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AN OVERVIEW OF THE BUDGET PROPOSAL FOR THE DEPARTMENT OF ENERGY FOR FISCAL YEAR 2017

HEARING

BEFORE THE

COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY
HOUSE OF REPRESENTATIVES

ONE HUNDRED FOURTEENTH CONGRESS

SECOND SESSION

March 22, 2016

Serial No. 114–69

Printed for the use of the Committee on Science, Space, and Technology

Available via the World Wide Web: http://science.house.gov

U.S. GOVERNMENT PUBLISHING OFFICE
20–839PDF WASHINGTON : 2017

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March 22, 2016

AN OVERVIEW OF THE BUDGET PROPOSAL FOR THE DEPARTMENT OF ENERGY FOR FOR FISCAL YEAR 2017

TUESDAY, MARCH 22, 2016

HOUSE OF REPRESENTATIVES,
COMMITTEE ON SCIENCE, SPACE, AND TECHNOLOGY,
Washington, D.C.

The Committee met, pursuant to call, at 10:06 a.m., in Room 2318 of the Rayburn House Office Building, Hon. Lamar Smith [Chairman of the Committee] presiding.

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Congress of the United States
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Full Committee

An Overview of the Budget Proposal for the Department of Energy for Fiscal Year 2017

Tuesday, March 22, 2016
10:00 a.m. – 12:00 p.m.
2318 Rayburn House Office Building

Witness

The Honorable Ernest Moniz, Secretary, U.S. Department of Energy

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

HEARING CHARTER

An Overview of the Budget Proposal for the Department of Energy for Fiscal Year 2017

Tuesday, March 22, 2016
10:00 a.m. – 12:00 p.m.
2318 Rayburn House Office Building

PURPOSE

The Committee on Science, Space, and Technology will hold a hearing titled *An Overview of the Department of Energy's Budget Proposal for Fiscal Year 2017* on Tuesday, March 22, 2016, at 10:00 a.m. in Room 2318 of the Rayburn House Office Building. With the release of the President's budget request for fiscal year (FY) 2017, the purpose of the hearing is to examine the Department of Energy's science and technology priorities and their impact on the allocation of funding within the Department's research, development, demonstration, and commercialization activities.

WITNESS LIST

- **The Honorable Ernest Moniz,** *Secretary of Energy, U.S. Department of Energy*

BACKGROUND

The Department of Energy's (DOE) primary mission is to "ensure America's security and prosperity by addressing its energy, environmental and nuclear challenges through transformative science and technology solutions."[1] DOE funds a wide range of research, development, demonstration, and commercial application activities under this mission, primarily executed by the Department's 17 national laboratories.

The President's FY 2017 budget request for DOE is $32.5 billion, which represents an increase of $2.9 billion or 9.8 percent over FY 2016 enacted levels.[2] Approximately one-third of this amount, $12.9 billion in the FY 2017 request, is dedicated to science and energy programs within the Committee on Science, Space, and Technology's jurisdiction. Funding for science, energy, and related programs in the request is $2.8 billion above the FY 2016 enacted level, and includes $11.3 billion in discretionary funding and $1.6 billion in proposed mandatory spending.[3]

[1] U.S. Department of Energy, "Mission Statement," Available at http://energy.gov/mission
[2] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Budget in Brief," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetinBrief_0.pdf
[3] Ibid.

The following table provides a summary of the FY 2017 DOE budget request for programs within the Science Committee's jurisdiction:[4]

Department of Energy (DOE) Science and Technology Spending (dollars in millions)				
Program	**FY 2015 Enacted**	**FY 2016 Enacted**	**FY 2017 Request**	**FY 2017 vs FY 2016 (% Change)**
Office of Science (SC)	**5,067.7**	**5,350.2**	**5,572.1**	**4.2%**
Advanced Scientific Computing Research	541.0	621.0	663.2	6.8%
Basic Energy Sciences	1,733.2	1,849.0	1,936.7	4.7%
Biological and Environmental Research	592.0	609.0	662.0	8.7%
Fusion Energy Sciences	467.5	438.0	398.2	-9.1%
High Energy Physics	766.0	795.0	818.0	2.9%
Nuclear Physics	595.5	617.1	635.7	3.0%
Workforce Development for Teachers and Scientists	19.5	19.5	20.9	7.3%
Science Laboratories Infrastructure	79.6	113.6	130.0	14.4%
Safeguards and Security	93.0	103.0	103.0	N/A
Science Program Direction	183.7	185.0	204.5	10.5%
Office of Science Mandatory Funding (University Grants)			100.0	100.0%
Energy Efficiency and Renewable Energy (EERE)	**1,914.2**	**2,069.2**	**2,898.4**	**40.1%**
EERE Mandatory Funding (Clean Transportation)	**N/A**	**N/A**	**1,335.0**	**100.0%**
Electricity Delivery and Energy Reliability (OE)	**147.0**	**206.0**	**262.3**	**27.3%**
Nuclear Energy (NE)	**833.4**	**986.2**	**993.9**	**0.8%**
Fossil Energy R&D (FER&D)	**560.6**	**632.0**	**600.0**	**-5.1%**
Advanced Research Projects Agency - Energy (ARPA-E)	**280.0**	**291.0**	**350.0**	**20.3%**
ARPA-E Mandatory Funding (ARPA-E Trust Fund)	**N/A**	**N/A**	**150.0**	**100.0 %**
Title 17 – Innovative Technology Loan Guarantee Program	**17.0**	**17.0**	**10.0**	**-41.2%**
Total	**8,819.9**	**9,551.6**	**12,271.8**	**22.0%**

This budget request claims to meet the Administration's goal to "invest in all stages of innovation across a diverse portfolio of clean energy technologies" in order to "enhance economic competitiveness in a low-carbon world and secure America's long-term energy security."[5] The budget proposal also stresses continued commitment to the President's Climate Action Plan (CAP) as driving the emphasis on research, development, demonstration, and commercial application of clean energy technologies.[6] The FY 2017 budget request also includes the first plan to implement commitments made through Mission Innovation, the Obama administration's pledge to double public funding for energy research and development made in

[4] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Budget in Brief," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetinBrief_0.pdf
[5] Ibid.
[6] Ibid.

conjunction with the Paris climate negotiations.[7] According to the Department, various programs throughout the DOE budget proposal contribute to nearly 80 percent of the administration's Mission Innovation commitments for FY 2017.[8]

In addition to continuing the reorganization of the Department into three Under Secretariats (Energy and Science, Nuclear Security, and Management and Performance) as proposed in the FY 2015 budget request, the FY 2017 request includes over $1.4 billion in crosscutting initiatives funded across the Science and Energy programs in the Department, an increase of $329 million from the FY 2016 enacted levels. Drawing funding from appropriate program offices, the crosscutting program coordinates research on technology areas with multiple energy resource applications, and are designed to institutionalize coordination between program offices and the national labs. Initiatives in the FY 2017 budget request include exascale computing, grid modernization, subsurface technology and engineering, supercritical CO2, cybersecurity, advanced materials for energy innovation, and the energy-water nexus.[9]

Important questions and key issues to be discussed at the hearing include:

- How effectively does fundamental research and development within the Department of Energy's Office of Science lead to transformative scientific breakthroughs?

- Given the emphasis on renewable energy deployment within the Department compared to basic research investments, are the strategic goals of the DOE's research programs aligned to the long-term needs of the American economy?

- How have the commitments made in conjunction with the Paris climate negotiations, including Mission Innovation, shaped the priorities outlined in the DOE FY 2017 budget request?

- How will key management, structure, and policy changes outlined in the request to Congress more efficiently and effectively advance the science and energy research and development conducted throughout DOE?

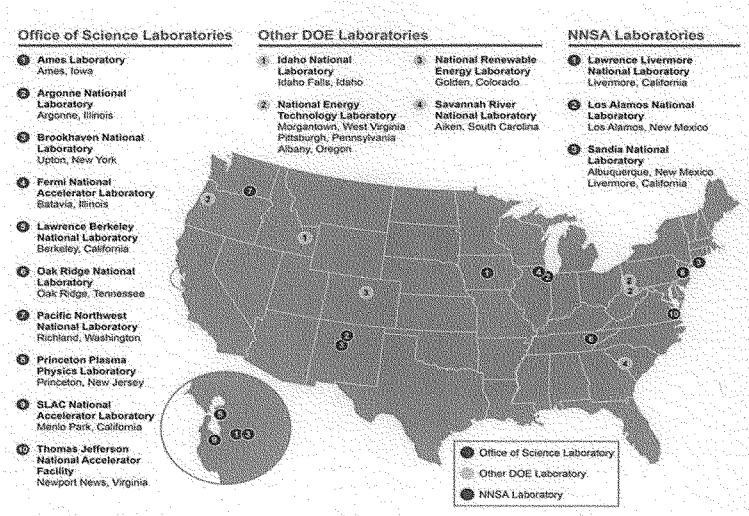
- The broader role of government in research and development, particularly the balance of investments between basic research versus applied energy development and demonstration.

[7] The White House, "Fact Sheet: Mission Innovation," November 29, 2015. Available at https://www.whitehouse.gov/the-press-office/2015/11/29/fact-sheet-mission-innovation
[8] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Budget in Brief," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetinBrief_0.pdf
[9] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 2," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f30/FY2017BudgetVolume2.pdf

ADDITIONAL BACKGROUND: DOE R&D PROGRAMS AND OFFICES

Office of Science (SC)

The Office of Science is the "largest federal sponsor of basic research in the physical sciences, supporting over 24,000 investigators at over 300 U.S. academic institutions and the DOE laboratories."[10] The FY 2017 budget request for the Office of Science (SC) is s $5.57 billion, $225 million or 4.2 percent above the FY 2016 enacted level.[11] The budget request includes $100 million in proposed mandatory spending for university research grants, which would require additional authorization from Congress.[12]



The Office of Science budget is divided into six major program areas:[13]

- **Advanced Scientific Computing Research (ASCR)** supports advanced computational research, applied mathematics, computer science, and networking and the development and operation of high performance computing facilities. Funding is specifically included to accelerate development of capable exascale computing systems, including the SC component of DOE's Exascale Computing Initiative (ECI) through the Office of Science Exascale

[10] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Budget in Brief," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetinBrief_0.pdf
[11] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 4," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume%204.pdf
[12] Ibid.
[13] Ibid.

