Russia? Do we know what they are going to ask in return, if anything, to approve of

this? Because, you know, they are pretty good dealmakers. And I suspect there is something on their table that they would like, and is it something can we accept? And if we have stopped MOX, do we then force ourselves into having to accept whatever they want to do? Concern one.

Concern two, the State of New Mexico. I don't see a lot of excitement in the State of New Mexico, in listening to their Senators. And I don't know that they have made a decision, and I am not suggesting they have, but there is obviously concern there. If we have to do another land withdrawal 2 or 4 or 6 years down the road when we have stopped MOX and can't go back in that direction, are we sitting here with our thumbs up our nose wondering what we are going to do next? You know? That is the concern I have.

Secretary MONIZ. Well, again, certainly the pathway, for the first 13—for 13 tons, which is all the plutonium at Savannah River, we think is pretty straightforward there. We would have to do additional safety analyses, and then there is the additional 27 tons, most of which is at Pantex at the moment, to take care of.

On the Russian question, well, the answer is "no," and in a certain sense "of course not," in the sense that we have not, you know, kind of triggered the formal process, which exists in the agreement, to see about endorsing the change.

As you indicated and as we have discussed previously, we have had certainly a number of discussions—I have had a number of discussions with Rosatom. The Deputy Secretary has, as well, with their deputy. They have expressed certainly a willingness to listen. But until, I think, we see with the Congress what our pathway is, we have not had of a formal initiation of a process.

Now, as you know, and as I think we have been very consistent for the last 2 to 3 years, is that our problem is the current pathway is not viable. We believe the dilute and dispose is both faster and cheaper, and the faster is important—much faster, by the way. We are talking a lot faster to move.

Mr. SIMPSON. By a factor of what?

Secretary MONIZ. We are talking about—the MOX approach will probably not actually put plutonium into a reactor if—and talking about uncertainty—if we can find somebody to burn it. There is no commitment to accept MOX fuel in any reactor in the United States. But if we get over that, then we are probably talking 2040-ish to begin versus maybe 15 years earlier with dilute and dispose.

So I think we have strong motivation. And our problem is, as we have always said, that to complete the MOX program we are going to have to bump up the funding to at least $800 million a year, probably closer to $1 billion a year, for a long time.

And so I have always made it clear, if the funds are there and the Congress wants to do it, we will do MOX. But we just don't see it as being realistic. And, again, I am not talking about just the MOX factory but the whole system and its operations, with certainly north of a $30 billion lifecycle to-go cost.

Mr. SIMPSON. So there are all these positive results. Certainly South Carolina has agreed to this, right?

Secretary MONIZ. No, as I think you know quite well that this remains—look, I am not going to sugarcoat it. This is a very tough

issue, obviously, for all kinds of reasons—some local, but also some policy reasons.

Mr. SIMPSON. Sure.

Secretary MONIZ. And, clearly, no one likes the idea of having gone quite some ways in building that particular facility. As you say, I mean, it is nearly $5 billion of sunk costs. But I am just looking at the to-go costs, and they are at least a factor of two—I think more, frankly—than dilute and dispose. So that is the tough question, the tough issue we face.

Mr. SIMPSON. Well, as I said, for me and I think for a lot of Members of Congress—and I understand that, you know, in South Carolina you are talking about jobs and a few other things like that, which are very important.

Secretary MONIZ. Uh-huh.

Mr. SIMPSON. But, for me, it is that I have seen too many times the Department head down a road over the years and get halfway down that road and find a fork and decide it doesn't want to go. And we end up with these monstrosities out there of half-finished projects or projects that have cost us four times what we thought they were going to cost us. So it is frustrating to me.

What I would need to see, frankly, is a signed agreement with Russia that this is going to be okay, because I want to know what I am getting into. I would want to know that New Mexico is on board and South Carolina is on board and we are not going to be paying fines to South Carolina. That is what I would need to see.

Secretary MONIZ. There is a bit of a chicken-and-egg issue. And, look——

Mr. SIMPSON. You bet there is.

Secretary MONIZ [continuing]. As you know, I have been discussing this now for years. I am happy to get together with both chambers, both parties, all the parties, and see what we can do for a path forward.

But, you know, let's face it, I mean, it is hard to see a convergence, because we have always said at the current funding level—and we try to extend it. We did extend it, working with Congress. We are following the edict of continuing to construct with the $340 million. But I don't think there is much argument that at that level of funding the project just does not reach completion.

Mr. SIMPSON. Is there a stop-work order out there?

Secretary MONIZ. No, there is not.

Mr. SIMPSON. There is not?

Secretary MONIZ. No, no. There is not.

Mr. SIMPSON. None have been prepared and are ready to be issued?

Secretary MONIZ. Certainly not to my knowledge, I think the confusion may come by, I mean, the language is there that if Congress endorses the shift of direction, then a stop-work order in fiscal year 2017 would be issued, but not in fiscal year 2016. We are following the congressional direction——

Mr. SIMPSON. OK.

Secretary MONIZ [continuing]. And constructing.

Mr. SIMPSON. Mr. Rogers.

The CHAIRMAN. Mr. Secretary, you were directly involved in the negotiations with Iran on the Joint Comprehensive Plan of Action.

Those negotiations, of course, have concluded. And DOE is expected to play some sort of role in implementing that agreement, but it is not clear to me exactly what that amounts to.

Is there funding in your request for that nuclear agreement with Iran? Did you request any funds to implement it?

Secretary MONIZ. There are no specific funds. Frankly, it is a relatively low expenditure in terms of supporting travel in kind of our normal nonproliferation activities. Most of these meetings we're supplying technical experts. For example, right now, we have a couple of people in Vienna right now meeting with Iranians to resolve some questions. But we have no major expenditure.

And, of course, I spend some of my time on the phone and in meetings, but that is the kind of thing that we are doing. And a lot of it is what we normally do of supporting the IAEA, because they are the ones who actually have the verification responsibilities.

The CHAIRMAN. The administration has said that, under the terms of that agreement, so much information on Iran's nuclear activities would be collected that if Iran pursues a nuclear weapons program it would be detected.

This week, though, GAO released a report that says that the International Atomic Energy Agency, IAEA, the agency responsible for verifying and reporting back to the international community on Iran's compliance, quote, "faces an inherent challenge in detecting undeclared nuclear materials and activities," end of quote.

Do you believe the verification measures that exist will be sufficient to monitor compliance and detect unlawful use of material?

Secretary MONIZ. Yes. First of all, the inherent challenge is clear, because if it is undeclared it is inherently a challenge compared to the declared facilities in a breakout scenario.

But, look, as Jim Clapper, our Director of National Intelligence, has said, you can never say 100 percent on any particular activity, but he then added that the insight that we get is dramatically enhanced. Certainly, the barriers to trying a clandestine program are substantially higher. There are unparalleled verification measures in there. We feel quite confident about it.

The CHAIRMAN. GAO also described concerns that, absent a complete accounting of Iran's past nuclear program being provided to the IAEA, the Agency would be limited in its ability to detect undeclared activity going forward.

What information regarding the nature or composition of Iran's past nuclear activities does the agreement require Iran to disclose?

Secretary MONIZ. The IAEA investigation into the so-called previous military dimensions was closed out in a report by the IAEA, although they certainly are not proscribed from revisiting that should new information appear. But, right now, our focus is clearly on verification in the future.

And, again, the measures are extraordinary. For example, for the first time anywhere, the IAEA has been monitoring the entire uranium the life cycle since January 16. That is a novel thing. And for 25 years monitoring that fuel cycle, for 20 years monitoring all production of the sensitive centrifuge parts, et cetera.

The CHAIRMAN. How would the agreement identify covert or undeclared activities that Iran might have or might develop over the next 15 years?

Secretary MONIZ. Well, at some point, as I said earlier for a different reason, we may want to get together in a different setting to discuss some of that.

But, basically, it is tracking the uranium; it is tracking all parts of the centrifuge; it is using other means of getting information and then exercising what is also novel, the IAEA's ability to go anywhere, within reason, to go anywhere in a fixed time period. That is, again, a novel feature of this agreement. And other stuff—and we could go into more detail in a different setting.

The CHAIRMAN. I look forward to that.

Secretary MONIZ. OK.

The CHAIRMAN. Thank you, Mr. Secretary.

Mr. SIMPSON. Ms. Kaptur.

Ms. KAPTUR. Thank you.

Thanks, Mr. Secretary, for your endurance here.

Your budget request includes funding for a new competition for regional energy innovation partnerships. And I know you care about them a great deal.

Do you have a conceptual idea yet of how regions of the country would be divided or topics would be divided?

And you intend these partnerships to be fuel-neutral, yet they are included in the EERE function in the budget. Does the Department have a proposal to address this limitation?

Secretary MONIZ. Yes. The proposal is parked in the EERE budget, but the regions would not be restricted to that. If there is a better way of putting that into the organizational structure, we are happy to discuss that with Congress. So number one is it is not restricted in how the regions would shape their portfolios.

Second, we have drawn our own little map for our own thinking, but I think, we very much hope to go forward with this. I think it is a novel and very important approach. And that would be something that we would want to discuss with Members, in terms of how those are structured.

We have tried to have a look at what are the R&D resources in different States and how might one put together the regions of contiguous States. But, again, that is something, I think, that we would have to discuss before actually executing.

Ms. KAPTUR. Thank you very much.

In terms of the national labs, we know what a tremendous asset they are and how much you pay attention to them.

You have recently stood up the Clean Energy Investment Center. And my question is, is this only to serve investors, or are others going to be somehow engaged in all of this? And how do you believe the center should serve business?

Secretary MONIZ. Well, the Clean Energy Investment Center is intended to provide transparency into the national lab programs for investors. That is the goal. On the other hand, you know, this is a public activity. This is not privileged information, so it is transparent. And I think we could consider businesses to be investors if they are interested in a particular technology.

We also, by the way, just hired, about a few weeks ago, an excellent person to head that center. Dr. "Malpotra" I think his name—something like that, approximately.

Ms. KAPTUR. It will be in Washington?

Secretary MONIZ. Malhotra.

Ms. KAPTUR. It will be in Washington, or have you not picked a place?

Secretary MONIZ. This is a very small activity. It would be included in the Office of Technology Transitions that we have asked for, I think, $8.5 million for.

In fact, there would be several functions in the Office of Technology Transitions. One of them is the Clean Energy Investment Center. Another one is—we have listened to the Congress that asked for the formation of what we have labeled it Technology Commercialization Fund. It is a fund explicitly put together with 0.9 percent of the applied energy programs funding. It is about a $20 million fund that will be run out of the OTT competitively for the labs, again, to commercialize technologies. That was put into the—I think it was the 2005, I think, Energy Policy Act. And we are proposing to implement that in 2017.

I might add, in terms of this structure of the OTT, it is not exactly the same subject, but going back to Chairman Rogers' comments earlier, opening statement, I would note that another initiative—and I think it is relevant to some of the things that Congresswoman Kaptur has mentioned in the past—is, about 2 years ago, we formed a Jobs Strategy Council and brought in two excellent people to do that. And I think they have had very good impacts, including, by the way, they have had some work with Paducah.

But, in the budget, we are asking to formalize that into, again, a small office whose focus would be often in working with labor, but the focus is on energy jobs in the country and what do we do to support them. So that is another initiative in the fiscal year 2017 budget.

Ms. KAPTUR. Thank you for those clarifications.

I wanted to turn quickly—just as a comment, the budget request proposes to establish a new hub focused on enabling technologies related to desalination. And the hub is proposed as a 5-year, $25 million initiative, and it would be a centralized research and development effort.

Coming from an area that won't need desalinization, I just wanted to point out that there are many water-related needs and power-related needs in other parts of the country related to clean energy, and I would hope that they would get equal attention. So that is in the way of an advertisement for the Great Lakes. And just wanted to——

Secretary MONIZ. I would add, the Energy-Water Nexus Program is much bigger than that.

Ms. KAPTUR. All right.

Secretary MONIZ. That is where that comes in.

Ms. KAPTUR. All right. Thank you.

And I have to end on a little light story. And it actually is a light story. And that is, you work at very high levels, Mr. Secretary. You negotiate with the Soviet Union—or, excuse me, Russia, although it certainly looks like what it used to be.

But out in Ohio, there are two farmers. One guy is named Dick, and the other guy is named John. And Dick runs a—he is a very innovative farmer, but he farms under a canopy. And he and John are always in competition, kind of like Jeff was in competition as a high jumper.

But Dick figured out that if he uses light something happens. And so he grew tomatoes that were so productive on vines that were one-third larger than John's tomatoes—and John runs a big processing company called Hirzel's—that John pulled his tomatoes out of where he was growing them, and he drove down in his truck down to Dick's operation to spy on how he was getting this higher yield. And they are sort of figuring out down there on the ground that light has a whole lot to do with success and higher yields.

And so I want to say that, to help our region of the country, that the ingredient of energy and light rays and light frequencies is something that needs attention, more than it is getting. And the way in which these folks are trying to compete, unsubsidized in a global marketplace, could really be enhanced by your department.

You already know that; you have heard me say it. But they are competing against cap-and-trade-subsidized systems in places like Brussels, Belgium, that get a 50-percent subsidy. And so, for us to be competitive, the energy piece is critical. And the folks at the Department—not you, but the people who work under you—have to understand this.

And it is not as difficult a challenge as providing power to Orion in deep space, but it is a real challenge on the ground. And it shouldn't be so difficult for these folks that are out there trying to make it in the marketplace to have the benefits of high science.

So I just wanted to end with that little story, because I want both Dick and John to be successful and to have the very best energy knowledge that they can possibly have in materials science so they can be the most successful farmers in the world.

Secretary MONIZ. I would suggest they also capture carbon dioxide and put it in a greenhouse.

Ms. KAPTUR. Well, help us do that.

Mr. SIMPSON. Mr. Honda.

Mr. HONDA. Thank you very much.

And let me shift a little bit towards energy storage. We know that energy storage technology can fundamentally improve the way with generate, deliver, and consume energy by increasing the electrical grid's capacity, flexibility, and reliability. And when it is paired with renewable energy, storage can increase the amount of clean energy that can be distributed throughout the grid and throughout the community, from homes, cars, to the grid.

Can you give us an assessment of the status of energy storage technology, and is the technology ready for widespread deployment? What are the barriers we need to overcome to speed up the deployment of storage technologies? And does DOE have a strategy to increase the deployment of storage energy throughout not only the electric grid but make it more available for homes and utilization of our electric cars and distribution of that?

Secretary MONIZ. Yes. Thank you. That is really an important subject. And we do in the fiscal year 2017 budget propose some significant increases there, I think up to $225 million over—I think

it is over three different programs, Office of Electricity being one of them. Of course, the Energy Efficiency and Renewables Office has a particular focus on the automotive side and on the integration of things like electric vehicles into the distribution system. So those are all going forward.

The role of storage in the grid is certainly extremely important. As you know, in California, there is an initiative, in fact, requiring storage to be included.

I must say that one of the things which is not a technology issue is we probably do not yet have developed the kind of regulatory structures to properly value storage in the grid, in terms of what it actually does for the whole system. It is obvious in terms of intermittent renewables, but there are other things in terms of grid stability, frequency stability, et cetera.

So we are focusing on that. I think there has been a tremendous advance in the last years. Costs have come down probably 70 percent in the last 7, 8 years, but we still have a ways to go.

In the automotive sector, for example, to be more specific, we model large-scale battery production based upon current technology as, let's say, around $250 per kilowatt hour of storage. We need to cut that down by at least a factor of two for it to really expand in the marketplace.

But we are optimistic. I mean, at the pace we are going, I think, you know, we will be there certainly within a decade.

Mr. HONDA. Thank you, Mr. Chairman.

Mr. SIMPSON. Mr. Fleischmann. And I have to tell you that when you say "Idaho potatoes" in the same sentence that is redundant.

Mr. FLEISCHMANN. There you go.

Mr. SIMPSON. All potatoes come from Idaho.

Mr. FLEISCHMANN. And we love your Idaho potatoes. And when I visited your lab, I had some of the best Idaho potatoes in the world. So thank you.

Secretary MONIZ. Actually, Mr. Chairman, if I may, I was just handed a note that I misspoke on something. I should clarify, unfortunately, for Chairman Rogers, that in the budget we do have explicitly $13 million for the JCPOA implementation. So I would like to just correct that for the record.

Mr. SIMPSON. OK.

Mr. Fleischmann.

Mr. FLEISCHMANN. Thank you.

Mr. Secretary, several years ago, some shortsighted changes were made to the management structure in the Department of Energy Oak Ridge Federal office. These problems have removed incentives for the many DOE program offices to work together in an integrated way that marshals all of our assets for greater results. The changes also have resulted in serious conflicts with local elected officials on top DOE priorities.

Mr. Secretary, we need your help in removing the stovepipes and integrating Oak Ridge programs again. My question for you is, will you work with me to address these problems, sir?

Secretary MONIZ. Congressman Fleischmann, I know the programs feel that the new organization, if you like, kind of better aligns what they are trying to do. So if there are issues, however, of kind of bridging between them, that is certainly something I am

happy to discuss with you and the programs and see if we can improve that.

I do add that, from the program side, they feel the new organization is actually giving them better alignment with what they are trying to do. Now, Oak Ridge, admittedly, is a complicated site. Not only does it have the three major programs there, but even just geographically you have some of the military stuff sitting in the laboratory. And I know that is a challenge, so I would be happy to discuss that.

I also want to say that we are moving, I think, expeditiously in terms of hiring the new science manager.

Mr. FLEISCHMANN. And I thank you. And these changes were made prior to your tenure and prior to my tenure. And there was an individual, who is a mutual friend of ours, who had that role. And that model was something, back years ago, that worked very efficiently, and I would just put that forth for your consideration, sir.

My next question is going to be on high-risk excess facilities. You named a panel within the Department of Energy, sir, to find solutions to the problem of high-risk excess facilities. What were the panel's findings? And what is your plan and timeline for reducing the risks in taking down these buildings, sir?

Secretary MONIZ. Get more money.

Mr. FLEISCHMANN. Yes, sir.

Secretary MONIZ. Yeah, so we have used our Laboratory Operations Board that I formed in 2013 in looking at what I would call really systemic problems.

The three areas I would just note that are kind of, in some sense, I view as connected—one is that, for the last two budgets, we have insisted on a principle, although calling it a principle may be elevating it too much, but a principle that the programs shall not put forward budgets that further increased deferred maintenance. You know, it is the old theory of holes—you have to kind of stop digging, and you have to just stop at some point. So the last two budgets, including this one, respect that principle.

Second, there was a major—really, the first, as far as I know, systemic study of kind of what I would call the general infrastructure needs at our laboratories and sites. And I am happy to say that, you know, it is a big bucket, but we are putting drops into it. And this budget, again, has a significant increase in addressing the general infrastructure issues.

The excess facilities are, frankly, more difficult, including sometimes the issues of boundaries, like transferring responsibility from NNSA to Environmental Management, and then when one runs into the budget problems that the chairman described earlier.

So all I can say there is that, you know, I think we are facing the problem. As you say, we charge this committee to look at these issues, and we are doing our best within the budget constraints. And at Oak Ridge that is certainly an issue to be concerned about.

Mr. FLEISCHMANN. Thank you, sir. Yes, it is.

One last question. As you know, in Oak Ridge, we not only clean up legacy sites, we reclaim them for economic development. And I think we do that perhaps better than anywhere in the country.

And I want to thank you again for your efforts to restart the stalled land transfer process for excess Federal land that is important to many DOE communities that lose tax revenue from the Department, substantial landownership.

We are grateful for the advancements that have occurred in the last 2 years, but has it become apparent that the process needs to be streamlined. The current system allows unlimited time with too few constraints on the many decision-makers involved in the process.

Mr. Secretary, would you consider authorizing a closer look at the process to find ways to streamline and shorten this process, sir?

Secretary MONIZ. I would be happy to have that looked at. Streamlining is a good thing, so we will do that.

Mr. FLEISCHMANN. Thank you.

Secretary MONIZ. In some cases, I might add, in some cases—you said multiple sites. And, in some cases, there are also different opinions in the community about how that is done, so it is not a cookie-cutter kind of issue. But we will look at it.

Mr. FLEISCHMANN. Thank you, sir.

I yield back.

Mr. SIMPSON. Mr. Fortenberry.

Mr. FORTENBERRY. Thank you, Mr. Chairman.

Mr. Secretary, I will probably return to the nonproliferation question this afternoon with General Klotz and get his perspective on whether or not the current construct is needing to be rethought, where we are in terms of a long-term assessment, but also probably—well, I will mention your interest in some additional meeting within the coming weeks or months.

Secretary MONIZ. Let's do that. That would be great.

Mr. FORTENBERRY. OK. Excellent. Thank you.

Regarding MOX, we are stuck. It is too expensive to complete. There are, really, three variables, that being the main one, too expensive to complete. There is a fairness issue to South Carolina, and then, third, what do you do with this fuel if we don't move forward.

Again, rethinking the whole construct, you talked about a Mission Innovation agreement in clean energy, R&D there. Has there been any thought to again—and it has broader implications, I think, with the IAEA and the entire international community and the entire fuel cycle and waste disposal problem and blend-down problems—of creating some of type of new international architecture of a shared agreement in which we are participating with other countries in this rather than trying to carry this load by ourselves?

Secretary MONIZ. Well, first of all, at a general level, I think as you know, at the very end of March, the President will host here the national security—no, the——

Mr. FORTENBERRY. The nuclear summit.

Secretary MONIZ [continuing]. Nuclear security summit. Thank you. And that is, of course, a global discussion about nonproliferation architectures.

With regard to plutonium disposition specifically, there certainly has not been any discussion of the type that you have suggested.

Of course, fundamentally, it comes down to Russia and the United States as having the large amounts to dispose of. And we should also note that at least my understanding is that, you know, Russia is not exactly either burning up the plutonium at this stage either. It is a tough, expensive proposition, as we have found.

Mr. FORTENBERRY. The blend-down option and storage in New Mexico is a reasoned alternative, from your perspective?

Secretary MONIZ. Yes. Well, first of all, I do want to emphasize that for the 34 tons, plus, by the way, the additional 6 tons that I mentioned at Savannah River which are not intended to be MOXed, we are not stating that necessarily all of that goes to New Mexico. We have said that 13 tons on top of the 5 that are already there can certainly be accommodated at WIPP, and the 6 tons are already scheduled to go to WIPP. Of course, WIPP has to get re-opened, and that is going to be another 5 years before they are—let's say roughly 5 years until they are in full operation.

But, technically, it is very simple. We have done it. As I said, we already have 4.8 tons diluted and disposed at WIPP. This exists. So there is really—frankly, there is far less technical risk in that approach than there is with MOX—far less.

Mr. FORTENBERRY. Is that your recommendation?

Secretary MONIZ. Yes. So, in our budget, we have recommended a shift, but this is, of course, up to the Congress to decide.

And then we need to go through—as the chairman said, we will need to go through kind of the formal process with Russia. I do note that that process was already exercised in the other direction, where the United States approved Russia to change its——

Mr. FORTENBERRY. It diverted it to another——

Secretary MONIZ [continuing]. Disposition pathway.

Mr. FORTENBERRY. Right. In 2010, if I recall correctly?

Secretary MONIZ. 2010, yes, I think that is right.

Mr. FORTENBERRY. Well, let's just keep the idea on the table of perhaps some, again, new international framework. Even though, as you have said, the lion's share of this is Russia and the United States, maybe there is some different approach that would allow for better cost-sharing rather than independent pathways.

Secretary MONIZ. The only thing that I could think of—and I am not recommending it, like, you make MOX fuel and you have it burned in a reactor in another country.

But, frankly, I don't think we want to get into the business of sending this to other places. So I think we are going to have to dispose of it domestically.

Mr. FORTENBERRY. Let me quickly turn to the International Atomic Energy Agency. And from your perspective—the Agency's ongoing shift of mission, or the concurrent missions of nuclear safety to nuclear proliferation, nonproliferation, has heightened.

Are their resources robust enough? Who is the primary leader of the International Atomic Energy Agency's culture? I think we have an excellent Director now, but we can't always guarantee that. Could you speak to those issues, please?

Secretary MONIZ. Well, first of all, I might say it is not only the Director but also the—the DG, but also the deputy directors, who really do the lot of the day-in, day-out, for example, with

verification in Iran. Very senior people are there quite frequently these days. So I think there is a great degree of competence.

And I have said before that we always, especially at Los Alamos, provide training for their inspectors. As far as budget goes, the Director General has said that, you know, they have adequate budget. They did need for Iran a plus-up of something less than $10 million a year, but they have budget.

But that, of course, assumes that they do get voluntary contributions to specific programs beyond their normal, kind of, dues, if you would like. So, for example, there is a significant program in terms of use of nuclear energy for all kinds of alternative applications in society. That depends critically upon getting, voluntary additional contributions.

Mr. FORTENBERRY. But in terms of continuity of the organization, continuity of leadership, are you comfortable with, oh, I guess, the oversight mechanisms, our intimacy with the organization, their dependence upon us, so that we can help in a profound manner shape the interior culture there, in order that we have, again, a continuity of process, like we are seeing now, which I think is good and strong and robust and growing? This is going to become more critical into the future, I think.

Secretary MONIZ. I think that the issue of continuity—well, first of all, I think the United States, I certainly think that we have a very good relationship with the leadership at IAEA. And, again, I don't just mean the Director General but going down more of the organization. Certainly, our lab people are there very, very frequently, you know, working on specific issues at the staff level.

But I think the Board of Governors mechanism has been working quite well. Obviously, we are a major player in that, but, in general, I think it is working well. Certainly, in all of this Iran business, you know, the Board of Governors was always quite helpful, I would say.

Mr. FORTENBERRY. Yeah.

Thank you, Mr. Chairman.

Mr. SIMPSON. Just to clarify your statement, your own red team suggested that selling the MOX fuel in the United States, that there would be a demand for it. That the only question out there was that—yes, they did. They didn't believe that that would be an issue.

Secretary MONIZ. Oh, I see. They didn't believe—all I am saying is that——

Mr. SIMPSON [continuing]. They weren't going into—well, who is going into a contractor commitment right now when they have no idea what the future of MOX is going to be? What company is going to go into that? Nobody is.

Secretary MONIZ. I agree with that, Mr. Chairman. I would also observe, however, that that was the case before the issue of changing pathways was raised.

Mr. SIMPSON. But there was interest at that time from TVA, wasn't there?

Secretary MONIZ. There was some interest expressed. Actually, Duke—I think it was Duke——

Mr. SIMPSON. Duke.

Secretary MONIZ [continuing]. Had expressed interest and then explicitly withdrew it, is my recollection. I will check on that. But it does require—because to use it, of course, requires a relicensing from the NRC.

Mr. SIMPSON. What I am suggesting is that your own red team is not as certain that it would have to be sold internationally because nobody has an interest in it.

Secretary MONIZ. Oh, no, no, no. Please——

I want to make known, I just raised that in the context of the question asked about internationally. I don't think that is a viable idea. I think it is a bad idea to think about selling——

Mr. SIMPSON. Well, yeah.

But you are saying that there would be no interest in the United States for it.

Secretary MONIZ. So the question is, in the United States—what I said—and this was before any discussion of changing from MOX—there did not seem to be a high degree of enthusiasm.

Mr. SIMPSON. Did your own red team suggest that there wouldn't be an issue with trying to sell it, that there would probably be demand for it, that that wouldn't be an issue?

Secretary MONIZ. I would say on neither side. They neither said that it couldn't be sold, nor did they kind of endorse the idea that it could easily be sold.

Mr. SIMPSON. I have to tell you—so they refused to kind of participate in that question.

Secretary MONIZ. Well, it is as you have said; it is hard to know. I mean, now, what we are saying is we could be talking 2040 before the first fuel is available. So it is a long way off.

Mr. SIMPSON. You know, in all honesty, this is what makes it so hard for us, to hear from legitimate sources two stories that are totally opposite.

I am not a nuclear engineer; I am a dentist. And here I am trying to solve some problems, moving forward politically, when I am hearing different stories from both sides from legitimate people that I respect on both sides. It is like everybody is looking at it from their perspective and that is it. Anything that this side brings up must be just bull, and the same on the other side.

Consequently, I am sitting here, going, okay, what do we do? We move forward so that in 2 or 4 or 6 years, when you and I are having a scotch in the bar wondering what we did while we were here, the Congress at that time is trying to figure out how do they move forward.

Secretary MONIZ. Well, again, we believe that, again, the dilute and dispose is a much more straightforward—technically, certainly, a much more straightforward path and a much faster one.

Mr. SIMPSON. Probably cheaper.

Secretary MONIZ. Huh?

Mr. SIMPSON. Probably cheaper.

Secretary MONIZ. And a lot cheaper.

Mr. SIMPSON. But there are questions out there. And while everybody says, oh, the Russians will go along with this, you know, you have a lot more confidence in the Russians' agreement with us than I do.

Secretary MONIZ. I have not made that statement, that they will go along with it. I just think that we need to——

Mr. SIMPSON. They are disposed to—they are open to it.

Secretary MONIZ. We have had very good discussions. They are open to this discussion. But we have not launched the process in a formal way, so——

Mr. SIMPSON. A lot of times, in a discussion with my wife on something that we disagree on, she is open to a discussion; it is how much it is going to cost me, and vice versa.

I don't mean to say that. I am in trouble now. I am not going home this weekend.

Secretary MONIZ. I will refrain from commenting on that.

Mr. SIMPSON. Mr. Secretary, at the United Nations climate change conference over the summer, the President announced Mission Innovation, a multiyear plan to double clean energy research over the next 5 years.

After analyzing how this is proposed to occur, I was disappointed that Mission Innovation favors the EERE account when compared to other energy technologies. When comparing funding classified as Mission Innovation with last year's enacted level, fossil energy remains relatively flat, nuclear energy gets a 7-percent cut, domestic fusion gets a 90-percent cut, and EERE gets a 49-percent increase.

The math doesn't seem to add up. This isn't an "all-of-the-above" initiative. This is another attempt of the Department to increase EERE accounts. I like EERE. This is not being critical of EERE, but not at the expense of other basic science and applied energy research.

If the goal is to double clean energy research and development, why don't all Mission Innovation funding accounts receive proportional increases?

Secretary MONIZ. Well, obviously, the different accounts were looked at different ways, but I would emphasize—so if you take fossil energy—and note, by the way, that, again, it is not only the fossil energy R&D account that we should be talking about. There are also roughly $5 billion of tax credits that I talked about for CCS. So, there are other elements. There are elements of fossil in ARPA–E. There are elements of fossil in Science. So it is a much broader picture.