Computing Project (SC-ECP). ASCR is funded at $663.2 million, an increase of $42.2 million or 6.8 percent from FY 2016 enacted levels.[14]

- **Basic Energy Sciences (BES)** supports fundamental research to understand, predict, and ultimately control matter and energy, 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. Funding for this program includes support for Energy Frontier Research Centers (EFRCs), the Energy Innovation Hubs, computational materials sciences activities, and continued funding for the construction for Linac Coherent Light Source-II (LCLS-II) and Advanced Photon Source (APS) upgrade. BES is funded at $1.94 billion in the FY 2017 request, an increase of $87.7 million or 4.7 percent from FY 2016 enacted levels.[15]

- **Biological and Environmental Research (BER)** supports scientific user facilities and fundamental research on complex biological, climatic, and environmental systems, core research in genomic science, and efforts to advance understanding of the role of atmospheric, terrestrial, ocean, and subsurface interactions, and field research and modeling to understand the dynamic physical, biogeochemical, microbial, and plant processes interactions involved in the energy-water nexus. Funding for this program supports three DOE Bioenergy Research Centers (BRC), the DOE Joint Genome Institute (JGI), the Environmental Molecular Sciences Laboratory (EMSL), and the Atmospheric Radiation Measurement Climate Research Facility (ARM). BER is funded at $661.9 million, an increase of $52.9 million or 8.7 percent above FY 2016 enacted levels.[16]

- **Fusion Energy Sciences (FES)** supports research to understand the behavior of matter at high temperatures and densities and continue to develop fusion as a future energy source. Funding is also included for the U.S. contribution to the International Thermonuclear Experimental Reactor (ITER) project and the operation of the National Spherical Torus Experiment Upgrade (NSTX-U). FES is funded at $398.18 million, a decrease of $39.8 million or 9.1 percent from FY 2016 enacted levels.[17]

- **High Energy Physics (HEP)** supports research to understand how the universe works at its most fundamental level by discovering the most elementary constituents of matter and energy, their interactions, and the basic nature of space and time. Funding for this program continues to implement activities and projects based on the strategic plan issued by the High Energy Physics Advisory Panel (HEPAP) in May 2014, including enhancing support for technical design and construction associated with the Long Baseline Neutrino Facility (LBNF)/Deep Underground Neutrino Experiment (DUNE) project, and continued construction of three MIEs for next generation dark-energy and dark-matter experiments.[18]

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[14] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 4," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume%204.pdf
[15] Ibid.
[16] Ibid.
[17] Ibid.
[18] Ibid.

HEP is funded at $817.9 million, an increase of $22.9 million or 2.9 percent above FY 2016 enacted levels.[19]

- **Nuclear Physics (NP)** supports research to discover, explore, and understand nuclear matter in a variety of different forms. Funding for this program includes continued construction of the Facility for Rare Isotope Beams (FRIB) at Michigan State University, increased operations of the Relativistic Heavy Ion Collider (RHIC) for explorations of spin physics and intriguing new phenomena observed in quark gluon plasma formation, and operations of the Argonne Tandem Linac Accelerator System (ATLAS) utilizing newly completed instrumentation. NP is funded at $635.7 million, an increase of $18.6 million or 3.0 percent relative to FY 2016 enacted levels.[20]

Energy Efficiency and Renewable Energy (EERE)

The Office of Energy Efficiency and Renewable Energy (EERE) is "the U.S. Government's primary clean energy technology organization" and supports applied research, development, demonstration, and deployment (RDD&D) activities in transportation, renewable power, and energy efficiency.[21] EERE's primary goals include "reducing U.S. reliance on oil, increasing energy affordability, ensuring environmental responsibility, enhancing energy security, offering Americans a broader range of energy choices, and creating job."[22] The FY 2017 budget request for EERE is $2.9 billion, an increase of $829 million or 40 percent over FY 2016 enacted levels.[23]

The FY 2017 request also includes a proposal for an additional $1.34 billion in mandatory funding for the administration's "21st Century Clean Transportation Plan."[24] This proposed mandatory funding would provide for expanded investment in advanced transportation technologies, establish regional fueling infrastructure for "low-carbon fuels," and encourage state and local governments to transition to alternative fuel or electric vehicle fleets.[25] Mandatory funding for EERE would require additional Congressional authorization. Including proposed mandatory spending, the FY 2017 budget request includes $4.23 billion, an increase of 2.16 billion or 104.6 percent.

EERE RDD&D is organized into three primary program areas: sustainable transportation ($853 million, an increase of 34 percent), renewable power ($620 million, an increase of 30 percent), and energy efficiency in buildings and manufacturing ($919 million, an increase of 27

[19] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 4," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume%204.pdf
[20] Ibid.
[21] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 3," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume3_2.pdf
[22] Ibid.
[23] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Budget in Brief," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetinBrief_0.pdf
[24] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 3," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume3_2.pdf
[25] Ibid.

percent).[26] EERE programs are also major contributors for five out of seven cross-cutting initiatives in the budget proposal, including Energy-Water Nexus, Grid Modernization, Subsurface Technology and Engineering, Supercritical CO_2, Advanced Materials, and Cybersecurity.[27]

Fossil Energy R&D (FER&D)

The DOE Office of Fossil Energy (FE) supports research, development, and demonstration focused on coal, oil, and gas, as well as the Federal Government's Strategic Petroleum Reserve. Within the Office of Fossil Energy, Fossil Energy Research and Development (FER&D) "advances technologies related to the reliable, efficient, affordable, and environmentally sound use of fossil fuels that are important to our Nation's security and economic prosperity."[28] The FY 2017 budget request for Fossil Energy R&D (FER&D) activities is $600 million, a decrease of $32 million or 5.1 percent from FY 2016 enacted levels.[29] The Department requested $360 million in the FY 2017 request, funding the rest of their budget proposal by deobligating $240 million from CCPI projects that have not reached financial close.[30]

In the FY 2017 budget request, DOE outlines a significant restructuring in FER&D programs, proposing to restructure the FER&D budget to eliminate the categorization of research and development by fuel type.[31] This reorganization would be unique to FER&D programs, as research programs in EERE remain divided by fuel type.

According to the budget request, the CCS and Advanced Power Systems program, formerly the Coal/CCS and Power Systems program, ($368 million, a decrease of 2.5 percent) would conduct research and development to advance carbon capture and storage technology for coal and natural gas power generation and power systems.[32] The Fuel Supply Impact Mitigation program, formerly the Natural Gas Technologies program, ($27 million, a decrease of 38.4 percent) would focus on research and development to reduce emissions and on water use in unconventional oil and gas development.[33]

FER&D programs are also major contributors to five cross-cutting initiatives in the budget proposal: Energy-Water Nexus, Subsurface Technology and Engineering, Supercritical CO_2, Cybersecurity, and Advanced Materials.[34]

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[26] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 3," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume3_2.pdf
[27] Ibid.
[28] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 3," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume3_2.pdf
[29] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Budget in Brief," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetinBrief_0.pdf
[30] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 3," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume3_2.pdf
[31] Ibid.
[32] Ibid.
[33] Ibid.
[34] Ibid.

Nuclear Energy (NE)

The Office of Nuclear Energy (NE) supports the diverse civilian nuclear energy programs of the U.S. Government, including federal research, development, and demonstration efforts "to advance nuclear power as a resource capable of contributing toward the Nation's energy supply, environmental, and national security needs."[35] The FY 2017 request for Nuclear Energy RD&D is $542.31 million, an increase of $9.69 million or approximately 1.82 percent above FY 2016 enacted levels.[36]

Nuclear energy R&D is primarily divided into four subprograms: Small Modular Reactor Licensing Technical Support ($89.60 million, an increase of 43.36 percent), Reactor Concepts Research, Development and Demonstration ($108.76 million, a decrease of 23.26 percent), Fuel Cycle Research and Development ($249.94 million, an increase of 22.64 percent), and Nuclear Energy Enabling Technologies ($89.51 million, a decrease of 19.79 percent).[37] The Reactor Concepts RD&D program will support implementation of the Civil Nuclear Cooperation aspects of the Iran Joint Comprehensive Plan of Action (JCPOA) to ensure that Iran's nuclear program will be exclusively peaceful.

NE R&D programs are also major contributors to four cross-cutting initiatives in the budget proposal, including Advanced Materials, Subsurface Technology and Engineering RD&D, Supercritical CO2, and Cybersecurity.[38]

Electricity Delivery and Energy Reliability (OE)

The mission of the Office of Electricity Delivery and Energy Reliability (OE) is driving "electric grid modernization and resiliency in the energy infrastructure" and leading efforts to "ensure a resilient, reliable, and flexible electricity system."[39] OE is also the federal government's energy sector-specific lead in responding to both physical and cyber emergencies to energy infrastructure. The FY 2017 budget request for OE is $262.3 million, an increase of $56.3 million or 27 percent from FY 2016 enacted levels.[40]

OE research and development is primarily divided between four program areas: Clean Energy Transmission and Reliability ($30.3 million, a decrease of 22 percent), Smart Grid Research and Development ($30 million, a decrease of 14 percent), Cybersecurity and Energy Delivery Systems ($45.5 million, a decrease of 27 percent), and Energy Storage ($44.5 million, an increase of 117 percent).[41] The FY 2017 budget request also proposes $15 million under a

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[35] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 3," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume3_2.pdf
[36] Ibid.
[37] Ibid.
[38] Ibid.
[39] U.S. Department of Energy, "Office of Electricity Delivery and Energy Reliability Mission Statement." Available at http://energy.gov/oe/mission
[40] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Budget in Brief," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetinBrief_0.pdf
[41] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 3," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume3_2.pdf

new program for Transformer Resilience and Advanced Components, which received an appropriation of $5 million in FY 2016.[42]

OE R&D programs are also major contributors to two cross-cutting initiatives in the budget proposal, including Grid Modernization, and Cybersecurity.[43]

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

The Advanced Research Projects Agency – Energy (ARPA-E) was established in 2007 by the America COMPETES Act (P.L.110-69), and was designed to develop energy technologies that result in "(i) reductions of imports of energy from foreign sources; (ii) reductions of energy-related emissions, including greenhouse gases; and (iii) improvement in the energy efficiency of all economic sectors."[44] ARPA-E funds potentially high-risk, high-impact projects that explore the development of transformational technologies that enhance economic and energy security, reduce energy imports, improve energy efficiency, and reduce emissions.[45] The FY 2017 budget request for ARPA-E is $350 million in discretionary funds, an increase of $59 million or 20.2 percent above FY 2016 enacted levels.[46]

The FY 2017 budget also includes an additional $150 million in mandatory funding for a proposed ARPA-E Trust, which would be focused on "larger scale, more complex energy challenges" than projects supported by the core ARPA-E program, including scale-up of technology and integration of multiple technical advances for energy system functionality.[47] Mandatory funding for ARPA-E would require additional authorization by Congress.