Within the FE account, a major shift was done, I would say, towards more innovation for new technologies because, frankly, we kind of took decisions in terms of the large-scale demonstration projects.

As you know, there is a big shift of funds there with some—there are some projects going along great, either operating or close to it. The Air Products project has been operating for 3 years. They have cut 3 megatons, roughly, of CO_2 underground for EOR. The ADM ethanol project will be starting up I think in, like, a month time scale. The Petra Nova coal plant, post-combustion plant, that will be starting up in—end-of-the-year kind of time scale.

So there are some, but there are others that just didn't close for whatever reason—HECA and FutureGen. Summit did not get its funding. So we have reoriented to, for example, in the budget, proposing to move forward with a set of, you know, smallish but important pilot projects to look at more novel capture approaches that

may significantly reduce costs, so really getting into chemical looping, into oxy-combustion, et cetera. So I think that there is, actually, a heightened focus on innovation within that budget.

I also just would repeat something that Congresswoman Kaptur raised, that while it sits in the EERE budget—and maybe we can discuss how that should be approached—these regional partnerships are not restricted—our view is that they are not restricted to EERE subjects.

So I think it is a little bit more nuanced than what you said, but there is no doubt there is a large increase in the EERE.

Mr. SIMPSON. I would tell you, if they are parked within EERE——

Secretary MONIZ. Yeah.

Mr. SIMPSON [continuing]. And there is no authorizing legislation for them specifically, then they are subject to the restraints of EERE.

Secretary MONIZ. OK.

Mr. SIMPSON. There would have to be separate language——

Secretary MONIZ. All right. Well, then that would be something we would love to work with the Committee on. Yeah.

Mr. SIMPSON. The current initiative in the private sector called Breakthrough Energy Coalition is being spearheaded by Bill Gates that you have mentioned to advance the public research pipeline and commercialization of these energy research investments.

The Department and the national labs have been trying to improve technology transfer issues for years. We have talked about it on this committee as long as I have been on this committee. How is this a different effort?

The Department has many programs that seek to usher in technology developments through the difficult process toward commercialization. How will the Breakthrough Energy Coalition efforts complement the Department's current commercialization efforts in the Loan Programs Office and ARPA–E?

Are we just adding a new program on top of things that already exist within the Department of Energy that we have been trying to do that aren't working well? If so, why aren't we transferring out of those into something new?

Secretary MONIZ. Well, I think there are two different issues here, Mr. Chairman.

First, we already discussed a little bit earlier some of the new approaches with the Office of Technology Transitions and the Technology Commercialization Fund, which, again, is something that Congress asked for over 10 years ago that we are moving.

Now, the Breakthrough Energy Coalition, I really want to emphasize, of course, it is not governmental in any sense. It is clearly private investors, in fact, from 10 countries. And they are certainly not looking just to look at technologies coming out of the laboratories. I mean, for example, the ARPA–E track record, I think, is exceptional. They have 36 companies that have spun out already. Those are not typically—I mean, some may be, but they are not typically out of the labs. They are awards that went to universities, to small companies, et cetera.

And the issue is that we are going to have to up the game. And part of the Energy Investment Center that we did in the OTT is

about enhancing the transparency and the ability of external investors to see into what we are doing at the labs—for the labs specifically.

And I want to emphasize it is not only the Breakthrough Energy Coalition investors. We are not giving them a proprietary right to this. I think they are going to be very active in this. That is kind of the idea. There may be some joint technology roadmapping exercises. But our job is to increase the transparency to the entire investment community to be able to come in and, you know, see what is most promising and move it out.

Mr. SIMPSON. OK.

Let's talk about the lab commission results for just a minute. Last year, at this hearing, we talked about what the Department is doing to repair what the lab commission deemed a broken trust between the Department and the national laboratories. Uneven levels of risk management between DOE headquarters and field offices was identified as one of the causes of this broken trust.

Since the lab commission report was published, what has the Department done to better align oversight activities between headquarters and field offices? And what about the field offices and the labs? Do you see areas where this relationship could be improved?

Secretary MONIZ. Certainly. And, of course, one of the things that we did do was submit (to the Congress), I think it was just last week, a very detailed response to the CRENEL commission, I think is the one you are referring to, just as we had earlier for the Augustine-Mies commission for the NNSA.

I think we are well on our way toward addressing many of the issues. There are a couple of areas where we have met with the chairs of the commission and we don't fully agree with the recommendation, but by and large we do.

I would also note—and I will come back to your question specifically that in my cover letter for the report I think I laid out something of what the vision is for the national labs and the Department relationship.

But I also noted that I think, since the end of the cold war, there is no doubt that a transactional approach has kind of grown in, in my view too much, relative to a more kind of strategic partnership. And I think, as you know, since I have come to this office, I have been working on that pretty hard, and I think we have made some real progress. We are not there.

And, also, there are issues of something raised earlier, in effect, about how transitions occur, and then we see what goes on. And that is certainly an issue that the lab directors are very focused on—how do we institutionalize things that have worked and improved issues.

Now, I think the issue with the field office, of the site offices, I think there has been some streamlining there, certainly, in terms of the reporting relationships. When all is said and done, it depends on the people, to be honest, the people in the program office, the people in the field, and how they work with the lab or the site.

So, I think we have streamlined. We have taken areas—security, for example. Some years back, also in counterintelligence, which is obviously especially important for the weapons labs, very, very different reporting relationships. The NNSA has done a reorganiza-

tion internally to give a clearer shot, straight to the senior levels of NNSA for the labs.

So I think we are working it, and I think it is improving. But, you know——

Mr. SIMPSON. OK.

The commission recommended that DOE conduct better oversight of the indirect cost tools at its national laboratories—that is, overhead costs of operating charged proportionally across the board to all programs, in contrast to direct programs costs that are directly appropriated by Congress for a particular purpose, such as funding for a certain kind of energy research or a construction project. These costs are significant and can cost over 50 percent of the estimated cost of a particular program, in many cases.

Do you agree with the commission's findings that the DOE programs should be tracking the indirect overhead costs of the labs? And is DOE taking any action at all to establish better accountability of these costs?

Secretary MONIZ. First of all, of course, we do track the indirect costs. And we had a long discussion, I might say, with the CRENEL co-chairs about this. This is one area where we are trying to work through how we respond to that recommendation.

The problem is that, in contrast to universities, in universities there is kind of a pretty common indirect cost structure. And, of course, largely, it is because there is a common auditor for anyplace that has Federal funding. Almost all universities have one auditor, coming out of HHS. And there are, from OMB rules, because of the Federal funding there, specific caps in terms of part of the indirect cost pool, et cetera.

Now you come to our laboratories and the M&O contract structure, and the indirect cost structures at different laboratories are quite different. They do not have the same structure. And it is not that one is better than the other; they are just different ways of assigning costs directly or indirectly. They are all audited, right? But there is no kind of, one magic number that we can say for all the laboratories.

So we are interested, absolutely interested, in transparency. I think, as the commission did, we need to at least break out our evaluations for different groups of laboratories. Like, the defense labs are different from the science labs, are different from the energy labs. Even in the science labs, the multipurpose science labs, like Oak Ridge, very, very different from a Jefferson Laboratory, single-purpose laboratory. So we probably need, like, four different buckets. And we need to find, then, some way of comparing true costs that go into an indirect cost idea, pool, and bring those together and be able to present those to the Congress and to others.

But it is not quite as simple. That is one of the areas where we said explicitly, look, you know, we can't just take that as it is. In addition, there are proprietary—because these are contracts often with a private sector company that is using its own corporate systems in terms of the accounting structures in the laboratory. So it is an issue.

Mr. SIMPSON. OK.

The laboratory commission also recommended that DOE change its accounting rules for the program, further providing the LDRD

program relief from overhead costs that are charged to other R&D programs at the labs.

Do you agree with the recommendation to unburden the LDRD program from paying laboratory overhead costs?

Secretary MONIZ. I think the question is—I think usually it is phrased as—well, the recommendation, I think, effectively was, like, a 6-percent cap unburdened or maybe an 8-percent cap burdened. It is a question of whether the burden is in or not and what the number is.

Mr. SIMPSON. Yeah.

Secretary MONIZ. Because what they were recommending is to have a real 6 percent, especially for the weapons labs, to be able to spend on program.

Mr. SIMPSON. Do you make a recommendation in that regard?

Secretary MONIZ. No.

Mr. SIMPSON. Let me——

Secretary MONIZ. Well, let me just say that I think the driver of that recommendation is—because it can be either way. I mean, you know, either way is fine, I think. But I think their driver of the critical importance of LDRD I fully support.

LDRD has just led to tremendous amounts of innovation, new directions that become important. And, historically, the weapons labs have needed the higher amount, frankly, often as part of their recruitment tools. A lot of young people come in, post-docs, beyond post-docs, through LDRD programs, and then over time their careers go into, for example, the weapons labs, the weapons programs.

Mr. SIMPSON. Right.

By May 2, you are supposed to make a decision that you are going to continue U.S. participate in ITER. I know it is not May 2 yet—did I say May 2?

Secretary MONIZ. Yes.

Mr. SIMPSON. I know it is not May 2 yet, so I won't ask for your recommendation. But we will write our bill before May 2, so I hope we can have some input from you before then about what direction you might be heading as we try to put our bill together probably early next month maybe, hopefully. The sooner, the better. Because we want to get this bill done. We would actually like to have you have an appropriation bill by October 1.

Secretary MONIZ. That would be nice.

Mr. SIMPSON. Novel concept, huh?

Secretary MONIZ. That would be good.

Mr. SIMPSON. Yes.

Other questions?

Secretary MONIZ. Well, on that, by the way, Mr. Chairman, okay, we will stay in touch. I just don't know to what extent we will have sufficient information in that early April timeframe. But we will at least touch base on it.

Mr. SIMPSON. OK.

Ms. Kaptur.

Ms. KAPTUR. Thank you, Mr. Chairman.

I was thinking, Mr. Secretary, as you were testifying, it is so wonderful to have your new energy at the Department of Energy.

You really do inspire people, including the people at the Department of Energy and people outside the Department of Energy.

I can remember former Secretaries who were—maybe they didn't have your high acuity, but they were ponderous and many times indecipherable and not very affable. And I think energy was harmed, the goal of energy independence for the country and of innovation was harmed. You really do bring a spark to it that is really refreshing. So thank you.

Now I will ask you some hard questions after that. I am going to ask you for some ballpark estimates here. For Yucca Mountain and for MOX, just approximately, how much money was already spent on those two projects by our government in the billions? If you want to just total the two of them up for me, approximately?

Secretary MONIZ. MOX I think has been approximately $5 billion.

Ms. KAPTUR. OK.

Secretary MONIZ. On Yucca, I would have to really look, but I am guessing—anybody know? 12ish, maybe.

Ms. KAPTUR. Something like that.

Secretary MONIZ. I would have to get back to you for the record on that.

Ms. KAPTUR. So between $15 and $20 billion.

Secretary MONIZ. Well, there remains something—again, I don't have the numbers at hand. But I think there remains something like $25 billion in the waste fund. But I think, in terms of expenditures, again, I will get back, but it is certainly less than that.

Ms. KAPTUR. OK. That is a lot of money.

And let me ask you, on a scale of 1 to 100, for Yucca Mountain, if you had to lay odds at a betting table that that would ever materialize, would you want to take a guess on a scale of 1 to 100? Would you put your chip on any number?

Secretary MONIZ. No, but I would say that we continue to say we think it is unworkable because obviously, there is very, very strong resistance in the State. And that goes back to the need for a consent-based process.

And I might say that, of course, in this fiscal year 2017 request, we have asked for an increase in the nuclear waste arena precisely to get the consent-based process moved to the next stage.

Ms. KAPTUR. And what about MOX? Would you put any chip down on any number from 1 to 100—100 being yes, it is going to happen; no, it isn't?

Secretary MONIZ. Well, no, I am not going to—again, I am not going to put a number in, but just to say again that we believe that for MOX to work we have to have appropriations on the order of a billion dollars a year for the whole program for a lot of decades.

And, certainly, in our current budgeting environment, it is, by demonstration, not feasible. And that is why we went to the dilute and dispose, which is much less expensive, much faster. It raises the issue the chairman has raised. I mean, you know, that is a fact.

Ms. KAPTUR. Well, I raise this issue just to raise consciousness within the Department about the process that we follow and the amount of dollars that have been expended. I have never served on a committee where——

Secretary MONIZ. Yes.

Ms. KAPTUR [continuing]. Anything like this has ever happened.

Now, let me turn to Portsmouth for a second. And looking toward the future, could you clarify what your budget request actually does both in the discretionary and mandatory funding relative to Portsmouth? What is the goal for Portsmouth?

Secretary MONIZ. Well, the goal is, for Portsmouth and Paducah and finishing Oak Ridge, as well, the goal is to go through the D&D and be able to, you know, have those sites used in a different way.

Now, with the proposed budget, we would, if anything, increase somewhat the D&D at Portsmouth, in particular, by also moving forward with the disposal cell that we need in addition to the actual D&D work.

Now, as discussed earlier and the chairman noted, we have proposed that $674 million be used out of the authorized mandatory USEC fund, which, again, I repeat, is one of three funds of relevance to this that are already in the treasury, if you like, totaling almost $5 billion.

Now, we recognize there is a challenge there. We did offer an offset for that. It is not one that is universally applauded. But the reality is, when the fee was stopped some years back, that was at a time when the actual dimensions of the cost of cleanup were not known. And now we think we have got, like, $22 billion to go for the UE D&D. And, now we know that. And the original principle was that the users of the service ultimately paid for the cleanup as well.

So, anyway, we are putting that forward. I mean, if there are other offsets, fine. But, again, that would be about a quarter-of-a-mil charge. But, clearly, if, as the chairman suggested, for some reason that were not to be done, then, that is a big hole that has to be filled somehow.

Ms. KAPTUR. Well, I wanted to comment there. You know, if you were to try to explain to the people who live in the places, the counties, the highest unemployment counties in Ohio, what the future of that site is, how simply could one explain it to them?

And then my second question really is, let's say that—I mean, everything has a useful life, even human beings, and we have to face the inevitable. If, in fact, the inevitable has to be faced at Portsmouth at some point—and we have people that live there—what thoughts are being given to—I notice that you have a proposal for another clean energy manufacturing institute. I don't quite understand what is being done at all the other ones. But is there something that can be done that is transformative for the people that are involved there that might be able to be put in place ahead of time?

Secretary MONIZ. Well, so, again, we are using Portsmouth as an example. First of all, there remains a very substantial D&D work, which does take a pretty big workforce, and that will go on for some time.

Now, in terms of alternative—look, with all of our sites, if we can help with, you know, generating more forward-looking activities, I mean, you know, that is really great, because these are communities we have worked with for a long time.

At Portsmouth, one of the obvious possibilities, where we, again, run into a current resource challenge, is that the large, specially designed building for the event centrifuge would remain a place where you would think we would eventually build a national security—so-called national security train for enriched uranium.

But, again, it is a few billion dollars to do that. And so, in the meantime, what we do is—and we have even identified additional material—is that we use other unobligated materials to make the nuclear fuel that can be used in a reactor to make tritium for our weapons program.

But, eventually, we are going to need a domestic U.S. technology enrichment facility. The ACP is the candidate at hand. The building is unique in being designed to handle those huge centrifuges. But, right now, you know, it is deferring it rather than putting up the several billion dollars to build that facility.

Ms. KAPTUR. I know this isn't in your wheelhouse, but when I think about our chairman, Mr. Rogers, and all the work he has done for the Appalachian Regional Commission, I think about the training that we need for certain types of fields and professions, and I look at those counties, though I don't represent them—there is a former mayor of Youngstown, Williamson I think, that the President appointed, relative to automotive communities that were bottomed out.

There may be some consortium that can be put together, I am just suggesting, to kind of look at over the next 3 years, 5 years, 10 years, and the people involved, so that we don't get the kind of depressed, hopeless scenario that I have seen in so many other places. So I just wanted to put that on the record.

Secretary MONIZ. And as we discussed the other day, I suggested that we follow through in having the head of our jobs program——

Ms. KAPTUR. Yes.

Secretary MONIZ [continuing]. Get together with you to compare ideas.

Ms. KAPTUR. That would be welcome.

Mr. Chairman, I just have a final question on Ukraine, switching gears here. Ukraine operates 15 reactors at 4 nuclear power plants, most of which came online before the Chernobyl disaster. Kiev recently announced it requires an estimated $1.7 billion to extend the life of its fleet of Soviet air and nuclear power reactors and bring them up to current Western standards.

Are there any activities in your budget request to support these goals? Or do you know of any such goals that may be set by other countries? And how difficult do you believe it is going to be to upgrade their aging nuclear facilities?

Secretary MONIZ. To be honest, I can't say I am familiar with their upgrade needs. We can look into that. Certainly, we remain involved with Ukraine in terms of their energy security issues, helping them devise their plans going forward. So I will check with those people to see if they can answer that question.

Ms. KAPTUR. I would really appreciate it if they could get back with me.

Secretary MONIZ. OK.

One of the things that we did do, which was not a money issue, we kind of helped to facilitate having Westinghouse do fuel for

those Soviet-era reactors. So Westinghouse has now done some fueling for those reactors.

Ms. KAPTUR. Thank you, Mr. Secretary.

Thanks, Mr. Chairman.

Mr. SIMPSON. Mr. Fortenberry.

Mr. FORTENBERRY. Mr. Chairman, thank you.

Mr. Secretary, quickly, I know we are running short on time, but just in terms of the vision for distributed energy—you talked about this earlier a bit. But in terms of the real microscale, the homeowner, if you will, on the horizon, because of the increasing efficiency in battery technology and the fall in prices and, I assume, the expanding expertise, such as in the installation of solar, are we seeing a rapid move—or do you anticipate a rapid move toward a rethinking of the entire energy infrastructure in the country so that, down to the micro level, the homeowner, in effect, becomes an energy farm?

Now, earlier this year, I lost an air conditioning unit. There was a mouse in it. I called a technician. He replaced the capacitor. The thing started to smoke—the air conditioner, not the mouse.

But what this led me to was a long process by which I installed geothermal in the house. That was made possible, of course, by tax credits, low-interest loan program, rebates from the local electric company, and the——

Secretary MONIZ. A heat pump?

Mr. FORTENBERRY. Geothermal.

Secretary MONIZ. Geothermal heat pump.

Mr. FORTENBERRY. Yes. So, glad to do it. The return on that, if you discount the cost of the air conditioner, probably the payback period is minimally 6 years, maximally 10 years.

Now, I have the ability to do that. Again, this is complicated, though, and it takes up resources as well. But it is—I purposefully did it because I wanted to move my own personal home in that direction. What do you see on the horizon on this regard?

Secretary MONIZ. Frankly, I think very much what you said. I think that storage at various scales, from the grid to the endpoint, to the consumer, I think, is going to come faster than people think. And that is pretty transformative.

Mr. FORTENBERRY. Is that just battery?

Secretary MONIZ. Yeah, I am thinking battery. Yes. It could be other things, but battery.

And I think one of the huge challenges is—we are seeing it with solar and net metering, but a broader issue is that, as the technology enables much more of this distributed generation, much more efficiency, much less demand, et cetera, there is a very fundamental utility business model of the future——

Mr. FORTENBERRY. Oh, I have heard about it. I mean, there are legacy costs here that are huge that are still being carried over forward in the future, and the transition is difficult.

Secretary MONIZ. Right. And then they will be distributed generators who are still grid-connected. Then there will be those who go off the grid. And how do you then allocate the fixed costs for the system.

So I think we have interesting technology challenges, but the technology solutions are going to lead to other kinds of challenges. And they are already. We are seeing the beginning of it.

Mr. FORTENBERRY. Yes.

I am going to yield to my colleague Mr. Fleischmann. I think he has one final question.

Mr. FLEISCHMANN. Thank you.

Mr. FORTENBERRY. Is that all right, Mr. Chairman?

Mr. FLEISCHMANN. Thank you.

Mr. Secretary, on an interesting different subject, as you know, I am a vocal advocate in the fight against cancer. I lost my mother at a very early age. As part of the privilege of being on the full Appropriations Committee, I also sit on the Labor, Education, Health and Human Services Subcommittee, which funds NIH. And I got to thinking the other day, with the administration's Cancer MoonShot initiative, perhaps a role for the Department of Energy, not exclusive to our great supercomputing research and availability, but inclusive of that.

Does the Department of Energy see a role in the fight against cancer in the MoonShot initiative, sir?

Secretary MONIZ. Yes, indeed. And sorry to hear about your mother. But we think we can make a big push on this cancer initiative, and we think DOE can have a very important role.

Let me make a few points, if I may.

First of all, that has been recognized in the administration, as I am one the Cabinet members on the Vice President's group OK?

Mr. FLEISCHMANN. Thank you.

Second, long before the Cancer MoonShot—well, not long before; it depends. Last June, let's say, Mr. Lowy, the acting director of the National Cancer Institute, came to see us, asking for our help. And the driver was principally computation, because cancer is a big data issue.

So we, with some of the labs and some of the NIH people, put together, at the end of the year roughly, three small pilot programs that addressed different parts of the cancer issue that we want to go and execute, frankly, as part of our normal business.

Let me emphasize—because mission issues always come up. Let me emphasize: Radiation, biology, and cancer has been part of the Department of Energy's work since the Atomic Energy Commission because of the issues of radiation from nuclear tests, et cetera, and nuclear stuff. The Genome Project, in some sense, evolved from that history, using our special capacities.

So, in that context, we are putting together a concept that will marry unguided machine learning at very large scale, at peta scale, with big data analytics and the modeling and simulation capacity that has always been a distinguishing feature at the labs. And those three tools will come together in looking at the cancer issue.

What is interesting is our computer guys are excited, because the cancer problem is going to lead to different kinds of questions and architectures in addressing the cancer problem that they think will ultimately help on the weapons program. So it is kind of interesting.

But the answer is yes.

Mr. FLEISCHMANN. Thank you. I wish you the best in those endeavors, sir.

Secretary MONIZ. Thank you.

Mr. FLEISCHMANN. Mr. Chairman, I yield back.

Mr. SIMPSON. Thank you, Mr. Secretary. We appreciate you being here today and taking such an extraordinary amount of time with the committee and answering our questions. We look forward to working with you to meet the challenges we face in this budget so that we can put together a budget that will move the Department of Energy forward.

Thank you. The hearing is adjourned.

[Whereupon, at 12:28 p.m., the subcommittee was adjourned.]

QUESTIONS FOR THE RECORD
SUBCOMMITTEE ON ENERGY AND WATER DEVELOPMENT
HOUSE COMMITTEE ON APPROPRIATIONS

Hearing on the 2017 Budget Request for the Department of Energy
Secretary Ernest Moniz
Tuesday, March 1, 2016

PLUTONIUM MANAGEMENT DISPOSITION AGREEMENT WITH RUSSIA

Subcommittee. Mr. Secretary, considering the high estimated cost of either the MOX or dilute and dispose alternative, is the Plutonium Management Disposition Agreement (PMDA) with Russia ultimately still in the national security interest of the United States?

Secretary Moniz. Yes, the PMDA is still in the national security interest of the United States.

Subcommittee. What nonproliferation benefits does the agreement provide?

Secretary Moniz. The PMDA supports overarching U.S. nonproliferation goals by obligating Russia to dispose of 34 metric tons (MT) of weapons-grade plutonium and operating its fast reactor with a breeding ratio of less than one so that the reactor will burn more plutonium than it produces. The PMDA has restrictions on the reprocessing, separation of plutonium, and use of material subject to the Agreement. It demonstrates both countries' leadership toward fulfilling each side's commitments under Article VI of the Non-Proliferation Treaty.

Subcommittee. Will those nonproliferation benefits endure if the U.S. renegotiates the agreement with Russia?

Secretary Moniz. It is important to note that the PMDA already provides for the possibility of using a non-MOX disposition method. In fact, the PMDA was altered in 2010 at Russia's request to change its disposition method. As for the nonproliferation benefits provided by the PMDA—such as the reduction in weapons-grade plutonium in Russia and monitoring and inspections—they will endure, assuming successful discussions.

Subcommittee. Do you anticipate that Russia will seek relief from restrictions in the current agreement on Russia's breeder reactor program if and when the agreement is re-negotiated?

Secretary Moniz. The PMDA provides for the possibility of using a different disposition method as agreed to by the Parties. We expect to have

discussions with Russia on the dilute and dispose method, as set forth by existing provisions of the PMDA, but we are not in a position to speculate on the Russian Federation positon during such discussions.

QER: GRID VS. CLEAN ENERGY FUNDING

Subcommittee. Mr. Secretary, last year the QER, and in particular the President's grid modernization crosscut request, brought to light how important strengthening the resiliency and reliability of the grid is in the face of the continual diversification of electricity generation in our country. However, I don't see how grid modernization and Mission Innovation can occur at the same time given the current budget caps. I understand technological breakthroughs that may occur from increases in clean energy funding require an adaptable grid to distribute energy efficiently.

However, Mr. Secretary, the reality of our budget situation is that we only have the funds to support a clear prioritization of efforts. With that in mind, what is the priority? How does grid modernization rank with Mission Innovation?

Secretary Moniz. As you state, the Grid Modernization Crosscut and the QER, as well as the 2015 Quadrennial Technology Review, highlight the importance of strengthening the resiliency and reliability of the grid in the face of continuing diversification of electricity generation.

That is why Grid Modernization funding is an important component of the broader Mission Innovation initiative. The two are not competing priorities; rather, the expanded clean energy research and development (R&D) proposed through Mission Innovation includes increased funding for technology development activities proposed through the Grid Modernization Crosscut.

The Department very much appreciates the strong support for the Office of Electricity and broader Grid Modernization Crosscut in the FY 2016 enacted budget. Funding for Grid Modernization has a high return on investment and is a necessary and impactful complement to the Department's R&D on clean electricity generation pursued through our fossil, nuclear and renewable power offices.

LAB COMMISSION RESULTS

Subcommittee. Mr. Secretary, last year at this hearing we talked about what the Department is doing to repair what the Lab Commission deemed a broken trust between the Department and the National Laboratories. Uneven levels of risk management between DOE headquarters and the field offices was identified as one of the causes of this broken trust.

Since the Lab Commission's Report was published, what has the Department done to better align oversight activities between headquarters and the field offices?

The Commission recommended that DOE conduct better oversight of the indirect cost pools at its national laboratories, that is overhead costs of operating charged proportionally across the board to all programs in contrast to "direct" program cost that are directly appropriated by the Congress for a particular purpose (such as funding for a certain kind of energy research or a construction project). These costs are significant and can constitute over 50% of the estimated cost of a particular program in many cases.

Do you agree with the commission's findings that DOE programs should be tracking the indirect overhead costs of the labs? Is DOE taking any action to establish better accountability for these costs?

The Laboratory Commission also recommended that DOE change its accounting rules to provide the LDRD program relief from overhead costs that are charged to other R&D programs at the labs.

Do you agree with the recommendation to "unburden" the LDRD program from paying laboratory overhead costs? Do you see any actual cost savings associated with the recommendation or would those costs be simply shifted to other programs?

One of the themes the Lab Commission focused on was how to maximize the impact of the labs by breaking down barriers to external collaborations between the labs and industry, academia, and other federal agencies.

Can you briefly describe the Department's current efforts to pursue technology transfer at the labs?

We hear each year of new activities the Department is undertaking to better transition the research from the National Laboratories to the private sector. However, each year it seems as if the problem remains the same. What is different about the efforts this year and how have they improved over previous tech transfer activities?

Secretary Moniz. The Department recently issued its response to the Final Report of the Commission to Review the Effectiveness of the National Energy Laboratories (Commission). As I stated in my Message from the Secretary accompanying the Department's response, I thank the Commission for its conscientious and serious work. The Department carefully considered each of the Commission's findings and recommendations in formulating its response. A central finding of the Commission reinforces the unparalleled value of the National Laboratory system to the Nation, serving as a science and technology powerhouse, and occupying a critical role that cannot be carried out solely by universities or the private sector. However, the report also notes that since the end of the Cold War, oversight by DOE has grown increasingly transactional rather than strategically mission-driven. One of my priorities as Secretary has been to reset this critical relationship – to improve the strategic partnership between the Department and the National Laboratories and, in emphasizing an enterprise-wide approach to the lab system, to help maximize their unique role in the Nation's innovation ecosystem.

The Commission also recognized the importance of an overarching strategic approach for the laboratories. Steps that I have taken in recent years to underscore the value of such an approach include:

- reorganizing the Department to integrate and better coordinate basic research and applied energy programs under a single Under Secretary for Science and Energy;
- establishing a Laboratory Policy Council (LPC) and a Laboratory Operations Board (LOB) to convene a senior-level strategic dialogue on key priorities and improve the effectiveness and efficiency of the laboratories' execution of the DOE mission;
- strengthening project management, including by establishing a Project Management Risk Committee, restructuring the Energy Systems

Acquisition Advisory Board, and reinforcing the independent peer review process;
- launching cross-cutting research initiatives that involve coordinated efforts between DOE and multiple laboratories;
- creating an annual Big Ideas Summit that convenes lab scientists and Departmental program leadership to generate new mission-related research challenges of importance to the Nation;
- initiating an integrated approach to cyber issues through the establishment of the DOE Cyber Council, in which the labs are called upon to play a significant role; and
- using the Technology Commercialization Fund to enhance opportunities for National Laboratory collaboration with the private sector on energy technology development.

Not only do these and other changes make it possible for the labs to become engaged in providing substantive input about research directions for the Department, but also they have helped to form networks of labs with complementary capabilities to deliver results. All of these steps have been focused on reinvigorating the strategic partnership necessary for effective stewardship of the laboratories as Federally Funded Research and Development Centers.

With respect to headquarters and field management, the Department's response indicates that in general, program management responsibility and strategic direction reside at DOE Headquarters whereas field offices provide day-to-day implementation and are advocates for mission work at the sites. DOE is taking steps to clarify the roles and responsibilities of the headquarters, program, field, and laboratory organizations. This will help strengthen the partnership between DOE and the labs and improve the implementation of core operational mechanisms and risk management, such as the Contractor Assurance System.

A working group of the LOB is developing a DOE/Laboratory Management Framework document to be completed in 2016, which will describe the current operational framework across the Department, identify those parts of the framework that have added value to the DOE/laboratory relationship, and articulate core management principles relevant to the DOE/laboratory relationship to be implemented by the Under Secretaries. Each DOE

program will review its field authorities and structure as part of this effort, including to ensure that Contracting Officers report to line managers. In addition, each program will formalize a field manager training and professional development program that provides for effective workforce planning and instills an understanding of "mission support" as the primary site office role.