DOE Loan Program Office (Title XVII and ATVM)

The Department of Energy (DOE) Loan Program Office (LPO) manages the Title XVII (Section 1703) innovative clean energy projects loan guarantee program and the Advanced Technology Vehicles Manufacturing (ATVM) direct loan program.[48] The LPO also monitors loan guarantees authorized under the Section 1705 loan guarantee program, a temporary loan guarantee program created by the American Recovery and Reinvestment Act of 2009.[49] The DOE LPO maintains a portfolio of loans for clean energy projects and advanced technology

[42] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 3," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume3_2.pdf
[43] Ibid.
[44] America COMPETES Act, Title V, Section 5102. August 9, 2007. Available at http://arpa-e.energy.gov/arpa-e-site-page/authorization
[45] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Volume 4," February 2016. Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetVolume%204.pdf
[46] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Budget in Brief," February 2016, Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetinBrief_0.pdf
[47] Ibid.
[48] Loan Program Office. "LPO Portfolio Overview." U.S. Department of Energy. Available at http://energy.gov/lpo/portfolio
[49] Loan Program Office. "Section 1705 Loan Program." U.S. Department of Energy. Available at http://energy.gov/lpo/services/section-1705-loan-program

vehicle manufacturing facilities through these programs, as well as issuing solicitations for future loans and loan guarantees under existing authority in the Section 1703 and ATVM program.[50]

In the FY 2017 budget request, DOE proposes $37 million for continued operation of the Title XVII program, offset by an expected $27 million in projected off-setting fees collected by recipients or applications for loan guarantees.[51] Including off-setting fees, the request outlines a decrease of $7 million or 41 percent from FY 2016 enacted levels.[52] In the ATVM program, DOE requests $5 million in FY 2017 for administrative expenses and to continue monitoring the existing portfolio of ATVM loans.[53] This is a decrease of $1 million or 16.7 percent from FY 2016 enacted levels.[54]

[50] Loan Program Office. "LPO Portfolio Overview." U.S. Department of Energy. Available at http://energy.gov/lpo/portfolio
[51] U.S. Department of Energy, "FY 2017 Congressional Budget Request: Budget in Brief," February 2016, Available at http://energy.gov/sites/prod/files/2016/02/f29/FY2017BudgetinBrief_0.pdf
[52] Ibid.
[53] Ibid.
[54] Ibid.

Chairman SMITH. Good morning. The Committee on Science, Space, and Technology will come to order. Without objection, the Chair is authorized to declare recesses of the Committee at any time.

Welcome to today's hearing entitled "An Overview of the Budget Proposal for the Department of Energy for Fiscal Year 2017." I'll recognize myself for an opening statement and the Ranking Member, the gentlewoman from California, for hers.

Today, the Committee on Science, Space, and Technology will examine the Department of Energy's Fiscal Year 2017 budget request. The Science Committee has jurisdiction over more than one-third of the Department's $30 billion budget, including almost $13 billion for fundamental scientific research and energy R&D. This includes the Department of Energy Office of Science, which is America's lead federal agency for basic research in the physical sciences. DOE's basic scientific research and energy R&D are conducted by 31,000 researchers at over 300 sites around the country, which include universities and the 17 national labs.

The fundamental research conducted by the Office of Science has led to groundbreaking discoveries about our universe, made possible innovative new technologies, and provided the foundational knowledge for private sector achievements across our energy and manufacturing industries.

This Committee provided strong support for the Office of Science through the America COMPETES Reauthorization Act, which provided $5.3 billion for basic research. The Science Committee bill passed the House last year. And that authorized level was enacted into law as part of the 2016 omnibus appropriations.

I'm pleased to see this budget proposal build on COMPETES and Congressional appropriations to provide priority funding for basic R&D. Unfortunately, the President's budget proposal doesn't stop there. The President refuses to make the tough choices necessary in a responsible budget environment.

Instead, the fiscal year 2017 proposal reads like a wishlist for the White House's political allies. It uses budget gimmicks to add more spending for expensive commercial technologies already available to American consumers or rejected by them in the market. For example, the Office of Energy Efficiency and Renewable Energy (EERE) receives an increase of $830 million, or 40 percent, in discretionary spending in the fiscal year 2017 budget.

In addition to this unjustified substantial increase, the Obama Administration proposes adding another $1.3 billion in new mandatory spending for "clean transportation." This allows DOE to commit large sums of money without following the budget caps set in law. Combined, this is a 105 percent increase in EERE's budget. The President's budget does not reflect current constraints on federal spending or support a balanced, all-of-the-above energy strategy.

The President's budget also proposes significant spending to support the administration's Mission Innovation initiative. This commitment was made during the Paris climate change negotiations and doubles federal spending on clean energy research and development.

But investment is not made primarily in basic research in pre-commercial areas such as high-performance computing and advanced materials that cannot be accomplished by the private sector. Instead, this budget appears to focus Mission Innovation dollars on methods to move renewable energy into the market.

The budget proposal lacks transparency on Mission Innovation. It should be clear what the Department hopes to accomplish since this budget proposal cuts projects with bipartisan support in order to fund this initiative. One example is the Department's proposed $40 million in cuts to fusion energy research. This is $90 million below the authorization in the House-passed *America COMPETES Act*. Fusion energy research could provide for safe, clean, and reliable energy for Americans in the future. If Mission Innovation is about investing in long-term research for clean energy, fusion should be a priority.

In my home state of Texas, funds awarded to the Texas Clean Energy Project, a coal gasification project with longstanding bipartisan support, were abruptly pulled to fund these new clean energy priorities. Since the project is expected to capture 90 percent of the CO_2 emitted from enhanced oil recovery in the Permian Basin, it is hard to understand how this project doesn't meet the administration's "clean energy" standards. I'm pleased to be working with my Ranking Member colleague, Ms. Johnson, to restore funding to this important project.

While Secretary Moniz and I may disagree on the spending and research priorities outlined in the administration's budget, we do share an appreciation for DOE's vital role in maintaining American leadership in scientific discovery and technological achievement.

Over the past year, this Committee has examined a broad range of the Department's research. It is our responsibility in Congress to ensure American tax dollars are spent wisely and efficiently. As we shape the future of DOE, our priority must be basic energy research and development that only the federal government has the resources to pursue. This will allow the private sector to move groundbreaking technology to the market across the energy spectrum, create jobs, and help our economy.

I want to thank Secretary Moniz for a good working relationship with this Committee and for his open and straightforward approach to issues of mutual interest.

[The prepared statement of Chairman Smith follows:]

COMMITTEE ON
SCIENCE, SPACE, & TECHNOLOGY
Lamar Smith, Chairman

For Immediate Release
March 22, 2016

Media Contact: Zachary Kurz
(202) 225-6371

Statement of Chairman Lamar Smith (R-Texas)

An Overview of the Department of Energy's Budget Proposal for Fiscal Year 2017

Chairman Smith: Good morning. Today the Committee on Science, Space, and Technology will examine the Department of Energy's (DOE) Fiscal Year 2017 budget request.

The Science Committee has jurisdiction over more than one-third of the Department's $30 billion budget, including almost $13 billion for fundamental scientific research and energy R&D. This includes the DOE Office of Science, which is America's lead federal agency for basic research in the physical sciences. DOE's basic scientific research and energy R&D are conducted by 31,000 researchers at over 300 sites around the country, which include universities and the 17 National Labs.

The fundamental research conducted by the Office of Science has led to groundbreaking discoveries about our universe, made possible innovative new technologies, and provided the foundational knowledge for private sector achievements across our energy and manufacturing industries.

This Committee provided strong support for the Office of Science through the America COMPETES Reauthorization Act, which provided $5.3 billion for basic research. The Science Committee bill passed the House last year. And that authorized level was enacted into law as part of the 2016 omnibus appropriations.

I'm pleased to see this budget proposal build on COMPETES and Congressional appropriations to provide priority funding for basic R&D. Unfortunately, the President's budget proposal doesn't stop there. The President refuses to make the tough choices necessary in a responsible budget environment.

Instead, the FY 2017 proposal reads like a wish-list for the White House's political allies. It uses budget gimmicks to add more spending for expensive commercial technologies already available to American consumers or rejected by them in the market. For example, the Office of Energy Efficiency and Renewable Energy (EERE) receives an increase of $830 million, or 40 percent in discretionary spending in the FY 2017 budget.

In addition to this unjustified substantial increase, the Obama administration proposes adding another $1.3 billion in new mandatory spending for "clean transportation." This allows DOE to commit large sums of money without following the budget caps set in law.

Combined, this is a 105 percent increase in EERE's budget. This is the opposite of the Congress' priorities. The President's budget does not reflect current constraints on federal spending or support a balanced, all-of-the-above energy strategy.

The President's budget also proposes significant spending to support the administration's "Mission Innovation" initiative. This commitment was made during the Paris climate change negotiations and doubles federal spending on clean energy research and development.

But investment is not made primarily in basic research in pre-commercial areas such as high performance computing and advanced materials that cannot be accomplished by the private sector. Instead, this budget appears to focus "Mission Innovation" dollars on methods to move renewable energy into the market.

The budget proposal lacks transparency on Mission Innovation. It should be clear what the Department hopes to accomplish since this budget proposal cuts projects with bipartisan support in order to fund this initiative.

One example is the Department's proposed $40 million in cuts to fusion energy research. This is $90 million below the authorization in the House-passed America COMPETES Act.

Fusion energy research could provide for safe, clean and reliable energy for Americans in the future. If Mission Innovation is about investing in long-term research for clean energy, fusion should be a priority.

In my home state of Texas, funds awarded to the Texas Clean Energy Project, a coal gasification project with long-standing bipartisan support, were abruptly pulled to fund these new clean energy priorities.

Since the project is expected to capture 90 percent of the CO2 emitted from enhanced oil recovery in the Permian Basin, it is hard to understand how this project doesn't meet the administration's "clean energy" standards. I'm pleased to be working with my ranking colleague, Ms. Johnson, to restore funding to this important project.

While Secretary Moniz and I may disagree on the spending and research priorities outlined in the administration's budget, we share an appreciation for DOE's vital role in maintaining American leadership in scientific discovery and technological achievement.

Over the past year, this Committee has examined a broad range of the Department's research. It is our responsibility in Congress to ensure American tax dollars are spent wisely and efficiently.

As we shape the future of DOE, our priority must be basic energy research and development that only the federal government has the resources to pursue. This will allow the private sector to move groundbreaking technology to the market across the energy spectrum, create jobs and help our economy.

I want to thank Secretary Moniz for a good working relationship with this Committee and for his open and straightforward approach to issues of mutual interest.

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Chairman SMITH. That concludes my opening statement, and the Ranking Member, Ms. Lofgren, is recognized for hers.