In particular, NNSA will execute plans to improve its governance and oversight of field operations at its laboratories, sites, and plants and clarifying roles and responsibilities. The new approach will clarify the oversight roles of headquarters and field office personnel, placing emphasis on new rigorous and dependable Contractor Assurance Systems, and leveraging best practices from the Office of Science, including enhancing peer review and corporate parent involvement as appropriate for each site. In addition, to manage and eliminate duplication in field oversight, NNSA's field offices will use a Site Integrated Assessment Plan (SIAP) to identify their annual oversight requirements. This effort is intended to result in a consolidated schedule across all field offices and to assign resources based on expertise and functional area.

With respect to indirect costs, the Department's response states that DOE will continue to work with the laboratories to refine and enhance the quality of the Institutional Cost Report (ICR) data. DOE initiated annual ICR reporting in FY 2011, and with the submission of FY 2015 data, will have five years of ICR data. This report provides high-level data to DOE on trends in indirect costs at the laboratories. DOE will work with the laboratories to analyze cost trends across the five years of data and continue to use the ICR data to provide supporting data, as appropriate, for DOE data calls and analyses of laboratory costs.

Detailed ICR data is shared among laboratories under a contractual term prohibiting disclosure of confidential or proprietary business information. This sharing has enabled the laboratories to perform peer reviews of the data to improve quality and consistency. Nonetheless, there are significant variations in the ICR data reflecting, in part, different accounting methods for allocation of indirect cost pools among the laboratories. DOE strongly supports the objective of improving the management efficiency of the National Laboratories through more rigorous analysis of indirect costs and

actions to better control costs. The laboratory peer review process provides a needed first step, and DOE will work with the laboratories to continue and intensify the peer review process in order to gain insight into management opportunities to reduce costs. In addition, the LOB will assign greater priority to providing a forum for identifying and sharing of best practices to reduce costs across the laboratories and DOE programs consistent with relevant OMB guidance. DOE will undertake additional efforts to improve the validation of indirect cost estimates, such as crosscutting reviews of selected indirect cost categories. Such reviews will inform additional efforts by the laboratories to manage indirect costs. DOE will also work on efforts that will lead toward consistency and promote greater transparency to the public on overhead rates in the national laboratory system within legal constraints.

With respect to LDRD, the Department's response states that DOE welcomes the Commission's support for LDRD programs. The LDRD Program provides the laboratories with the opportunity and flexibility to establish and maintain an environment that encourages and supports creativity and innovation, and contributes to their long-term viability. LDRD allows DOE's laboratories to position themselves to advance the national security mission and respond to the Nation's future research needs. The Commission recommended that Congress restore the cap on LDRD to 6 percent unburdened, or its equivalent, noting that this will have the largest impact on LDRD at the NNSA laboratories. In my view, LDRD costs should remain "burdened." If the LDRD program were granted relief from paying overhead costs that are charged to other R&D programs, those overhead costs would be shifted to other programs.

DOE also is working to promulgate best practices on LDRD throughout DOE. DOE will establish a best practices process in FY 2016 to help the National Laboratories improve the flow of outcomes from LDRD to missions. This working group, led by NNSA but involving the other Under Secretary offices as well, also will develop an electronic forum in 2016 to document and share best practices. In FY 2016, DOE will issue a LDRD Highlights document; NNSA also will share the individual annual lab reports with Congress and provide an annual briefing for stakeholders on the benefits realized due to LDRD investments.

Finally, with respect to DOE's Technology Transfer Mission, the Department's response states that DOE also recognizes how technology transition activities offer ways to improve coordination of strategic activities with the laboratory enterprise. In early 2015, the Secretary established the Office of Technology Transitions (OTT) to help coordinate and optimize DOE's technology transfer, commercialization, and deployment activities. The OTT works with the Technology Transfer Working Group, which includes representatives from all National Laboratories, as a strategic partner providing them information about DOE activities and getting feedback from them on new technology transition programs and policies.

To further support technology transitions activities, DOE will update its 2008 Department-wide policy statement on technology transfer activities and will also develop the statutorily-required Technology Transfer Execution Plan, which will help set the strategic vision and implementation instructions for DOE. These documents will identify ways to enhance the visibility and endorse the importance of the technology transition mission. Additionally, DOE will work to provide more clarity to laboratories regarding the acceptable range for terms and conditions for non-standard CRADAs to expedite negotiation and subsequent review and approval. DOE implements both decentralized and centralized approaches to technology transfer and notes that National Laboratories currently have and employ the flexibility to interact directly with industry and negotiate agreements. DOE supports industry and laboratory interactions that are decentralized since each laboratory is unique and should develop partnerships that support the missions of DOE, and are tailored to the Laboratory's surrounding community and industry needs, including the pursuit of innovation-based economic development. Recognizing some of the constraints of existing mechanisms, DOE has over the last few years worked to provide more flexibility through the Agreement for Commercializing Technology (ACT) pilot, which will be assessed for its ability to reduce barriers to entities that access the laboratories. DOE also will continue to encourage laboratories to build on the successful innovative mechanisms identified by the Commission for engaging industry to make collaborations easier, faster, less expensive, and more effective.

CONSENT BASED SITING DEFINITION

Subcommittee. This year's budget request proposes a new account structure within Nuclear Energy Research and Development to address consent based siting activities and other waste management issues. On the consent based siting side, the request proposes $39 million for consultations, negotiations, legal terms and conditions, focus groups, surveys, and grants in an effort to basically establish a definition of "consent based siting". The request also proposes funds to begin a screening of sites for a defense repository.

Could any of the sites proposed for a defense repository also be utilized as an interim waste storage site?

Secretary Moniz. Currently, no sites have been proposed for a defense repository. The degree to which multiple facilities can be placed on one site will largely depend on the desires of the host community and the types of facilities that they are interested in supporting.

Subcommittee. Does a working definition of "consent based siting" exist? If not, when do you expect to produce one?

Secretary Moniz. In practical terms, this means encouraging communities to volunteer to be considered to host a nuclear waste management facility while also allowing for DOE, as the current waste management organization, to approach communities it believes can meet the siting requirements. Under such an arrangement, communities could volunteer to provide a consolidated interim storage facility and/or a repository in expectation of the economic activity or other benefit that would result from the siting, construction, and operation of such a facility in their communities. The Department of Energy is currently working with interested parties to solicit ideas for what the specifics of this approach could look like. Ideas and thoughts are being solicited through an invitation for public comment that will be open through July 31, 2016, as well as a series of eight public meetings that will be held around the country beginning in March 2016 and ending in July 2016. Information provided to the Department of Energy through these activities will be included in a draft report that is anticipated for released at the end of Fiscal Year 2016.

MEDICAL ISOTOPE PRODUCTION

Subcommittee. Mr. Secretary, the schedule closing of Canada's National Research Universal Reactor, which produces around 40 percent of the world supply of Mo-99, is concerning considering how important this medical isotope is to millions of medical procedures performed each year in the U.S. As a result, DOE was tasked to support the creation of new domestic sources of Mo-99 production. The budget request for the Office of Science includes funds to establish an isotope production facility at Oak Ridge National Lab to address U.S. demands for high priority isotopes, including target material for Mo-99 production.

Are these two efforts related and how is DOE incorporating the National Labs into efforts to ensure a stable, domestic supply of Mo-99 in the future?

Secretary Moniz. These are two related, but completely separate efforts. As part of its nuclear nonproliferation mission, and in support of the American Medical Isotopes Production Act of 2012 (AMIPA), DOE's National Nuclear Security Administration (NNSA) is partnering with domestic commercial entities to accelerate commercial production of the medical isotope molybdenum-99 (Mo-99) in the United States without the use of highly enriched uranium (HEU). NNSA provides funding and makes the expertise of the national laboratories available to support technical development of each of the Mo-99 technical pathways and to support the acceleration of commercial projects using non-HEU technologies. The National Laboratories perform only public domain, non-proprietary, non-critical-path activities in support of Mo-99 technical development.

Meanwhile, DOE's Office of Science (SC) oversees the DOE Isotope Program, which has exhausted its inventory of several enriched stable isotopes at Oak Ridge National Laboratory (ORNL) over the past decades. Therefore, DOE is reestablishing a domestic capability to produce small research quantities of enriched stable isotopes through an R&D prototype capability that is slated to be completed at ORNL and commence operations in 2016. The objective of the R&D prototype is to produce small quantities of stable isotopes required to support domestic R&D in medicine, research, commercial manufacturing, and national security, including modest amounts of enriched Mo-98 and Mo-100 that may be required for continued R&D of some Mo-99 production methods. The President's FY 2017 Budget Request

also includes an expansion of this R&D effort to initiate the Stable Isotope Production Facility (SIPF) Major Item of Equipment (MIE). The objective of the FY 2017 request for the SC Isotope Program is to provide a cost-effective, domestic capability for production of enriched stable isotopes for basic research, medical and industrial applications and to help mitigate dependence on foreign suppliers by expanding the annual stable isotope production capacity of the prototype capability to a kilogram or more for several selected isotopes, including Mo-98 and Mo-100.

Subcommittee. How will you ensure the labs are not competing with industry to produce Mo-99?

Secretary Moniz. The National Laboratories perform only public domain, non-proprietary, non-critical-path activities in support of Mo-99 technical development. The results of this work are made available to any interested party to assist technical efforts to produce Mo-99 in the commercial sector. The national laboratories are performing R&D activities and are not establishing in-house production capabilities for Mo-99.

The DOE Isotope Program does not produce Mo-99. There is no domestic production capability for Mo-98 and Mo-100, which are feedstock material for the accelerator-based and neutron capture-based production routes of Mo-99. DOE's Isotope Program does not compete with U.S. private industry. The Isotope Program assesses domestic isotope supply and demand, and produces radioactive or stable isotopes only when there is no domestic commercial capability, or when commercial capability is inadequate to meet domestic demand. Should U.S. industry develop a production capability for Mo-98 and Mo-100 and meet the demands of the Nation in full, the DOE Isotope Program would exit the market.

Subcommittee. Can you discuss what your Department is doing to help ensure a stable supply of Mo-99?

Secretary Moniz. The American Medical Isotopes Production Act of 2012 (AMIPA) directs the Department of Energy to implement a technology-neutral program to evaluate and support projects in the United States for the production of Mo-99 for medical uses, in cooperation with non-Federal entities. In accordance with the AMIPA, NNSA currently is working with three U.S. commercial entities to develop four diverse

technical pathways. These include: (1) SHINE Medical Technologies – accelerator with low-enriched uranium (LEU) fission technology, (2) NorthStar Medical Radioisotopes – accelerator technology and neutron capture technology, and (3) General Atomics – LEU fission target technology. Each of these cooperative agreements is with a commercial, non-Federal entity, as required by AMIPA, and they are implemented under a 50-50 cost-share arrangement and limited to an NNSA contribution of up to $25 million per project.

The DOE Isotope Program provides NNSA with technical support in its objectives, and is also re-establishing a domestic capability for producing enriched stable isotopes. This will help mitigate dependence on foreign supply of feedstock material needed for the accelerator-based and neutron capture-based production routes of Mo-99 that NNSA is helping to develop.

DOE MANAGEMENT

CONTRACT MANAGEMENT AND COSTS OF LITIGATION

Subcommittee. Mr. Secretary, during your tenure you've been provided with numerous reports from the DOE Inspector General that describe DOE contractors being reimbursed for costs that potentially should not be charged to the federal government. Most recently, the IG reported DOE made reimbursements of $84 million in legal costs that were questionable. The IG warned that since post-settlement reviews had not been conducted, the taxpayer could be footing the bill for litigation that may be related to contractor misconduct.

Do you believe that DOE has an adequate post-settlement review process in place?

Secretary Moniz. The Department is taking action to address the issues raised in DOE IG Report DOE-OIG-16-06, Followup Audit of the Department of Energy's Management of Contractor Fines, Penalties, and Legal Costs (February, 2016). As provided in the OIG Report, "Management concurred with each of the report's recommendations and indicated that corrective actions were planned to address the identified issues." In addition, "management indicated that procedures for performing reviews for settlements related to matters other than discrimination and whistleblowers would be developed." Finally, the OIG Report provided that, "management stated that procedures would be developed for when a post-settlement review should be performed." The Department is currently taking these steps to ensure that post-settlement reviews are conducted, where warranted, in order to further protect taxpayer resources.

Subcommittee. What is DOE's process exactly when a contractor is sued by an employee, members of the public, or another party? Are the contractor's legal costs automatically paid in advance?

Secretary Moniz. Contractors' legal costs are not paid in advance. Federal regulations generally allow for provisional reimbursement of contractor legal expenses pending resolution of legal proceedings brought by third parties. DOE regulations give contracting officers the discretion to provisionally reimburse a contractor's legal costs related to whistleblower

allegations, on a case-by-case basis, pending resolution of the legal proceedings. 48 C.F.R. 931.205-47(h)(2)(i). In addition, the majority of large DOE contracts are subject to the "Contractor Legal Management Requirements" at 10 C.F.R. part 719. This regulation facilitates control of Department and contractor legal costs, including litigation costs. The contractor is required to develop a procedure for retaining legal counsel, and to document the analysis used to decide when, where and who will be engaged as outside counsel and the terms of the engagement. Reimbursement of allowable contractor legal costs under covered contracts is subject to compliance with this part.

Subcommittee. What can be done to improve the process?

Secretary Moniz. The actions being taken by the Department in response to DOE IG Report DOE-OIG-16-06, Followup Audit of the Department of Energy's Management of Contractor Fines, Penalties, and Legal Costs (February, 2016), will strengthen the Department's management of allowable costs.

SAFETY CULTURE AND WHISTLEBLOWER PROTECTIONS

Subcommittee. Mr. Secretary, in 2012 the Defense Nuclear Facilities Safety Board issued a recommendation to then Secretary-Chu regarding a deteriorating safety culture at the Hanford Waste Treatment Plant that was preventing workers from raising safety issues to supervisors. There have been a couple of widely publicized whistleblower cases that alleged retaliation at the site. Since then, the Department has instituted some reforms, but investigations completed this year by the DOE Office of Enterprise Assessments reported varying levels of continued safety culture issues at several other DOE sites.

Just last week, the House Science Committee announced it is investigating DOE for allegedly retaliating against a whistleblower who provided Congress with technical information about the biological effects of radiation.

Why do you think DOE continues to have so many problems with its safety culture?

Secretary Moniz. Safety culture, like any other culture, is shaped by a wide variety of factors including the actions and behaviors of management and employees and the opinions expressed by community leaders, the media and others on the status of the culture. The Department has made much progress, but there is still work to do to make safety culture a fundamental element of all DOE work. The Department is fully committed to taking the steps needed to build and sustain a robust safety culture.

Subcommittee. What have you done as Secretary to address these persistent problems?

Secretary Moniz. Over the past couple of years, the Department has taken several steps to develop a more robust safety culture. More than 2,200 federal and contractor executives and managers have been trained on the principles of and steps needed for ensuring a Safety Conscious Work Environment (SCWE). As a result, there has been increased SCWE awareness and knowledge across management staff. The Department has also completed self-assessments across the DOE complex to build the capacity to self-identify and correct issues when they first appear.