Ms. LOFGREN. Thank you, Chairman Smith, for holding this hearing, and thank you, Secretary Moniz, for being here to discuss the fiscal year 2017 budget proposal and for your distinguished service to our country not only during this Administration but throughout your career.

I think we can all agree that the federal investments in research and development have proven to be worth every penny, especially in the energy sector. Without these crucial investments over the past century, the nuclear power industry would not be where it is today, the shale gas boom might never have happened, and our growing utilization of the vast array of renewable sources might be nonexistent. So I'm proud of our accomplishments but we need to look ahead.

During the Paris climate negotiations, Secretary Moniz and Bill Gates took a basic idea, doubling our investment in clean energy, and grew it into an unprecedented effort to modernize our world energy economy. Mission Innovation is a joint effort between 20 countries to double publicly funded clean energy research over the next 5 years.

This was coupled with an announcement from a group of many of the world's top private sector investors called the Breakthrough Energy Coalition which aims to invest billions of dollars in commercializing new technologies developed in Mission Innovation partner nations. COP21 was an ideal location for Mission Innovation to come to fruition, and the way we produce and use energies over the coming decades will ultimately determine the future of our planet. And technology and innovation is a key factor in all of this.

And so I applaud you, Secretary Moniz, for your work to guarantee a brighter future in the face of the growing threat of climate change.

The budget request is the first attempt to identify and account for Mission Innovation funding, and I'm pleased to say I believe the proposals for the Office of Energy Efficiency and Renewable Energy, the Office of Electricity, ARPA–E, and most of the programs within the Office of Science are in line with the thrust of this new initiative, and I strongly support them.

However, I am concerned that some areas of the budget were neglected, areas that are consistent with the ultimate goal of achieving a clean energy future. And while I appreciate this year's reasonable request for supporting the operations of the National Ignition Facility, the Fusion Energy Science budget, as the Chairman has mentioned, within the Office of Science seems to baffle me every year. With a ten percent cut proposed last year, followed a nine percent cut this year, it's the only program within the Office of Science receiving a cut, and they're just does not seem to be justification provided for this decision.

The potential for fusion energy is growing, as we see incredibly innovative researchers and companies approaching this challenge with new ideas and designs, yet these innovative concepts seem to reach a dead-end if they go to FES for support.

The landscape and potential for fusion research is changing, and it does not appear that the fusion energy budget is changing with

it. It would be disappointing and disheartening if the ultimate fusion breakthrough never saw the light of day because of unnecessary limitations within this budget.

Now, Ranking Member Johnson is with President Obama today. It's the only reason why she's not here, and I want to mention her concern with the budget for the Office of Fossil Energy and in particular the proposed de-obligation of funds for the Texas Clean Energy Project also mentioned by the Chairman. I joined the Texas and Washington delegations in their desire to work with you to come to a fair and transparent path forward for this project. It appears to have a great deal of potential for developing and deploying carbon capture technologies that could be key to meeting our and the world's climate targets.

More broadly, the research and development activities carried out by the Office of Fossil Energy are almost entirely devoted to climate and environmental impact mitigation, and as much as I would like to see a faster shift toward renewable and other low-carbon sources in the near term, I expect that we will continue to rely on some mix of fossil fuels. So we need to find ways to make them cleaner sources of power in the interim, and I'm afraid this budget does not properly prioritize that responsibility, especially in the context of Mission Innovation.

In addition, I'm interested in learning more about how the budget proposal supports the future of advanced fission reactors, which have the potential to be significantly safer while producing far less waste than the current generation of nuclear reactors. As a zero-emissions source of energy that can provide reliable baseload power, researching these new technologies should be a high priority. But the proposed 28 percent cut to advanced reactor technologies does not seem to indicate that.

So while there's lots to like in this budget request, I think we can understand why we'll also have more than a few questions. Your agency plays a lead role in determining how we power our economy and protect our environment. I very much appreciate your leadership and look forward to working with you to address each of these concerns.

And thank you, Mr. Chairman. I yield back the balance of my time.

[The prepared statement of Ms. Lofgren follows:]

OPENING STATEMENT
Congresswoman Zoe Lofgren (D-CA)

House Committee on Science, Space, and Technology
Full Committee
"An Overview of the Budget Proposal for the Department of Energy for Fiscal Year 2017"
March 22, 2016

Thank you, Chairman Smith for holding this hearing. And thank you, Secretary Moniz, for being here to discuss the FY 2017 budget proposal and for your distinguished service to the country, not only during this Administration but throughout your career.

I think we can all agree that the federal investments in research and development have proven to be worth every penny, especially in the energy sector. Without these crucial investments over the past century the nuclear power industry would not be where it is today, the shale gas boom may have never happened, and our growing utilization of the vast array of renewable sources might be nonexistent. I am proud of our accomplishments, but we must look ahead.

During the Paris climate negotiations, Secretary Moniz and Bill Gates took a basic idea – doubling our investment in clean energy – and grew it into an unprecedented effort to modernize our world energy economy. Mission Innovation is a joint effort between 20 countries to double publicly funded clean energy research over the next five years. And this was coupled with an announcement from a group of many of the world's top private sector investors called the Breakthrough Energy Coalition, which aims to invest billions of dollars in commercializing new technologies developed in Mission Innovation partner nations. COP21 was an ideal location for Mission Innovation to come to fruition. The way we produce and use energy over the coming decades will ultimately determine the future of our planet and technological innovation is a key

factor in all of this. I applaud you for your work to guarantee a brighter future in the face of the growing threat of climate change.

This budget request is the first attempt to identify and account for "Mission Innovation funding". I am pleased to say that I believe the proposals for the Office of Energy Efficiency and Renewable Energy, the Office of Electricity, ARPA-E, and most of the programs within the Office of the Science are in line with the thrust of this new initiative and I strongly support them.

However, I am concerned that some areas of the budget were neglected, areas that are quite consistent with the ultimate goal of achieving a clean energy future. While I appreciate this year's reasonable request for supporting the operations of the National Ignition Facility, the Fusion Energy Sciences budget within the Office of Science seems to baffle me every year – with a 10% cut proposed last year followed by a 9% cut this year. It is the only program within the Office of Science receiving a cut and there does not seem to be much justification provided for this decision.

The potential for fusion energy is growing as we see incredibly innovative researchers and companies approaching this challenge with new ideas and designs. Yet these innovative concepts seem to reach a dead end if they go to FES for support. The landscape and potential for fusion research is changing and it does not appear that the fusion energy budget is changing with it. It would be disappointing and disheartening if the ultimate fusion breakthrough never saw the light of day because of unnecessary limitations within your budget.

I also share Ranking Member Johnson's concern with the budget for the Office of Fossil Energy, and in particular the proposed de-obligation of funds for the Texas Clean Energy Project. I join the Texas and Washington delegations in their desire to work with you to come to a fair and transparent path forward for this project. It appears to have a great deal of potential for

developing and deploying carbon capture technologies that could be key to meeting our – and the world's – climate targets.

More broadly, the research and development activities carried out by the Office of Fossil Energy are almost entirely devoted to climate and environment impact mitigation. As much as I would like to see a faster shift toward renewable and other low carbon sources, in the near term I expect that we will continue to rely on some mix of fossil fuels. So it is incumbent upon us to find ways to make them cleaner sources of power, and I am afraid that this budget does not properly prioritize that responsibility – especially in the context of Mission Innovation.

In addition, I'm interested in learning more about how this budget proposal supports the future of advanced fission reactors, which have the potential to be significantly safer while producing far less waste than the current generation of nuclear reactors. As a zero-emission source of energy that can provide reliable baseload power, researching these new technologies should be a high priority. But your proposed 28% cut to Advanced Reactor Technologies does not seem to indicate that.

So while there is a lot to like in this budget request, I think you can understand why we'll also have more than a few questions. Your agency plays a lead role in determining how we power our economy and protect our environment. I appreciate your leadership and look forward to working with you to address each of these concerns.

Thank you again, Mr. Chairman. I yield back.

Chairman SMITH. Thank you, Ms. Lofgren.

Our witness today is the Hon. Ernest Moniz, Secretary of the Department of Energy. Prior to his appointment, Dr. Moniz was the head of the Department of Physics at the Massachusetts Institute of Technology where he was a faculty member since 1973. Previously, Dr. Moniz served as Under Secretary of the Department of Energy where he oversaw the Department's science and energy programs. From 1995 to 1997, he served as the Associate Director for Science in the Office of Science and Technology Policy in the Executive Office of the President.

Dr. Moniz brings both impressive academic credentials and practical skills to a very demanding job. Dr. Moniz received a bachelor of science degree in physics from Boston College and a doctorate in theoretical physics from Stanford University. Secretary Moniz, we welcome you and look forward to your testimony.

TESTIMONY OF THE HONORABLE ERNEST MONIZ, SECRETARY, U.S. DEPARTMENT OF ENERGY

Secretary MONIZ. Thank you, Mr. Chairman and Ranking Member Lofgren and Members of the Committee. I appreciate the opportunity to discuss our budget proposal with you today. It totals $32.5 billion in discretionary mandatory spending, but I want to emphasize the request for annual appropriations is $30.2 billion, an increase of two percent above the fiscal year 2016 enacted appropriation. And that two percent applies to both the national security and the domestic side of the ledger.

It is supplemented by the $2.3 billion in mandatory spending request, including $750 million for R&D and $674 million for uranium enrichment D&D, the latter from the USEC fund.

I want to emphasize, however, that in particular the $1.6 billion USEC fund is an existing, not new, mandatory spending account, and our proposal is in keeping with the spirit of current authorization that revenues from the beneficiaries of past uranium enrichment, rather than taxpayers at large, be used to pay the cost of D&D of the now-shuttered facilities. The USEC fund, by the way, is one of three federal funds totaling nearly $5 billion that can be used in this manner.

I want to acknowledge that underpinning all of these priorities is stewardship of the Department as a Science and Technology powerhouse, with an unparalleled network of 17 national laboratories. And we are working hard to strengthen the strategic relationship between the Department and our national laboratory network.

And finally, in this introduction, I want to highlight the crosscutting R&D initiatives in the budget. Among these initiatives are large increases proposed for grid modernization, the energy-water nexus, and the exascale high-performance computing initiative to support everything from nuclear weapons to energy technologies to cancer solutions.

The supporting budget details for each of these are provided in an extensive statement for the record, which I request be inserted into the record, and I will spend my last few minutes discussing our Mission Innovation initiative.

The fiscal year 2017 budget includes an increase of 21 percent in discretionary spending for clean energy R&D activities supporting our U.S. Mission Innovation initiative. The President's budget proposes this increase within the overall discretionary budget cap.