DOE has also established the Safety Culture Improvement Panel (SCIP), chartered by the Deputy Secretary. The SCIP's purpose is to establish a permanent, high-level organization devoted to promoting continuous safety culture improvement across DOE. The SCIP is developing methods to incorporate DOE's emphasis on safety culture in the Department's contracts with entities that manage and operate DOE sites. The panel is also finalizing a report with recommendations on how to better measure and sustain safety culture improvements. Finally, the panel is completing a plan to train first-line supervisors and employees on safety culture essentials to complement the senior management training described above. The SCIP is working with the National Training Center to institutionalize safety culture concepts into DOE directives and training. In addition, the Department and its contractors have programs to address employee concerns, differing professional opinion, equal employment opportunity, and other issues, with approved procedures and processes that help facilitate discrete interactions with employees who raise safety and other concerns. The procedures associated with these programs allow contractor personnel as well as federal employees to raise concerns through the DOE programs.

Specifically, the Department's Employee Concerns Program (ECP) provides DOE federal and contractor employees with a voluntary, independent avenue for the reporting of concerns related to issues such as the environment, safety, health, and management of DOE programs and facilities. The ECP is intended to supplement, not replace, existing processes designed to address concerns and resolve disputes. The ECP has been strengthened by placing it in the Office of Environment, Health, Safety and Security, and through requests, if implemented, for additional resources in the FY 2017 Budget Request.

A DOE contractor employee may choose to utilize the Department's ECP, the Department's 10 C.F.R. Part 708 contractor whistleblower protection program process, relevant Department of Labor processes, and/or litigation, among other avenues, to address his/her concerns. The choice of which process to utilize, if any, rests solely with the employee.

Subcommittee. What are you doing to ensure whistleblowers in particular are being adequately protected?

Secretary Moniz. The Department is strongly committed to a workplace where all workers—both Federal and contractor employees—are free to speak out, voice concerns, or lodge complaints without fear of retaliation. In particular, contractors are statutorily and contractually bound not to retaliate against employees for protected whistleblower conduct. DOE takes concerns of retaliation very seriously. When individuals allege retaliation, the Department takes immediate actions to:

- Advise employees of their right to file a formal complaint under applicable regulations (e.g., 10 CFR 708 for contractors, DOL's 29 CFR Part 24, Section 211 for contractors and federal employees, and the Merit System Protection Board and Office of Special Counsel for federal employees).
- Promptly investigate claims of retaliation for engagement in protected activity as well as the allegations raised that may have prompted the complaint of retaliation.
- Communicate/reinforce expectations to establish and maintain a positive safety culture and Safety Conscious Work Environment (SCWE), and to reinforce the need to foster an environment of trust, a questioning attitude and receptiveness to raising issues.
- Periodically survey the workforce using standard industry survey instruments to evaluate the "state" of the organizational climate.

In addition, DOE has engaged with subject matter experts from the Nuclear Regulatory Commission, the commercial nuclear power industry, National Aeronautics and Space Administration, and academia to provide their insight on best practices and lessons learned as well as feedback on DOE initiatives. While we are making meaningful progress in improving safety culture, we recognize it requires continued emphasis and we are committed to having a strong and enduring culture.

NATIONAL SECURITY

FUNDING FOR IRAN AGREEMENT

Subcommittee. Mr. Secretary, you were directly involved in the negotiations with Iran on the Joint Comprehensive Plan of Action (JCPOA). Those negotiations have concluded and the Department of Energy is expected to play some kind of role in implementing the agreement. However, your responsibilities for implementation are not exactly clear.

Is there any funding in your budget request to support the nuclear agreement with Iran?

Secretary Moniz. A total of $13 million is provided within Defense Nuclear Nonproliferation (DNN) for implementation of the Joint Comprehensive Plan of Action (JCPOA). This funding will support activities to ensure that Iran is meeting its commitments and that its nuclear program remains exclusively peaceful. $10 million is provided to support JCPOA material management activities including the U.S. role in the Arak Modernization Project to redesign and rebuild the reactor, assuring that it will not produce weapon-grade plutonium. $3 million is provided within the Office of Nonproliferation and Arms Control (NPAC) for safeguards and export control activities, including technical support to the U.S. interagency process supporting the United Nations Procurement Working Group (UN PWG) and for in-kind support in the form of technical and technology assistance to the IAEA to implement the JCPOA.

Subcommittee. What is the role of DOE going forward?

Secretary Moniz. Going forward there are three main areas where DOE will play a key role in technical support: 1) the UN Procurement Working Group, 2) the Arak Modernization Project, and 3) supporting the IAEA's monitoring and verification activities. The technical and scientific expertise of DOE and DOE's national labs will play a significant role in supporting implementation of the JCPOA and keeping Iran on a peaceful track.

The JCPOA calls for a working group of the P5+1 and EU to facilitate the Arak redesign and reconstruction project. The United States will co-chair

the working group and provide technical support and review of the modernized reactor design, as well as analysis of fuel design and safety standards, to ensure it conforms to the key attributes and characteristics of the modernized reactor as set forth in the JCPOA. Redesigning the Arak Reactor will assure that it will not produce weapons grade plutonium.

The JCPOA establishes a Joint Commission (JC) to review and make recommendations on proposals by states seeking to engage in nuclear related activities with Iran. The Procurement Working Group (PWG) will review proposals by States for the sale, supply or transfer of export controlled items to Iran to ensure that any items are for peaceful applications only. DOE, as a participant in the U.S. support to the PWG, will review and make technical recommendations to the Department of State, the U.S. lead agency, on nuclear related activities.

The JCPOA provides for an extraordinarily intrusive inspections and monitoring regime. DOE's technical expertise and training supports the IAEA's monitoring and verification activities that will be key to keeping track of Iran's activities. For example, DOE provides assistance to the IAEA Department of Safeguards by supporting technology and concept development and specialized training. DOE, through its national labs, is also a major contributor to the IAEA's Network of Analytical Laboratories (NWAL), a network of 20 labs worldwide, which participates in the high precision analysis of nuclear material and environmental samples.

SCIENTIFIC ENGAGEMENTS WITH IRAN

Subcommittee. Mr. Secretary, the JCPOA discusses a "broader opening of scientific engagements" between the E3/EU+3 and Iran.

What cooperative activities will the U.S. participate in and what are the guidelines the Administration is using for transfer of nuclear expertise and technologies?

Secretary Moniz. There is nothing in the civil nuclear cooperation annex to the JCPOA that commits the United States to participate in any particular cooperative activity with Iran. Annex III makes this clear by stating that the projects envisioned "may be undertaken in a variety of formats, with a variety of potential participants" and that a given project would not necessarily include participation by all JCPOA participants.

Any cooperation between the United States and Iran would be of limited scope and consistent with current law, which significantly restricts any such cooperation with Iran.

Subcommittee. What protections will be put into place to ensure Iran cannot divert or reuse nuclear reactor, centrifuge, or other parts under the auspices of this agreement?

Secretary Moniz. The JCPOA puts into place robust transparency measures, which is the best way to prevent a covert path from being used. There will be surveillance of the entire nuclear supply chain, including increased IAEA access to uranium mines, and continuous monitoring of uranium mills and centrifuge production, assembly, and storage facilities. This kind of monitoring ensures that it would be exceedingly difficult for Iran to divert materials or components from its nuclear infrastructure to establish new clandestine sites without our knowledge.

As of Implementation Day, Iran has provisionally applied the Additional Protocol, which is a set of transparency measures that allows the IAEA to request access to undeclared facilities they have questions about, and has also fully implemented Modified Code 3.1. This means the IAEA can access any requested location in the country within a predetermined, limited time period.

CLEAN ENERGY RESEARCH AND DEVELOPMENT

CLEAN ENERGY MANUFACTURING INSTITUTES

Subcommittee. The budget request proposes to establish an additional Clean Energy Manufacturing Innovation (CEMI) Institute in fiscal year 2017. Each of these institutes is a 5-year, $70 million commitment, and your office already funds five of them. Additionally, at the end of the five year term, the Institutes are expected to be financially independent and sustainable using resources other than federal funding.

The first Institute was funded in 2013 and its five year term is on the horizon. What kind of preparations is the Department making to ensure its financial stability in the absence of federal funding? Do you believe this goal can be achieved?

What is the overall vision for the CEMI Institutes? Is there a limit to how many the Department should support, given other priorities in EERE and the Advanced Manufacturing Office?

How are you coordinating with DoD and NSF to share effective approaches to transitioning these Institutes to private funding?

Secretary Moniz. Yes, the Department anticipates all DOE-supported Institutes will transition to become self-sustaining beyond the original federal funding after five years. DOE works with each Institute to establish firm research, development, and demonstration milestones for the five-year DOE commitment. The Department has established metrics with each Institute to assure that within 5 years of launch each Institute will be financially independent and sustainable.

Clean Energy Manufacturing Innovation Institutes are part of the National Network for Manufacturing Innovation (NNMI). The NNMI consists of multiple linked Manufacturing Innovation Institutes at different agencies. Each has a unique technological concentration, but is also designed to accelerate U.S. advanced manufacturing as a whole. As nodes in the NNMI, the institutes complement each other's capabilities and benefit from shared approaches to matters such as intellectual property, contract research, and performance metrics. Each provides shared facilities to local start-ups and

small manufacturers to help them scale up new technologies, accelerate technology transfer to the marketplace, and facilitate the adoption of innovation workforce skills. The network is designed to foster innovation and deliver new capabilities that can stimulate the manufacturing sector on a large scale.

The FY 2017 President's Budget funds a national network of 45 manufacturing innovation institutes that will position the United States as a global leader in advanced manufacturing technology. Specifically, the Budget builds on the 13 institutes already funded through 2016 with more than $250 million in additional discretionary funds to support these and 5 new manufacturing innovation institutes in DOC, DOD, and DOE – one in EERE and one in the DOE Office of Electricity, which will solicit proposals on a wide-range of focus areas across the manufacturing sector.

The President's NNMI has always been a multi-agency effort that brings together the best of industry, academia and the government to invest in manufacturing competitiveness. Institutes are supported across different agencies with different missions, all of which have relevance to a stronger U.S. manufacturing sector. The DOE-sponsored Institutes are members of the NNMI and share best practices, coordinate with other Federal agencies (where appropriate), including the Department of Defense and National Science Foundation, and have an additional clearinghouse of information for manufacturers. For example, DOE and DOD have worked together to engage the manufacturing stakeholder community on possible topic areas for Institutes under the NNMI framework.

NUCLEAR ENERGY

THE SMALL MODULAR REACTOR PROGRAM

Subcommittee. Secretary Moniz, this year's request proposes a $27 million increase for the SMR Licensing Technical Support program. This increase is in line with the original award plan and will support NuScale's efforts to submit a license application to the NRC by the end of this year. Although it will take time to review and eventually issue a license, it is a good time to take a step back and assess the program.

What has worked well within the SMR program and what needs improvement?

Secretary Moniz. The goal of the Small Modular Reactor (SMR) Licensing Technical Support Program is to accelerate design development, licensing, and deployment of SMRs that can provide safe, clean, and affordable energy options. The program is making significant progress in achieving that goal. The cost-shared cooperative agreement with NuScale has accelerated its development work, and the company plans to submit an application for design certification to the Nuclear Regulatory Commission (NRC) by the end of 2016. Risk-sharing arrangements with industry partners will also have allowed the completion and submittal to the NRC of one Early Site Permit, the near completion of one combined license application, and the initiation of another license application. The program also provided resources to evaluate, analyze, and identify solutions to economic, technical, and regulatory issues that are unique to SMRs, thus further aiding the commercialization of SMRs.

Congressional support, cost-shared financial assistance vehicles, and close collaboration with industry partners and key stakeholders have all been key factors in allowing the program to realize its goal of accelerating and licensing SMR designs; however, more could be done to improve the deployment potential of these designs. Improvements could still be made to support design finalization (getting the licensed design to the point where an SMR could actually be built), share additional risk for license application and review, provide stimuli for customers, and develop and enhance the manufacturing base to support high quality modular fabrication and the highly skilled workforce to produce the modules.

Subcommittee. What is the Department's assessment of the commercialization potential of this technology?

Secretary Moniz. The Department has believed in the commercialization potential of SMR technology from the inception of the SMR LTS program and is confident our support has strengthened that potential, as evidenced by growing nuclear power industry interest and support. So far, two utilities have invested significant resources in siting SMR projects and an industry group has formed to share information and resources to further SMR projects and overcome barriers to commercialization. Utilities recognize that SMRs have the potential to replace aging coal plants, provide cost-effective incremental capacity to meet load growth, diversify generation portfolios, and help States meet the carbon-reduction goals in the Clean Power Plan.

Subcommittee. What steps will you take to keep this energy technology in the U.S.?

Secretary Moniz. Whether SMRs are built in the U.S. or abroad is largely a question of economics. Making the investments outlined above would help ensure that the economics are such that U.S. SMR designs are deployed here; however, deploying these SMRs abroad could also provide high-paying jobs here in the U.S. and help ensure U.S. leadership in globally deploying this safe and important nuclear energy technology.

NUCLEAR SCIENCE AT THE UNIVERSITY LEVEL

Subcommittee. Mr. Secretary, this year's request eliminates funding for the popular Integrated University Program, which supports domestic nuclear science and engineering students with fellowships and scholarships. Instead, the request proposes a $1 million program within the International Nuclear Energy Cooperation account to support international nuclear energy education outreach.

It seems as if the budget request has reached the conclusion that support for international nuclear education outweighs the existence of a domestic program. Is this the case?

Secretary Moniz. No, the Administration has always been a strong supporter of domestic STEM education. The International Nuclear Education and Training program is to support diplomatic, climate, civil nuclear, nonproliferation, and international economic objectives for the safe and secure use of peaceful uses of nuclear technology in emerging countries developing nuclear energy programs.

Subcommittee. If not, why not propose funds for both programs?

Secretary Moniz. In the view of the Administration, the IUP is a less effective means to advance the Administration's science, technology, engineering, and math objectives than other existing programs. Also, as the nuclear industry expands, it will create the incentives necessary for students to enter nuclear-related programs.

Subcommittee. Can you assess the current state of nuclear sciences at the University level and where else support can occur?

Secretary Moniz. A 2014 study by the Oak Ridge Institute for Science and Education, entitled Nuclear Engineering Enrollments and Degrees Survey, shows that the number of enrollments and the number of bachelor's and graduate degrees in nuclear engineering programs were significantly greater than the numbers reported at the beginning of the decade and more than twice the number reported in 2005. It appears that the nuclear sciences at the University level is more stable than it has been in several decades, and sufficient enrollment and graduation rates will continue to sustain the

nuclear energy workforce. This is due in part to existing efforts in both the civilian and government sectors to establish effective programs and incentives.

NUCLEAR FUEL AND WASTE DISPOSITION

DEEP BOREHOLE PROJECT IN NORTH DAKOTA

Subcommittee. Mr. Secretary, the Department is currently facing some delays regarding the field test of a deep borehole in North Dakota. It seems as if not all the relevant parties had signed off on the test and many residents in the surrounding area were not aware of the field test details.

What is the status of this activity and how has the Department responded to the concerns of the residents?

Secretary Moniz. The Department, along with its Battelle contractor team, worked with State and local officials in North Dakota, including Pierce County Commissioners and local residents, to address their questions and concerns raised by the contract announcement on January 5, 2016. This outreach included attending County Commission meetings, holding a public open house in the local community, and working individually with local officials and residents.