Mission Innovation is an unprecedented global initiative by 20 countries pledging to seek doubling of public clean energy R&D over five years. Those countries represent over 80 percent of global government investment in clean energy R&D, so this entails a highly leveraged opportunity to drive energy innovation.

The initiative is long overdue. In 2010, the American Energy Innovation Council, comprised of CEOs from multiple sectors, recommended that the government triple its investment in clean energy R&D. The Council made three points: One, innovation is the essence of America's strength; two, public investment is critical; three, the cost of RD&D are tiny compared with the benefits.

So the pledge to seek to double the level of investment over five years is ambitious but needed in the context of the AEIC. Bill Gates, who was the leader of the AEIC, I know has recently met with a number of Members of Congress and reiterated 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. The U.S. and global clean energy markets have been growing rapidly, but they should pick up the pace even more now as the world's nations implement the Paris agreement. Picking up the pace of our own clean energy innovation will result in commensurate benefits for our economy, environment, and security.

The scope of Mission Innovation spans the innovation cycle, from the earliest stages through initial demonstration, but with a weighting towards the early stages. And all clean supply-and-demand technologies and infrastructure enablers are part of it.

Mission Innovation is complemented by the Breakthrough Energy Coalition that was referred to, launched simultaneously with Mission Innovation, spearheaded by Bill Gates, launched with 28 investors from 10 countries. The Coalition committed to providing investment in new technologies originating from the innovation pipelines in the Mission Innovation countries from early-stage R&D through ultimate deployment. These investors are committed to a higher risk tolerance and patience for return than is typical, combined with a willingness to take the most promising innovations all the way past the finish line to deployment. And that's another important leveraging of the Mission Innovation proposal.

In particular, I want to single out the fiscal year 2017 budget proposal for $110 million to establish Regional Clean Innovation Partnerships as not-for-profit consortia competitively selected for a fixed period 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, "until very recently, U.S. federal agencies have done little to support state and regional innovation cluster initiatives" and recommended that "regional innovation cluster initiatives by state and local organizations should be assessed, and where appropriate, provided with greater funding and expanded geographically."

The Mission Innovation budget also supports increased investments in successful ongoing innovation programs at universities, national labs, companies, programs such as ARPA–E, energy frontier research centers, advanced manufacturing, bioenergy centers, advanced transportation technologies, advanced nuclear reactor technologies, and next-generation carbon-capture technologies, to name a few.

In closing, I want to note that we will be holding a set of regional meetings across the country to gain input on these regional partnerships, and for the Chairman and Ranking Member Johnson, I'd like to say that we will have a May meeting in Texas, and we will extend invitations to both of you.

That concludes my summary. Thank you for your interest, and I look forward to the discussion.

[The prepared statement of Secretary Moniz follows:]

Testimony of Secretary Ernest Moniz
U.S. Department of Energy
Before the
Committee on Science, Space, and Technology
U.S. House of Representatives
March 22, 2016

Chairman Smith, Ranking Member Johnson, and Members of the Committee, 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

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

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 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 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

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

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.

As United States Secretary of Energy, Dr. Ernest Moniz is tasked with implementing critical Department of Energy missions in support of President Obama's goals of growing the economy, enhancing security and protecting the environment. This encompasses advancing the President's all-of-the-above energy strategy, maintaining the nuclear deterrent and reducing the nuclear danger, promoting American leadership in science and clean energy technology innovation, cleaning up the legacy of the cold war, and strengthening management and performance.

Prior to his appointment, Dr. Moniz was the Cecil and Ida Green Professor of Physics and Engineering Systems at the Massachusetts Institute of Technology (MIT), where he was a faculty member since 1973. At MIT, he headed the Department of Physics and the Bates Linear Accelerator Center. Most recently, Dr. Moniz served as the founding Director of the MIT Energy Initiative and of the MIT Laboratory for Energy and the Environment and was a leader of multidisciplinary technology and policy studies on the future of nuclear power, coal, nuclear fuel cycles, natural gas and solar energy in a low-carbon world.

From 1997 until January 2001, Dr. Moniz served as Under Secretary of the Department of Energy. He was responsible for overseeing the Department's science and energy programs, leading a comprehensive review of nuclear weapons stockpile stewardship, and serving as the Secretary's special negotiator for the disposition of Russian nuclear materials. From 1995 to 1997, he served as Associate Director for Science in the Office of Science and Technology Policy in the Executive Office of the President.

In addition to his work at MIT, the White House and the Department of Energy, Dr. Moniz has served on a number of boards of directors and commissions involving science, energy and security. These include President Obama's Council of Advisors on Science and Technology, the Department of Defense Threat Reduction Advisory Committee, and the Blue Ribbon Commission on America's Nuclear Future.

A member of the Council on Foreign Relations, Dr. Moniz is a Fellow of the American Association for the Advancement of Science, the American Academy of Arts and Sciences, the Humboldt Foundation, and the American Physical Society.

Dr. Moniz received a Bachelor of Science degree *summa cum laude* in Physics from Boston College, a Doctorate in Theoretical Physics from Stanford University, and honorary degrees from the University of Athens, the University of Erlangen-Nurenberg, Michigan State University and Universidad Pontificia de Comillas.

Chairman SMITH. Thank you, Secretary Moniz, and I'll recognize myself for questions.

And that meeting that you just mentioned is going to be in Austin, Texas, is it not, May 9?

Secretary MONIZ. May 9 is the plan——

Chairman SMITH. Okay.

Secretary MONIZ. —in Austin, Texas——

Chairman SMITH. Great.

Secretary MONIZ. —at U.T.

Chairman SMITH. All right. My first question goes to the subject of the budget, and just to make sure that we all understand, this is a budget proposal that the President cannot unilaterally implement. It is a budget that has to be authorized and appropriated by Congress, and that may or may not be exactly what the President requested. Is that the case?

Secretary MONIZ. I believe we are here, in fact, to seek support for the budget, yes.

Chairman SMITH. Okay. Secretary Moniz, my next question goes to our oversight responsibilities. And the Committee has engaged in continued oversight of the Department, including raising questions about DOE's Loan Guarantee Program, DOE home energy standards, DOE scientists who may have been fired for talking to the committee staff, and then just last week, a bipartisan request regarding the Texas Clean Energy Project.

While we have received some documents from DOE on these issues, and I appreciate your telling me yesterday that you are conducting an investigation in regard to the home energy standards issue, many of our questions remain outstanding. For example, in the case of the DOE Loan Guarantee Program, we have yet to receive the Department's Risk List, which would include DOE's assessment of the risk for each loan guarantee.

Now, just last week, news broke that the Ivanpah solar plant, which received a $1.6 billion loan guarantee, was struggling to meet its production commitments. And will you be able to assure us today that we will get the information we have requested, including the Risk List?

Secretary MONIZ. As we discussed, Mr. Chairman, the Risk List is very sensitive for proprietary information, but I think the best thing we could do is perhaps arrange a briefing on that risk profile of our various projects.

Chairman SMITH. Okay. Let's start with the briefing and then we'll go from there. Thank you.

My next question is this: In—another subject involves the—what I mentioned just a minute ago, the DOE scientist who worked with this committee that was fired six days after meeting with our committee staff. These discussions took place at the Committee's request, and the briefing was organized through DOE Congressional Affairs.

I just am curious whether any officials connected to that episode have in any way been sanctioned or upbraided, or is that going to wait on your—on some internal investigation?

Secretary MONIZ. That particular case, we indeed delved into that, and a settlement was reached that is confidential among the

parties. But the employee is employed at the Department of Energy.

Chairman SMITH. Right. I understand that. We are still, however, interested in the circumstances that caused the dismissal of the employee. We're also concerned about an intimidation factor in regard to other employees who might talk to members of our staff. And in that regard, will you also assure us today that you'll provide the documents and information that we have requested? I know some more was forthcoming, I think, yesterday——

Secretary MONIZ. Last night, yes.

Chairman SMITH. —but not everything we have asked for, and so in regard to what—the documents that remain that we've asked for, can we——

Secretary MONIZ. Well, we—okay. I believe our General Counsel felt they were being responsive, but let's get together again with your staff, make sure what the staff views as not including in those documents yesterday, and we'll keep working at it to——

Chairman SMITH. Okay.

Secretary MONIZ. —get you what you want.

Chairman SMITH. I would guess your general counsel knows the documents that we have not yet received, and I guess I'm looking for an assurance that, all things being equal, that we will get those documents in a timely fashion.

Secretary MONIZ. Again, I am committed to providing documents as much as we can within the constraints of the General Counsel says if there are things that are——

Chairman SMITH. Okay.

Secretary MONIZ. —proprietary and need to be kept very close hold. Those could be a discussion with the counsel in terms of——

Chairman SMITH. Okay. In regard to this particular subject, we have not been told any of the documents are proprietary; it's just the question of——

Secretary MONIZ. No, no, it's not proprietary. It's—the settlements was reached as a settlement between the employee and the department and——

Chairman SMITH. Right. We're looking at communications, as you may or may not know, and those communications, I don't think, would be a part of any settlement. So to the extent that you can, you will give us the documents?

Secretary MONIZ. I—absolutely.

Chairman SMITH. Okay.

Secretary MONIZ. Yes.

Chairman SMITH. Thank you, Secretary Moniz.

And the gentlewoman from California, Ms. Lofgren, is recognized for her questions.

Ms. LOFGREN. Thank you, Mr. Chairman.

I would just note that our staff calculates that your department has sent over about 8,000 pages of documents in response to inquiries this year, so I know you'll continue to work with the Committee, but I wouldn't want people to think that you haven't delivered boatloads of information to the Committee.

I also want to talk about fusion energy. As you know, we've talked about that in the past. I'm particularly concerned about the National Ignition Facility and its importance. I know you're aware.

We were at the groundbreaking together. And I've been trying to follow up on this. As you know, I'm sure, Dr. Holden in 2014 said that we couldn't support inertial fusion energy R&D activities that weren't relevant to the nuclear weapons reliability unless ignition was achieved.

Now, subsequent to that, there was a National Academy report that had some very important proposals. Actually, that was prior to that. And I felt that Dr. Holden, who I admire a great deal, that his answer to my questions were not consistent with the National Academy recommendations.

To follow up, I sent a letter to you in November to try and clarify the misunderstanding, and there had been statements made by the co-Chairs of the Academy report explaining their findings, their intent. And last month, I heard from the NSA Administrator, not you, indicating that they could not divert so-called—it's their word—the Fusion Energy Science program from its primary mission.