Despite these efforts, a letter received from the Pierce County Board of Commissioners dated March 1, 2016 and addressed to the University of North Dakota Energy and Environmental Research Center (EERC, a team partner with Battelle) made it clear that Pierce County had no interest in hosting the Deep Borehole Field Test. The letter specifically requested that the EERC, Battelle, and the Department cease consideration of anywhere in Pierce County, North Dakota, as a site for the field test.

To honor the request of the Pierce County Board of Commissioners, the Department has ceased consideration of the proposed test site near Rugby, as well as any other site in North Dakota. Battelle is currently exploring options for an alternative test site outside of North Dakota, as allowed for under the existing contract.

Subcommittee. Would you characterize the selection of Pierce County, North Dakota as a consent based siting process?

Secretary Moniz. No. A consent-based siting process was not used for siting the field test as the Deep Borehole Field Test is a scientific

research project which does not use any radioactive waste during the test, and there is no intent to ever dispose of radioactive waste in the test boreholes. The Department is currently developing a consent-based siting process with public input which will be used to site future repositories for HLW and SNF.

Subcommittee. The budget request proposes $22.5 million to continue the field test activities in North Dakota. Do these recent delays change the planned activities for 2017?

Secretary Moniz. The effect on the Department's current plans for conducting the field test is that the Deep Borehole Field Test will be conducted at an alternate site outside of the State of North Dakota when a suitable location and willing host community is obtained. The impact on the Department's field test schedule and therefore any delay in planned FY2017 activities are not yet known.

DEEP BOREHOLE DISPOSAL

Subcommittee. The Nuclear Waste Technical Review Board recently released a report evaluating the deep borehole concept. The Board suggested that the types of activities needed to identify a site and analyze boreholes at disposal depths are comparable to that of a mined, geologic repository. The Board also determined that the field test in North Dakota will provide only limited information on the feasibility of the deep borehole disposal concept. Furthermore, the Board recommended that a more comprehensive risk analysis be completed for the feasibility of the deep borehole disposal concept.

How have the Nuclear Waste Technical Review Board recommendations changed the Department's approach to deep borehole?

Secretary Moniz. The Department believes that the Deep Borehole Field Test will provide valuable information on the feasibility of the deep borehole disposal concept. The Department is currently working with our National Laboratories and the Deep Borehole Field Test contractor team led by Battelle Memorial Institute to complete a detailed Drilling and Test Plan for the field test.

Recommendations made by the Nuclear Waste Technical Review Board (Board) are being considered as the Drilling and Test Plan is completed. However, significant change is not expected to be made to the Department's approach based on the Board's recommendations.

Subcommittee. In light of the recommendations, does the continuation of deep borehole as a disposal option, rather than a mined, geologic repository, make financial sense?

Secretary Moniz. The purpose of evaluating the feasibility of the deep borehole disposal concept is to provide an additional disposal option for some smaller DOE-managed radioactive waste, but deep borehole disposal would not be a replacement for a mined-geologic repository. Evaluation of the deep borehole disposal option should continue since it has the potential for faster deployment at less cost as compared to a mined-geologic repository.

THE ADMINISTRATION'S STRATEGY FOR USED NUCLEAR FUEL DISPOSITION

Subcommittee. Mr. Secretary, this year's budget request proposes $15 million to pursue a separate repository for defense waste. In 2014 the Department conducted an assessment of disposal options for high-level waste and spent nuclear fuel and determined that a separate repository for defense and commercial waste could potentially add up to $47 billion in additional costs.

With these increases in mind, can you explain why the Department has decided this approach is in the best financial interests of the Nation? Can the Department pursue a separate defense repository under the current structures of the Nuclear Waste Policy Act?

Secretary Moniz. The FY17 budget request allows us to make progress on all fronts of an Integrated Waste Management System (IWMS) including the design of a consent-based siting process and efforts for a defense waste repository. The Department is planning for an IWMS to transport, store, and dispose of spent nuclear fuel from commercial electricity generation, as well as high-level radioactive waste from defense activities. The IWMS may contain:

- a pilot interim storage facility, initially focused on accepting spent nuclear fuel from shutdown reactor sites;
- a full-scale, consolidated interim storage facility that provides greater capacity and flexibility within the waste management system;
- Deep borehole disposal, which could be an option for disposal of smaller and more compact waste forms currently stored at Department of Energy sites;
- a geologic repository for commercial spent nuclear fuel; and
- a separate repository for high-level waste from atomic energy defense activities.

Many factors could influence the cost of building and operating a defense waste repository, including the selected geology and type and amount of material selected for disposal.

As we move forward, we will ensure that cost efficiency continues to be examined to ensure that resources will be spent in the most effective way. Since we are in the early stages of planning and evaluating alternatives for this concept, definitive plans and risk analyses have not yet been finalized. As we go forward with the planning for a defense repository, more precise cost estimates will be developed. The cost for disposal of radioactive waste in a geologic repository is influenced by numerous variables including the geologic medium, the quantity of waste, the emplacement method and configuration, how heat-dissipation is managed, and the depth of the repository.

Pursuing a separate, consent-based facility for defense waste offers the flexibility to begin to deal with these waste streams sooner while not postponing efforts to deal with commercial nuclear waste. Accordingly, the Department will move on a parallel track to address storage and disposal of commercial spent fuel.

The Department has existing authority under the Atomic Energy Act of 1954 (AEA) to develop a separate repository for defense waste. In developing such a repository, the Department would be subject to NRC licensing authority, but would not be subject to the NWPA's siting provisions, apart from the State and tribal participation provisions specified in Section 101 of the NWPA.

Subcommittee. This year's request also includes $61 million for consent based siting and other waste management activities, all of which would be derived from the Nuclear Waste Fund (NWF).

Would this research be applicable to Yucca Mountain?

Secretary Moniz. The requested activities for the $61 million are independent of the Yucca Mountain site.

ELECTRICITY DELIVERY AND ENERGY RELIABILITY

STATE DISTRIBUTION-LEVEL REFORM PROGRAM

Subcommittee. Mr. Secretary, this year's budget request contains a $15 million proposal for a new activity to assist states with identifying and addressing issues related to the regulatory framework in the electricity distribution sector.

Can you discuss how the proposal came about?

The request notes that several states have already embarked on major efforts, with DOE support, to address the types of issues this new activity seeks to support.

How is this new activity different from previous efforts by the states?

Secretary Moniz. The State Distribution-Level Reform Program has its origins in the findings of the April 2015 Quadrennial Energy Review that the electric grid of the future will have two-way power flow on both long-distance, high-voltage transmission lines and the local distribution networks. These two-way flows blur the distinction between the federally regulated bulk transmission system and state regulated distribution system in ways that have not yet been fully identified or understood. DOE currently provides technical assistance on general topics relating to distribution-level emerging issues (grid architecture, utility business models, communications and controls, etc.) through national organizations such as the National Governor's Association, National Association of Regulatory Utility Commissioners, and National Association of State Energy Offices. The State Distribution-Level Reform program is intended to allow states to address issues relating to the undertaking of structural, policy, and regulatory reforms that are more situationally specific than those addressed in OE's core program.

The State Distribution-Level Reform Program is similar in concept to efforts currently underway in California, New York, and Hawaii. This program is intended to expand on the existing efforts in California, New York, and Hawaii and to enable more states to conduct distribution-level reform. Numerous states (Minnesota, Massachusetts, Ohio, Michigan, Illinois, and

Maryland) have all indicated an interest in undertaking some level of distribution-level reform.

FOSSIL ENERGY RESEARCH AND DEVELOPMENT

THE FUTURE OF COAL

Subcommittee. Mr. Secretary, coal accounts for 37 percent of our electricity, and it's as important as ever to make sure we use this resource well. The Fossil Energy Research and Development program has played a critical role to that end, both in improving existing technologies and inventing entirely new ones.

How does this budget request propose to utilize this abundant resource and provide for new efficiencies in the future?

Secretary Moniz. The fiscal year 2017 (FY2017) budget request for Fossil Energy Research and Development (FE R&D) maintains priority on carbon capture and storage (CCS) R&D, which is critical to the future of coal and other fossil energy resources. Additionally, the request also includes R&D on high-priority activities, such as water management, extreme environment materials, and new power generation cycles (e.g., supercritical CO2 and chemical looping), that may improve the efficiency, reduce the environmental impact, and decrease the cost of the utilization of coal and other fossil energy resources.

Subcommittee. What does the next generation of Carbon Capture Sequestration technologies look like?

Secretary Moniz. While it is difficult to predict the success of R&D, the FE R&D portfolio includes many promising technologies for CCS. The FE R&D program is investing in various advanced solvents, sorbents, and membranes for post- and pre-combustion capture that show potential for reducing the cost of carbon capture. Several of these technologies have progressed to the small pilot-scale (~ 20 tonnes per day captured CO2 equivalent) and large pilot-scale (~ 200 tonnes per day captured CO2 equivalent). Transformational technologies that focus on development of electrochemical concepts, chemical looping, and pressurized oxycombustion also show promise. Advanced manufacturing and advanced computing techniques may also help conceive new designs and systems for coal-fired power generation and the capture of CO2.

For carbon storage, new characterization and monitoring tools that can provide a clearer picture of the subsurface before, during, and after injection will be critical to ensuring the safe, permanent storage of CO2. The ability to process data from the subsurface in a rapid manner to perform real-time, adaptive control of injection operations will also improve management of CO2 storage projects. This includes better modeling and simulation tools, data conversion and management techniques, risk assessment tools and methodologies, as well as technologies to improve wellbore integrity. Field testing of novel operational techniques such as coupled CO2 injection with brine extraction can help improve the efficiency of storage operations while also addressing water resource needs.

Subcommittee. If you were provided an additional $50 million or $100 million to further advance second-generation CCS Technologies, how would you propose to spend it?

Secretary Moniz. The FY 2017 budget request outlines the most efficient and effective use of funds to implement the proposed R&D activities.

LOAN GUARANTEE PROGRAMS

NEW LOAN AUTHORITY

Subcommittee. Mr. Secretary, the budget request proposes an additional $4 billion in loan authority.

I understand the $4 billion would be split among the Advanced Fossil and Renewable Energy solicitations but I am unclear on the specific details. How much authority would be given to either solicitation?

Secretary Moniz. The Department's FY17 Budget Request for $4 billion of additional loan authority is intended to be for mixed use for Title XVII projects.

The request for this additional authority was based on the strong and growing market response to the Advanced Fossil Energy Projects and Renewable Energy and Efficient Energy (REEE) Projects Solicitations, which were oversubscribed at the time of DOE's Budget Request. Since then, additional applications have been received across each of the three open Solicitations, including the Advanced Nuclear Energy Projects Solicitation. As of May 6, 2016, each of the three open Solicitations for Title XVII are oversubscribed. DOE's request for mixed-used authority was intended to give the Department the flexibility to respond effectively to the growing market interest across the spectrum of the technology categories eligible for Title XVII DOE loan guarantees.

To date, projects applying under the REEE Solicitation include energy storage, distributed energy, waste-to-energy, efficiency improvements, and biochemicals production projects, among others. Under the Advanced Fossil Solicitation, current applicants include projects developing petrochemicals projects, carbon capture and utilization, natural gas-to-liquids, petroleum coke gasification, among other projects. Projects applying under the Advanced Nuclear Energy Projects Solicitation include advanced reactors and small modular reactors.

Subcommittee. The Loan Program request states that all the remaining loan guarantee authority will be closed or committed by the end of 2016 for

these two solicitations. What are the types of projects you are seeing applying for these two solicitations?

Secretary Moniz. The Loan Programs Office (LPO) has experienced a steady uptick in applications and anticipates that the market will continue to respond to the Title XVII Solicitations with an increasing volume of applications. As of May 6, 2016, the loan request amount for Advanced Fossil applications totals $10.3 billion, exceeding the $8.5 billion in loan authority available under the current Solicitation. Similarly, the loan request amount for REEE applications totals $7.4 billion, also exceeding the existing $4.5 billion in available loan authority. In addition, $15.7 billion has been requested by applicants under the Advanced Nuclear Energy Projects Solicitation, for which $12.5 billion remains in available loan authority.

SCIENCE

BIOMEDICAL SUPPORT BY DOE

Subcommittee. The Secretary of Energy Advisory Board Task Force on Biomedical Sciences was charged last year with identifying new research areas for DOE in the area of biomedical sciences and proposing new initiatives in the health-related sciences.

Is there any funding in this year's budget request focusing on biomedical sciences or the health field?

Secretary Moniz. In FY 2017, the Office of Science is partnering with the National Institute of Health (NIH) to accelerate the goals of the Brain Research through Advancing Innovative Neurotechnologies® (BRAIN) initiative. The total FY 2017 Budget Request is $9 million, including funding for the following programs:

- Advanced Scientific Computing Research ($3M) – High Performance Computing, data management, and computational science;
- Basic Energy Sciences ($4M) – X-ray light sources and Nanoscale Science Research Centers for brain imaging and sensing, including fabricating biocompatible electronic materials and sensors; and
- Biological and Environmental Research ($2M) – Joint Genome Institute and Environmental Molecular Science Laboratory to enable biosensor synthesis and characterization.

Subcommittee. Why should the Department fund these activities rather than utilize the Work For Others funding mechanisms available to all the National Labs?

Secretary Moniz. The Strategic Partnership Program (formerly referred to as Work for Others) will continue to provide NIH funding to researchers for BRAIN-relevant research activities. The requested funding for the Office of Science will support techniques and tools development at the DOE user facilities that will benefit the BRAIN initiative while also advancing the DOE mission. As the largest provider of Federal funding in the physical sciences, DOE has unique capabilities that can be leveraged in a

complementary fashion to support the research in partnership with NIH in the BRAIN Initiative. These capabilities include unparalleled user facilities by all three participating programs in the Office of Science, where access is available at no charge to users as long as the resulting data is made publically available. Activities in the BRAIN Initiative support DOE's mission, by advancing DOE capabilities in imaging, sensing, and data analytics, among other areas.

ARPA-E

ARPA-E FUNDING OVERLAPS

Subcommittee. Mr. Secretary, the budget request provides strong support for the Advanced Research Projects Agency – Energy ("ARPA-E"). How does ARPA-E ensure that its funding is not competing with other research dollars that go into the Office of Science or the applied technology areas of the Department?

Secretary Moniz. Congress established ARPA-E to accelerate "transformational technological advances in areas that industry by itself is not likely to undertake because of technical and financial uncertainty" (42 U.S.C. §16538 (c)(2)(C)). To ensure that ARPA-E's is not "competing" with other departmental elements, ARPA-E undertakes a comprehensive process to identify a technology "white space" that is not likely being addressed by the private sector, other Federal Agencies, or other offices within the Department. ARPA-E technical staff begin by reviewing the scientific literature to identify potential program areas. Next, ARPA-E technical staff examine the current state of the art technologies in the space, the main players in this space, including consulting with other DOE offices, and the major technology challenges. If ARPA-E concludes that a technology white space exists, ARPA-E technical staff organize a workshop, bringing in relevant players from industry, academia, and government to further refine the concept for a potential research program. Relevant technical staff from other offices within the Department often participate in ARPA-E workshops. If the workshop is successful, ARPA-E may issue a Funding Opportunity Announcement (FOA) containing market-based cost and performance metrics that, if achieved, would displace the prevailing technology.