Now, my question is this: The primary mission of the Department of Energy's Fusion Energy Science program is to steward research in promising fusion energy pathways. And considering that there's still no ongoing program at the Office of Science or ARPA–E for the—or the NNSA for proposals to conduct research in this area to compete for federal funding, how can we begin implementing the recommendations from the National Academy's report and establish a program that directly, officially supports R&D in inertial fusion for energy applications or at least find a way to allow strong, merit-reviewed proposals for inertial fusion energy research to be eligible for federal support? How do we do that?

Secretary MONIZ. Thank you. First, context would be interesting to put out there. And, first of all, the good news is NIF has become more effective in——

Ms. LOFGREN. That is correct.

Secretary MONIZ. —and up over 350 shots last year. And the primary mission unquestionably is the Stockpile Stewardship Program——

Ms. LOFGREN. Of course.

Secretary MONIZ. —for which it has made major contributions. However, almost 20 percent of the shots were dedicated last year to non-stockpile stewardship activities, and those range from basic science in astrophysics to activities relevant to potential fusion.

However, the National Academy's overarching recommendation, as I understand it, was that a structured program would await ignition. And as you know, ignition has proved elusive. So we continue to optimize both beam and target physics to achieve ignition, which would be the threshold for a more systematic ICF program.

Ms. LOFGREN. I don't think that's correct.

Secretary MONIZ. Okay.

Ms. LOFGREN. And I don't want to get in a debate here because our time is limited. Perhaps we can follow up after this hearing——

Secretary MONIZ. Sure.

Ms. LOFGREN. —and go through the National Academy report.

Let's talk about the alternative approaches. Now, there have been several promising alternative approaches to fusion from small

and midsize startups, and we had talked earlier about ARPA–E doing a three-year program to further explore potential for some of these concepts called the magnetized target fusion, but that program is temporary and it doesn't cover the full range of emerging alternatives that currently don't have federal support.

What is the Department considering to ensure the full range of viable options for commercial fusion energy in terms of vetting and, where appropriate, actively—active pursuit? And does the Office of Science's current fusion research program have the flexibility to shift resources to new approaches if they don't align, for example, the tokamak research pathway? If not, what flexibility does the Office of Science need to be provided to do that?

Secretary MONIZ. First of all, the ARPA–E program, of course, like all the ARPA–E programs, are 3-year——

Ms. LOFGREN. Of course.

Secretary MONIZ. —kind of programs, and I might add, by the way, that some of the support from the ARPA–E program will actually be carried out at NIF, so that is part of a fusion program actually at NIF in terms of those experiments.

In terms of the Office of Science fusion program—well, first of all, we have to say, you know, the—kind of the elephant in the room, frankly, is the trajectory for the ITER project——

Ms. LOFGREN. Right.

Secretary MONIZ. —and we are due to provide Congress a report on May 2 following a major project review in April. No matter which way we and the Congress go, that will have significant implications obviously for the science fusion program.

The program certainly has flexibilities within the budget constraints. I mean, there are discussions about, well, first of all the MIT—I am past my recusal period. The MIT program is shut down in this budget. That accounts for much of the drop in the budget. So General Atomics has the tokamak work. Princeton has alternative work. The whole stellarator approach is of interest there. So they have the flexibility. It's a question of structuring the program within the budget.

Ms. LOFGREN. I think my time is expired, Mr. Chairman, so thank you for yielding to me.

Secretary MONIZ. And if I may add, I would be happy to follow up on that ICF in the next few——

Ms. LOFGREN. I would look forward to that, and maybe we can get to—rather than sending letters back and forth, get to an understanding on it.

Chairman SMITH. Thank you, Ms. Lofgren.

The gentleman from Georgia, Mr. Loudermilk, is recognized for his questions.

Mr. LOUDERMILK. Thank you, Mr. Chairman, and thank you, Secretary Moniz, for being here.

And before I start my question, I would just like to extend my heartfelt prayers to the people in Brussels, Belgium, this morning for the horrific terrorist attacks taken against our friends and allies and remind people that it's not just the people of the Belgium that were attacked, but many Americans who serve at NATO live in that area. And the terrorism is a real, real-time threat not only

overseas but here in the United States, as we have recently learned.

As part of my responsibility in Congress, I serve as the Chairman of the Oversight Subcommittee, on this honorable committee. I also sit on the Homeland Security Committee, and back in May we traveled through the Middle East and even into Europe, and I went to Brussels as part of a counterterrorism task force.

And one of the scenarios that we have to look at and one of the things that frightens me much more than other attacks that we have seen is a potential of a dirty bomb, release of radiation on our citizens not necessarily through a nuclear—traditional nuclear bomb but just a dirty bomb that releases radioactive material.

And I want to follow up a little bit on what the Chairman had asked is in the last Congress the committee staff requested a briefing on low-dose radiation from your department regarding legislation dealing with low-dose radiation. And it's important, as we develop legislation, to understand the effects of and the risks of low-dose radiation either through a dirty bomb, how do we evacuate, how do we protect the people, as well as physicians who deal with this type of radiation.

And as was mentioned earlier, and as I was made aware, that subsequent to that briefing where technical questions were answered, this employee was fired from your department. And, again, this briefing was organized through your Congressional Affairs Office.

And I'm gravely concerned that—how can Congress do our job if we don't have timely and effective technical information which we rely on from agencies under the executive branch that we can effectively do our job not only from an oversight and investigatory authority that we have through the Constitution but also good legislation that represents the people, that we can effectively respond to these type of threats that we face or just the daily operation of using radiological material?

What have you done in light of this to ensure that your employees are not intimidated from within to sharing truth and the information that Congress needs to be able to do our job that the American people expect us to do for them?

Secretary MONIZ. Well, thank you. If I may comment on Brussels first——

Mr. LOUDERMILK. Please.

Secretary MONIZ. —because of course we all align with your initial statement. But I just would note that our Deputy Secretary was actually in Brussels on Friday discussing precisely these issues offered to our Belgian colleagues, an opportunity to come to our laboratories to see some of the technologies that could be used to prevent these things——

Mr. LOUDERMILK. Thank you for that.

Secretary MONIZ. —which they said immediately, yes, and just days before this terrible, terrible event.

I would also mention that March 31 and April 1, so end of next week I guess, we will host the Nuclear Security Summit here in Washington, which will address many of these issues.

With regard to the low-dose radiation issue, first of all, I am trying my best to make sure that there's a culture of understanding,

that we want to have clear statements of what are technical facts, as I said, and in this case—that employee is at work at the Department of Energy so——

Mr. LOUDERMILK. So she has been rehired——

Secretary MONIZ. Correct.

Mr. LOUDERMILK. —after being fired?

Secretary MONIZ. That is correct.

Mr. LOUDERMILK. Okay.

Secretary MONIZ. So——

Mr. LOUDERMILK. So at least there is some recognition——

Secretary MONIZ. Action was taken, correct.

Mr. LOUDERMILK. Okay.

Secretary MONIZ. If I might add, on the substance, just to conclude on the low-dose radiation, I asked my Secretary of Energy Advisory Board to look at that. They came back and said the important issue, we're not the right group to look at this. We then charged the BER Advisory Committee to look at this. They will come back with a report this fall on what a restructured, effective program may look like.

The reality is, as we all know, it's been a frustrating subject in terms of being unable to reach the conclusions that we would like to operationalize what is a hugely important and expensive issue for us, how one treats low-dose radiation. So we are actively looking at that. In the fall we'll have a report back.

And I might add the cancer—this is a little bit of a stretch, but we can discuss it later—the cancer initiative may provide, through big-data analytics, one of the most effective ways of addressing the low-dose issue.

Mr. LOUDERMILK. And thank you for what you're doing. And again, my concern goes back to—there may be a nuclear engineer on this committee. I am not one, and so therefore I rely heavily upon those that you employee to ensure that we do our job that the American people expect us to do. And things such as protecting against a dirty bomb, I can't think of anything that would be more high priority than us being proactive in that and from a legislative standpoint.

And I hope that you agree that working between the branches of government is extremely important, that we have the access to the information, and when we request information, that we receive honest, true information that's comprehensive and in a timely matter to our job. Do you agree that——

Secretary MONIZ. Yes.

Mr. LOUDERMILK. —we must do that? All right. Thank you. I yield back.

Chairman SMITH. Thank you, Mr. Loudermilk.

The gentleman from Illinois, Mr. Lipinski, is recognized for his questions.

Mr. LIPINSKI. Thank you, Mr. Chairman.

Welcome back, Secretary Moniz. It's great to see you again.

I wanted to start out by asking about the Advanced Photon Source at Argonne National Lab. It's my understanding that the APS is slated for a major facilities upgrade and is the next project in line for an upgrade. So could you talk about the importance of upgrading the Advanced Photon Source and the importance, more

broadly speaking, of maintaining our global leadership in light sources?

Secretary MONIZ. Yes, it is extremely important and, as you have said, we're on a systematic march towards upgrading our light sources. Just last year, we completed the Brookhaven upgrade for very high brightness. Our current project is on the coherent light source, so-called x-ray laser at SLAC, and we are in the early engineering phases now of designing the APS upgrade, which will provide much greater coherence in the beam—and it'll be an absolutely world-leading tool.

So we're systematically upgrading our light sources, which are premier tools, the biggest drivers really of our user communities in this country. And I think, as you know, others may not, also spending about 40 percent of their time in the life sciences and making enormous contributions.

Mr. LIPINSKI. Yes, so thank you for that, and it's important. As you said, we continue to move forward here.

The second thing, as you know, an interest of mine is commercialization of DOE-funded research from universities and national labs. Last year, there were a couple of advancements on this front. First, the Office of Technology Transitions was tasked with supporting commercialization activities across the DOE; and second, the Lab-Corps program was created to accelerate the transfer of clean energy technologies from national labs such as Argonne to the commercial marketplace. Now, Lab-Corps is based on NSF's I–Corps model, and the program trains researchers on how to turn the discoveries into real-world technology.

As I mentioned, work going on at Argonne includes developing energy-efficient material for windows, processes for deionizing water, and devices for charging electric vehicles.

So Lab-Corps just began the second round of training sessions. Could you give us an update on the Lab-Corps program and also on the activities of the Office of Technology Transitions?

Secretary MONIZ. Yes, thank you. And I hope the Committee recognizes that we apparently can listen to these suggestions moving forward in these directions. So number one is the establishment of the Office of Technology Transitions under Jetta Wong, and I think that is making tremendous progress in multiple dimensions, including, I might add, implementing the 2005 Energy Policy Act call for a Technology Commercialization Fund. And that is approximately a $20 million fund specifically for commercializing laboratory technologies.

I might say there is at least one difficulty that we would like to see addressed in that, and that is that currently, the $20 million fund is quite atomized by having the contributions to it siloed according to the program from which those funds came. And that leaves very, very small amounts, as opposed to what we might accomplish by further aggregation, so that's an issue with the Congress that we would need authorization to address that.

I might also add in the Office of Technology Transitions, we just established—and in January hired a person to head—an energy-investment activity that will provide much greater transparency for all investors to be able to access our technologies laboratory and university grants, et cetera.

Lab-CorpE and other specific programs such as a voucher program, as well we have in the budget, and there's a lot of enthusiasm at the laboratories for advancing these. We can get you some statistics then for the record if you'd like. But I'm very pleased that the focus on technology transfer has been elevated quite dramatically.

Mr. LIPINSKI. Thank you, and I appreciate your responsiveness and the Department's responsiveness, and these are things that I think are important for us to work together on as we move forward, so take a look at——

Secretary MONIZ. Great.

Mr. LIPINSKI. —what you had mentioned.

Thank you. I yield back.

Chairman SMITH. Okay. Thank you, Mr. Lipinski.

And another gentleman from Illinois, Mr. LaHood.

Mr. LAHOOD. Thank you, Mr. Chairman.

And Secretary Moniz, thank you for being here today and for your testimony.

And we are proud in Illinois to have two really first-class national laboratories, the Fermi National Accelerator Lab and also the Argonne National Lab. And looking at how we—the research, technology, and innovation that's being done at these labs and how we ensure that we are getting that technology transfer information to the private sector, whether that's entrepreneurs, whether that's mature companies, how we do that and the potential barriers that are there, Secretary Moniz. Are you satisfied now we're doing all we can to, you know, engage in that process and further the private sector, or is there more to do there?

Secretary MONIZ. Oh, I think there's certainly more. I'm pleased that we are doing more, but there's clearly more to be done. The Energy Investment Center that I mentioned is part of that. That's another new step to providing the transparency.

But also what I would say is what's maybe most important in the end is not a specific program but the clear recognition by the laboratory directors that technology transition is part of their responsibility. So I think if it's done at the laboratories with the commitment of the director, that in the end may be the most effective step.

Mr. LAHOOD. And is it your view that that's something that can be internally done by your department or is there something you need from us to ensure that we continue to engage in this?

Secretary MONIZ. At a high-level we probably have the authorities that we need, but as I said earlier, something like the Technology Commercialization Fund—I already mentioned one problem, which is the atomization of it, the siloed nature, so that's something we would need Congressional action.

And another issue is there is a—at a minimum I would call it a lack of clarity on cost-sharing requirements. And our General Counsel is interpreting them rather narrowly that we are going to require at least 50/50 cost-sharing. In that kind of a program it would probably be better to have more flexibility, as we do in applied energy programs to have, for example, a 20 percent cost-sharing. So there's a couple of places where Congressional action could be extremely helpful.

Mr. LAHOOD. And can you give us a couple examples of success stories you've had in the last couple years here in reducing these barriers and success that we've seen in the private sector?

Secretary MONIZ. Well, I think that success means things actually happening, and if we go to Argonne, to pick an arbitrary laboratory, for example, the JCESR, the hub on energy storage, has had results get out into the automotive sector already. So that's a great example of technology transfer driven by the dialogue between the companies, including the companies in the region, obviously, with the Argonne leadership.

Mr. LAHOOD. Yes. And I guess I would just say, you know, highlighting more things like that, reducing those barriers, you know, is, you know, something that we need more of, and the public seeing the direct benefits of taxpayer money being spent at these labs and kind of the fruitful results of that, you know, is going to benefit us all——

Secretary MONIZ. Yes.

Mr. LAHOOD. —and so I would encourage more of that with the Department.

Secretary MONIZ. Thank you. And I might add that part of the communication is that coming up in—what's the date of Lab Day—I forgot.

Anyway, assume coming up we will have here on the Hill Lab Day. I forget the exact date. And the focus this time is on science. We're rotating it, national security, et cetera, science, and that'll be an important part of the communication.

Mr. LAHOOD. Thank you.

Those are all my questions, Mr. Chairman.

Chairman SMITH. Thank you, Mr. LaHood.

The gentlewoman from Connecticut, Ms. Esty, is recognized.

Ms. ESTY. Thank you, Mr. Chairman, and thank you, Ranking Member Lofgren, for holding today's hearing to review the U.S. Department of Energy's science and technology priorities within its budget request for 2017.

Secretary Moniz, please first let me allow you to—congratulate you on your excellent work in securing the historic climate pact in Paris just in the last few months. While it's only a first step, we must all work together to take action on climate change.

There are a couple of topics I'd like to touch on. The first is on the U.S.-Israel Strategic Partnership Act which Congress passed and the President signed into law in late 2014 establishing that it is a policy priority for the United States to pursue every opportunity to deepen our energy relationship with Israel. Managed by DOE with strong bipartisan support in Congress, the U.S.-Israel Energy Cooperation Program has set the stage for long-term strategic cooperation in the development of new energy technologies.

Now, we know that Israel is a world leader in technological research and development with expertise in areas such as cleantech, water resource management, and cyber protection technologies that may be applicable to our own critical infrastructure.

So a couple of questions: As DOE increases its investments in R&D, does the Department have plans to expand its current programs with Israel? And second, increased investment in R&D will also serve to improve cybersecurity in the electric power and nat-

ural gas subsectors. And how do you see this benefiting the region like the Northeast, as you know well, where the natural gas supplies are constrained during winter months?

Secretary MONIZ. Thank you. If I may, by the way, note April 20 is the day of Lab Day on the Hill for science.

With regard to Israel, first of all, I'm happy to say that I will be traveling to Israel April the 2nd for a few days. I'll be hosted by Minister Steinitz, my corresponding Cabinet member, and we are definitely talking about increasing our collaboration in energy.

But I might also mention certainly I'm very interested in carrying forward the discussions we've already started on looking at the energy-water nexus. Israel is obviously well-known as a world leader in water management, all types of energy-efficient water management. It's going to be a great area for collaboration. So I'm not saying we have something mapped out yet, but that's an area that we will certainly be exploring.

On cybersecurity more broadly—there was, of course, a discussion about some cyber issues in Israel not so long ago, but here in our program I want to emphasize we continue to have a very strong emphasis on cybersecurity. All the risks, frankly to the grid, cyber among them. I just want to emphasize that overall our budget is up, but in one program, the Office of Electricity, it went down. But I want to emphasize it's because with the fiscal year 2016, we finished four discrete projects, so kind of the fundamentals are there as well.

We also have expanded dramatically our interaction with industry. The Deputy Secretary chairs an initiative there, and in fact we've taken the step of doing things like providing clearances to key members of that industry to be able to share information. So this is a huge, huge issue, we know, and we will continue to focus on that quite strongly.

Natural gas, our Quadrennial Energy Review, both the first installment on energy infrastructure and the second installment that we are working on now, which is on electricity end-to-end has a strong look at this because, as we've seen, there have been projections, of course, of natural gas growing dramatically in the energy sector. The growth has been even faster than anticipated, and indeed, in 2016 for the first time the EIA at least projects that natural gas will have a higher market share than coal over the entire year. This is an incredible change.

Now, in looking at that, the QER analyses, interestingly enough, say that the scale of build-out of the transmission infrastructure to manage this growth actually does not have to be any bigger than the current rate, the current rate of build-out. Partly, that's because of the geographical diversity now of the sources.

However, there are localized issues—you mentioned New England—that's the prime example where we continue to work on the constraints there. There is some development of increasing capacity, but that's one where we have to keep an eye out.

Ms. ESTY. Thank you. And I'll follow up more on the desalination efforts in the proposal in the budget on that and——

Secretary MONIZ. Yes, we have a de-sal hub proposed in the budget, yes.

Ms. ESTY. Thank you very much, and I yield back.

Chairman SMITH. Thank you, Ms. Esty.

And the gentleman from Texas, Mr. Weber, is recognized for his questions.

Mr. WEBER. Thank you, Mr. Chairman.

Secretary Moniz, thank you for being here. I'm glad to hear about the report of natural gas actually replacing coal in the marketplace or leading—having more of a market share. As Chairman of the Subcommittee on Energy, that's important to us.

Do you think, just from a practical standpoint—so natural gas and nuclear for that matter, I guess, would be labeled as one of the more cleaner energies, I guess, for lack of a better term? Would you agree with that?

Secretary MONIZ. Absolutely.

Mr. WEBER. Good. As you probably know, the Golden Pass LNG plant is actually in—well, you may not know it's in my district—and it's waiting to export, waiting on permits. The first DOE permit was first filed in 2012. Now, this project represents billions of dollars of private investment and thousands of jobs in Texas and in the nation, and you've already said natural gas is coming up in the marketplace. I'm glad to hear that.

FERC—we want to get that permit expedited. They have to have a permit from FERC. So all of these LNG plans, I would argue, are critical. Will you commit to working with me to advance critical infrastructure projects like this, help DOE to move those projects along and in fact provide timely updates to me and my staff on those applications and where they stand?

Secretary MONIZ. Oh, certainly. We've been, I think, very transparent and, quite frankly, processing things quite fast once they have their FERC EIS because——

Mr. WEBER. Do you think we can get that done in 30 days after their EIS is approved?

Secretary MONIZ. Well, yes. So the last two years we've been getting things out between day timescale to month timescale. So——

Mr. WEBER. Okay.

Secretary MONIZ. —that's our intent.

Mr. WEBER. Well, that's——

Secretary MONIZ. And, of course, the FTA license was granted in 2012. It's the non-FTA that's now on the——

Mr. WEBER. Right, so you're going to work with us and we can get those as quickly as possible because, obviously, we'd like to take—we would like to take advantage of that market share increase that you're talking about.

Secretary MONIZ. I believe FERC's docket shows the EIS coming up in the summer for this—

Mr. WEBER. Okay. Well, that's what we want to hear.

I'm going to jump over to nuclear here now and put my nuclear hat on. H.R. 4084 is a bill that we passed out of this committee. Chairman Smith and Ranking Member Johnson were cosponsors of it, as myself and many others on the Committee for that matter. And what it does is it—are you aware of that bill? It instructs the DOE to focus on the next round of nuclear generators research—I'm sorry, nuclear reactors research and to be able to partner with private industry to have the site developed so that we can actually come up with the next—are you familiar with 4084?

Secretary MONIZ. In general terms, not——

Mr. WEBER. Okay.

Secretary MONIZ. —in specifics.

Mr. WEBER. Okay.

Secretary MONIZ. Right.

Mr. WEBER. So on February 29 it passed the House by voice vote. On January the 28th, the Senate language passed as an amendment by recorded vote of 87 to 4. Now, I bring those numbers up because that's a pretty substantial backing bipartisan bill that we would argue, known as the Nuclear Energy Innovation Capabilities Act.