Once a FOA is issued applicants are required to disclose in their applications whether they submitted the same or similar concepts to other Federal agencies, or private investors. In addition, applicants are required to disclose prior and current sources of funding, if any, for the proposed research project and related work. Finally, applicants are required to provide a detailed explanation for lack of support from existing sources of funding. For example, large businesses are required to explain why the proposed project is not being sponsored internally.

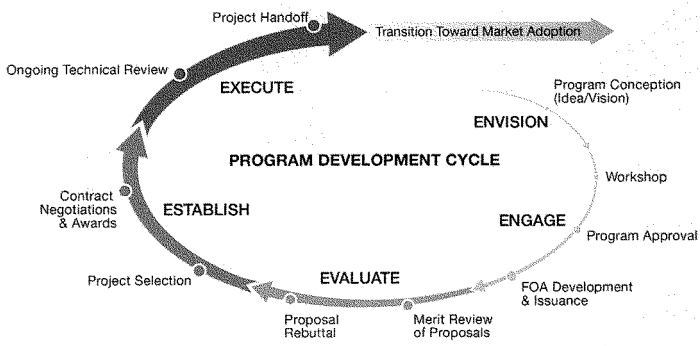
During the merit review process ARPA-E utilizes expert reviewers from industry, academia, and government to rate and provide comments on applications. These reviewers help ARPA-E to avoid funding any technical concepts which are already funded by other Federal agencies and private investors.

ARPA-E recipients are also required to disclose in their quarterly performance reports any new funding received from public or private sources. This ensures transparency and enables ARPA-E to make appropriate funding determinations.

In accordance with its statutory mandate, ARPA-E makes investments in transformational and disruptive energy technologies that private investors are not likely to fund at their present stage of development. The Government Accountability Office's (GAO's) January 2012 report entitled, "Advanced Research Projects Agency-Energy Could Benefit from Information on Applicants' Prior Funding" largely confirmed that ARPA-E was complementing and not replacing private sector investment, stating in part, "GAO's review suggests that most ARPA-E projects could not have been funded solely by private investors."[1]

[1] U.S. Government Accountability Office, Advanced Research Projects Agency-Energy Could Benefit from Information on Applicants' Prior Funding (2012, available from: http://www.gao.gov/assets/590/587667.pdf), highlights page.

Figure 1: ARPA-E's Technology Acceleration Model.



THE HONORABLE KEN CALVERT

DEPARTMENT EFFICIENCY

Mr. Calvert. Mr. Secretary, the Department's FY17 budget request includes a proposal for $5 million to establish an independent, statutory office, similar to that at the Department of Defense, for cost estimating and program evaluation to set cost assessment policy and provide timely, unbiased analysis and cost estimation.

Can you expand on the Department's vision for this independent, statutory office and discuss how this proposal came about?

Secretary Moniz. The Department envisions this independent, statutory office would ensure consistent policy, procedures and practices across the Department, formalize program management practices for cost estimation, and reviews to improve outcomes, accountability and efficiency. It would serve as the single agency point of contact on all matters related to cost estimation, program evaluation and management.

This proposal came about during ongoing efforts to improve DOE project management, a key component of which is to adopt best practices equivalent to those implemented by the Department of Defense (DOD) and other government departments. This Office would be modeled on the authorities, responsibilities, requirements and accountability of the DOD Cost Assessment and Program Evaluation (CAPE). This proposal would also complement, but not duplicate, NNSA's Office of Cost Estimating and Program Evaluation (CEPE) established by the 2014 National Defense Authorization Act (50 USC 2411).

Mr. Calvert. How do you think such an office may improve on current practices within the Department?

Secretary Moniz. This statutory office will improve upon current Departmental practices by providing independent analytic advice on all aspects of DOE programs, including cost-effectiveness, and the development and evaluation of program alternatives. By establishing Department-wide cost assessment procedures, the Office will ensure that the Department's cost estimation and cost analysis processes provide accurate information for

the Department's programs and acquisitions. Ultimately, DOE-wide policy and guidance will be comprehensive and consistent and valued by program decision makers. Further, the conduct of these functions by an organization independent of the acquisition chain of command would provide unbiased program analysis and evaluation.

Mr. Calvert. Have there been instances where access to such an independent, statutory office within the Department would have resulted in cost-savings or more unbiased program analysis and evaluation?

Secretary Moniz. There are instances where access to such an independent, statutory office would benefit the Department in program analysis and evaluation. One of the main goals would be to avoid cost growth (or achieve cost savings) in major acquisition programs. Toward that end, this Office, like CAPE, would be responsible for ensuring that the cost estimation and cost analysis processes of the Department provide accurate information and realistic estimates of cost for the major acquisition programs. This Office would prepare a government independent cost estimate (ICE) that would be the Department's commitment to cost, schedule and performance for its acquisitions as well as used to support the assessment of root causes of cost growth, if any. Specifically, the Department would benefit from this office during the analysis of a multi-year procurement to an environmentally contaminated cleanup site. Ultimately, the overall quality of the cost estimates will improve when an organization independent of the program office is used to assess historic cost information in order to develop cost elements that are well-documented, comprehensive, accurate and credible. The conduct of program analysis and evaluation will result in a better understanding of the program requirements being acquired. This understanding, in turn, will lead to improved program management in applying resources and mitigating program risks. As part of the analysis, this Office will assess the program's risk to minimize exposure that could be harmful to successful program execution. This assessment will allow the program to update their risk management plan and realize associated impacts to program cost and schedule projections.

THE HONORABLE JAIME HERRERA BEUTLER

CLEANUP ALONG THE COLUMBIA RIVER

Ms. Herrera Beutler. I am hearing from the Tri-City community that they want to concentrate first on cleaning up the sites close to the Columbia River, which I have seen firsthand – K-Basin Sludge; 324 Building, and the 618-10 waste site. As I discussed with you during last year's hearing, there has been a disturbing trend, which we see again in the FY-17 request, of the Administration cutting funding for these cleanup projects. Congress is then compelled to add appropriations to support this critical cleanup along the river.

Why doesn't DOE concentrate on finishing the cleanup of these sites, making the Columbia River safe – and then focus on other aspects of Hanford cleanup, such as the Central Plateau?

Secretary Moniz. The FY 2017 Budget Request positions the Department to continue progress at Hanford, which includes completion of demolition of the Plutonium Finishing Plant, continued progress in removing the K Basin sludge from near the Columbia River, and continuing pump and treat activities to remediate contaminated groundwater. In addition, the Department will also continue to make progress in remediation of trenches and vertical piping units at the 618-10 burial ground.

PRIME CONTRACTOR RE-BIDS

Ms. Herrera Beutler. I understand that DOE has announced plans to re-bid all three of the major prime cleanup contracts at Hanford over the next two years. Re-bids cause additional uncertainty and delays in cleanup as the contracting teams prepare proposals and a new contractor takes months to get up to speed.

Why doesn't DOE simply extend the existing contracts in order to bridge the change in Administration and to allow the new Administration an opportunity to submit its budget request to Congress? Or, at least, why can't DOE spread out the re-bids to minimize uncertainty and delays?

Secretary Moniz. Currently, there are three major prime cleanup contracts at Hanford: the Plateau Remediation Contract and Tank Operations Contract, which both expire in September 2018, and the Mission Support Contract, which expires in May 2019. DOE is currently formulating its acquisition strategy and the procurement timing of these contracts has not yet been determined. These contracts were issued through the competitive process, through which U.S. policy favoring competition in contracting, set forth in the Competition in Contracting Act and other statutes, is implemented. Preliminary market research indicates that there are numerous firms that would like the opportunity to compete for this work.

THE HONORABLE LUCILLE ROYBAL-ALLARD

DESALINATION HUB

Ms. Roybal-Allard. In Fall 2015, DOE held a workshop to refine the technical scope of a new Desalination Innovation Hub. In the DOE's FY17 budget proposal, it listed the launch of the hub as its top priority within the Energy-Water Nexus crosscutting initiative.

What are the short and long-term goals for this hub and are there technologies that could be quickly deployed to address the drought in California, or are these all longer term investments?

What was discussed at the Fall 2015 workshop and please elaborate on how this hub plans to utilize department-wide resources to accomplish its goal?

Secretary Moniz. The Department proposes to establish an Energy-Water Desalination Hub focused on research, development, and demonstration (RD&D) on new technologies to dramatically lower the cost, energy use, and carbon footprint of water desalination. The goal of the Hub would be to research, develop and demonstrate new desalination technology to treat and deliver water to users at the same cost and level of energy use as required by current water supplies. The Department refers to this goal as "pipe parity" and has identified desalination system approaches, enabling technologies and foundational science challenges which, if addressed through a coordinated RD&D program, would provide a science and technology framework for advanced desalination with the potential for reaching pipe parity.

The economic cost of producing water through seawater desalination using existing technology is two to four times higher than the current cost of providing fresh water domestically, depending on location. Similarly, the energy used (and related carbon emissions) in the production of clean water through desalination is four to five times higher than the energy consumption associated with providing fresh water by traditional means. As a result, the long-term targets for pipe-parity are to provide municipal drinking quality water at $0.50/cubic meter (m3) ($617/acre-foot), 1 kilowatt-hour (kWh)/ m3 (electrical) (2.5 kWh/m3 primary energy), and 1 pound carbon dioxide/m3. These targets were developed with input from a

wide variety of industry and research partners including those highlighted in the DOE 2014 Water-Energy Nexus: Challenges and Opportunities report.

While some research is currently underway on these topics in pockets of the U.S. innovation ecosystem, the proposed effort would serve as a significant first-of-a-kind centralized critical-mass RD&D effort and will provide an important public-private partnership framework. The Hub will also provide a connection point for researchers working on related technologies in water infrastructure, including others supported by complementary investments in DOE.

A workshop was held in the fall of 2015 to explore the technical scope for a future Hub through dialog with stakeholders from industry, academic researchers, and national laboratories. Specific technical topics discussed at the workshop included high-thermal flux and high corrosion resistance heat exchangers using low-cost materials; high-volume production of membranes with low cost, long lifetimes, low propensity for fouling, controlled thermal properties, superior transport properties and robust chemical and mechanical stability; fabrication of complex flow-field structures for ¬¬mass transfer with low boundary layer resistance; and materials and structures that cost-effectively enable higher distillation temperatures and therefore more efficient heat utilization while preventing chemical scaling in thermal technologies. The workshop included participants from national labs and universities and other research organizations to identify opportunities where existing science and technology resources supported by the Department of Energy could potentially be applied to the science and technology challenges related to water desalination.

MINORITIES IN ENERGY INITIATIVE

Ms. Roybal-Allard. Explain how the DOE works with minority businesses, specifically the Hispanic community, to accomplish the goals of the Minorities in Energy Initiative.

Secretary Moniz. The Office of Minority Business and Economic Development (MBED) is developing a technical assistance program to educate minority businesses on market trends and strategic business opportunities in the energy sector. MBED works within the Department, and collaborates across government agencies, industry and non-governmental organizations to educate and to increase capacity of minority businesses so they are better positioned to take advantage of new energy opportunities and drive innovation.

The primary objective of MBED is to increase participation of minority-owned businesses in the energy sector and the emerging technology sector. For example, MBED has partnered with the Houston Minority Supplier Development Council to host an Oil and Gas Diverse Business Opportunity Session, and with the California Public Utility Commission and the Western Region Supplier Development Council to host a Renewable Energy and Emerging Technologies Business Opportunity Session for diverse businesses.

In 2016, MBED will develop educational materials on how communities and policymakers can use large-scale private sector energy developments to drive local community development. These materials will describe Community Benefit Agreements (CBA), which are agreements signed by community benefit groups and by a developer, setting forth a range of community benefits that the developer agrees to provide as part of the project development in return for the community's support of the project. Benefits can include local hiring and local business procurement goals. MBED will develop these materials in 2016 and deploy them in 2017 to educate community organizations and policymakers on using CBAs as a tool to grow local economies with large-scale private sector energy development and infrastructure projects.

In regard to engaging the Hispanic community, the Office of Economic Impact and Diversity participated in a Congressional Hispanic Caucus

Institute session called, "Energy, STEM/STEAM and the Talent Pipeline." The panel discussed best practices in government and industry aimed at raising interest in science, technology, engineering and mathematics (STEM) disciplines to prepare for energy sector careers. The Department co-sponsored the 2015 Annual Conference of the Society for Chicanos and Native Americans in Science in October 2015, and engaged energy industry and lab researchers in two panels including "Careers at DOE Labs" and "Careers in the Energy Sector."

As part of ongoing support of Hispanic communities, the Department plans to collaborate with Hispanic Serving Institutions to develop strategic partnerships with industry, minority businesses, entrepreneurs, and the DOE National Laboratories to design and implement lab-to-market programs to facilitate the commercialization of innovative energy technologies. Moreover, the Department will develop a framework to assess and evaluate opportunities for the Hispanic communities to engage in key Departmental cross-cutting initiatives in support of clean energy research and development projects.

Ms. Roybal-Allard. DOE states that the increase in funds for Fiscal Year 2017 will be to establish a department-wide sustainable platform for the Minorities in Energy Initiative. Describe how the department plans to establish a sustainable platform for the initiative and what a successful sustainable platform looks like.

Secretary Moniz. The FY 2017 funding request would enable the Department to build out the MIE initiative with staff and financial resources, achieving a sustainable platform for engagement of minority communities in the energy sector, specifically in areas of STEM education, workforce development, energy economic development, and climate change.

In general, the proposed funding level institutionalizes the Minorities in Energy initiative by creating a platform for the Department to: a) strategically leverage public-private partnerships that advance minority participation in the energy sector; b) support initiatives such as My Brother's Keeper, Women and Girls in STEM, Women and Girls of Color, and Educational Excellence for African Americans; c) establish sustainable investments in Minority Serving Institutions to support infrastructure, laboratory engagement, technology transfer and commercialization

activities; d) develop a regional energy economic development model that leverages local resources and private industry; and e) expand the reach of DOE programs and laboratory assets to new stakeholders from diverse communities in support of clean energy research and development projects.

Recognizing that it will take a diverse and collective group of stakeholders to effectively and strategically ensure that women and minorities are granted an opportunity to actively participate within the energy and STEM fields, the Department has selected key influencers from Federal Government, industry, academia, and non-profit organizations to serve as MIE Ambassadors and MIE Champions to help advocate for the engagement of underrepresented communities within the energy sector. Additionally, the Department is cultivating a framework that encourages senior executive leaders across the DOE complex and national laboratories to collaborate and strategically evaluate synergies that can be derived from cross-cutting programs in support of MIE.

MIE goals specifically support the following areas:

- STEM Education – The Department will develop, implement and administer Lab-to-Market internship programs with the DOE National Laboratories. The Department will expand the Advancing Research and Technology in the Sciences (ARTS) program to grant more Minority Serving Institutions an opportunity to network with the Departmental program offices and discuss partnerships relating to research and development, technical assistance, grant and contracting prospects. The Department will foster more strategic outreach and collaborative university, industry and laboratory partnerships with Minority Serving Institutions.
- Energy Economic/Workforce Development – The Department will launch a nation-wide place-based energy workforce development toolkit/model that strategically factors in community-based agreements that encourage industry, state and local governments, entrepreneurs, and minority business partners to work together to ensure that all parties have an equal opportunity to partake in mega energy projects.

- Climate Change – The Department will expand its Climate Change initiatives, including: STEM Mentoring Cafés, Climate Change Outreach, Tribal Climate literacy competitions, and educational initiatives.