So do you know about the bill? And I guess I'll put you on the spot. Do you support that kind of legislation?

Secretary MONIZ. Well, again, I don't know the specifics of the bill, but generally speaking, yes. I believe that nuclear and innovation in nuclear fission technologies is very important.

Mr. WEBER. Sure, but you agreed with me earlier or you actually stated an opinion that natural gas and nuclear is among the cleaner energies.

Secretary MONIZ. Yes, yes—no, so I—yes, I totally support the general objective——

Mr. WEBER. Right.

Secretary MONIZ. —for sure, yes.

Mr. WEBER. So if we can bring in the next round of reactors, that would be advantageous to us.

Secretary MONIZ. And we did provide up to $80 million for molten salt and for pebble bed development, for example, in addition to supporting the ongoing work with the small modular reactor.

Mr. WEBER. Right. Well, the DOE Office of Nuclear Energy supports civilian nuclear R&D for energy and we would argue national security needs. Now, based on what happened and what's been happening around the world—and Representative Loudermilk brought it up earlier what happened in Brussels. We would argue that we need to be very intense and focused on our national security, and this is one way that if we're in the lead, nuclear speaking, then we can help with nonproliferation. So I would say that for the DOE's, I hope, point of view this is an important bill that would get you all's support.

Secretary MONIZ. Yes. Again, I don't know the specifics of everything——

Mr. WEBER. Sure.

Secretary MONIZ. —in the bill, but generally speaking, absolutely.

I might also add on Friday in China, we dedicated a Center of Excellence on Nuclear Security——

Mr. WEBER. Okay.

Secretary MONIZ. —that addresses some of those questions that——

Mr. WEBER. Well, I'm glad to hear that. Let me jump over real quick to, I think, what one of the other members brought up, the Iran nuclear deal. And even though I wasn't supportive of that deal and I would say—I forget the number—70 percent of Americans were not in supportive of that deal, that deal was struck. And so it's important that we maintain the parameters of that deal and

maintain a strict oversight on the nuclear deal. And I understand you were instrumental in negotiating the deal, is that right?

Secretary MONIZ. I was certainly heavily involved, yes.

Mr. WEBER. I'm sorry?

Secretary MONIZ. I was certainly heavily involved.

Mr. WEBER. You were heavily involved so you were heavily invested?

Secretary MONIZ. Well, I did spend 19 days straight in Vienna to——

Mr. WEBER. Okay. Well, we want to make sure that you keep our committee informed with any information on briefings that we need when you think that deal has been—that the tenets of that deal have been broached. Will you commit to do that for us?

Secretary MONIZ. I have to say the State Department leads this with DOE supporting them in terms of keeping the Congress informed, including on a classified level.

Mr. WEBER. Do you have any oversight purview over that deal? I mean, you're the "nuclear expert," spent 19 days there. Are you——

Secretary MONIZ. By the way, along with Secretary Kerry.

Mr. WEBER. Okay.

Secretary MONIZ. We were both there for 19 days. The——

Mr. WEBER. Did Secretary Kerry go to MIT? I'm just asking.

Secretary MONIZ. Not yet.

Mr. WEBER. Okay. You're working on him already?

Secretary MONIZ. Yes, we're working on it. Right.

Mr. WEBER. Okay.

Secretary MONIZ. We did both go to Boston College, however.

Mr. WEBER. Okay.

Secretary MONIZ. But the——

Mr. WEBER. Do you have any kind of oversight on that?

Secretary MONIZ. Yes, so, again—so the Department of Energy is the core team in the implementation phase, so the answer is yes, and I personally remain engaged.

Mr. WEBER. Okay. So you will come back to this—if you see anything that adversely affects that deal and of course our national security, you would come back to this committee?

Secretary MONIZ. We—again, through the state-led process we will keep the Congress informed, including providing regular reports typically through the Foreign Affairs Committee, but I think it's open to all Members of Congress.

Mr. WEBER. Okay. Thank you, Mr. Chairman. I yield back.

Chairman SMITH. Thank you, Mr. Weber.

The gentlewoman from Massachusetts, Ms. Clark, is recognized.

Ms. CLARK. Thank you, Mr. Chairman, and thank you, Secretary Moniz, for your leadership and for being here today.

I want to go back to Mission Innovation. And in Paris, the United States was one of 20 countries that agreed to double their support for clean energy research and development activities over the next five years, as you put it, creating a highly leveraged opportunity for us. And the President's fiscal year 2017 budget lays out his plan to do just that, but we have grave concerns about the ability to get that budget through the House and Senate this year.

How important is it that we meet that goal of doubling our clean energy R&D over the next five years, and how important is it to where we stand with climate change?

Secretary MONIZ. I think it's very important on multiple counts. One, it's important objectively as, again, the American Energy Innovation Council pointed out. They recommended a tripling.

Ms. CLARK. Yes.

Secretary MONIZ. We propose this doubling. Number two is I would say that, as is in many things, you know, the United States has a special role in leadership, and if we fall down in meeting our objective, I think that would have significant deleterious consequences much more broadly in this highly leveraged situation with other countries and with the private investors.

And third, I think that, again, even without going into the specifics of the Paris agreement, et cetera, it is simply a fact that essentially every country in the world is committed to pursuing lower carbon fairly aggressively. That means multitrillion dollar markets are going to be developing even faster, and we want to keep our innovation edge to take advantage of those markets.

Ms. CLARK. I think that is a critical point, and also going back to the end of your second point, with the public investment we saw with Bill Gates leading an effort but, I believe, 28 investors from 10 different countries, how—if we don't meet our goals on the public investment side, what do you think will happen to that private investment?

Secretary MONIZ. Well, again, I think it will be very, very hard to sustain because this was viewed as two complementary initiative. They're independent in principle but two complementary initiatives. We open up the innovation pipeline. They are prepared to put billions in to take advantage of that expanded pipeline.

Ms. CLARK. And what do you think—thinking of American leadership abroad, you know, if we don't meet this, what do you think will happen with the other countries' commitments? Do you think they will continue on, leaving our markets, our innovation behind, or do you think we'll have a destabilizing effect?

Secretary MONIZ. I think some will and probably some won't, but some of the bigger ones, to be perfectly honest, I think if you look at China's initial publications of its 13th five-year plan—again, I was just there last week, spoke with many government officials—the first characteristic, all of them mentioned about the five-year plan was the emphasis on innovation. So they are going to be pushing on science and engineering innovation as a foundation of what they are doing in the next year. So they're going to go ahead in my view as one example.

Ms. CLARK. Yes.

Secretary MONIZ. And that's just an example of why we need to maintain competitive edge, which is innovation.

Ms. CLARK. Yes. Well, we certainly believe that in Massachusetts, and I thank you for your efforts on this, and we look forward to working with you and also on the Regional Innovation Centers. I think that will be a critical piece to establishing our place in this marketplace not only because climate change has such a huge effect on our economy and our resiliency, but also because it is an

area where we can lead and really be—create such a viable market for clean energy products and technologies.

So thank you, and thank you, Mr. Chairman. I yield back.

Chairman SMITH. Thank you, Ms. Clark.

And the gentleman from California, Mr. Rohrabacher, is recognized.

Mr. ROHRABACHER. Mr. Secretary, thank you very much. It's been a joy over the years actually having this interaction——

Secretary MONIZ. Quite a few years.

Mr. ROHRABACHER. Yes, it has been.

Secretary MONIZ. Right.

Mr. ROHRABACHER. Was your hair gray when it started?

Secretary MONIZ. I have no comment. I could—no, I won't dare to ask the same question.

Mr. ROHRABACHER. Mine wasn't gray.

Just a couple of thoughts here. The—when several of my colleagues on the other side of the aisle mentioned clean energy, let's note that there is a differentiation between clean energy with a definition that's aimed at stopping global warming versus clean energy that is based on human health.

CO_2, which is the target of global warming-focused energy reforms, CO_2 is not in any way a threat to human health. However, NOx, SOx, and other things in the air, trying to get them out of the air is certainly important to people's health and especially those of us who live in urban areas, as I do, and have children are very concerned about those pollution factors. So we do want clean air.

And I want to mention the nuclear energy issue to you in a moment, but let us note that when you mentioned earlier in your testimony about the positive nature of going from coal to natural gas, which is, I think, a very big step forward for both health and global warming considerations, let us just note that that would not have happened if the administration, while trying to stop the production of CO_2, would have had its way in terms of disrupting the evolution in fracking. Fracking has given us, has it not, a major increase in the production of natural gas? And so that's if we get in the way of fracking and we get in the way of basically having a cleaner air, both for global warming and for people's health. Would you like to comment on that?

Secretary MONIZ. Well, first of all, of course it's a fact that horizontal drilling and hydraulic fracturing is what's opened up tremendous amounts of natural gas and oil production in this country.

Mr. ROHRABACHER. Right.

Secretary MONIZ. But I guess I don't quite understand the administration comment you made in the sense that, frankly, the administration has been supportive of these developments with natural gas. Obviously, there are environmental issues to address. A lot of those are being done in the states. For example, Oklahoma has been very concerned over the seismic issues, which are not from fracking but from water disposal——

Mr. ROHRABACHER. Right.

Secretary MONIZ. —which is where that is coming. So I think that is a balance between state and federal——

Mr. ROHRABACHER. Well, we believe someone has looked at that pipeline decision as being something that was based—fundamentally opposed to fracking and—because that's where the—that extra oil was going to be coming from.

Let me ask you about nuclear energy here. It has been of concern to me that as we move forward with—and, by the way, I would suggest that's the one area that people on both sides of the global warming issue should be able to agree upon.

But from the Department of Energy under your leadership I have not seen the shift away from the light-water reactors, which I believe are naturally dangerous. And we—I've been told and correct me if I'm wrong—is we do have the capability of the building reactors now, especially small modular reactors that are not based on light-water technology. Why are we not focused on getting away from light-water technology and putting our money in building a prototype from—of one of these small modular reactors that is not light-water reactor?

Secretary MONIZ. Well, first of all, of course as you know, we are supporting a light-water reactor small modular reactor——

Mr. ROHRABACHER. Right.

Secretary MONIZ. —to go to design certification this year at the NRC. But I do want to add that even though it's a light-water reactor, the safety characteristics are excellent. So we believe that is a very viable and safe——

Mr. ROHRABACHER. Safer——

Secretary MONIZ. —technology.

Mr. ROHRABACHER. —but not necessarily safe.

Secretary MONIZ. Well, it's basically passively safe. Now, one of the reasons for that focus, our initial small modular reactor focus was on light-water reactors for the reason that those are the ones that could move most rapidly to a deployment because, frankly, it's also on the regulatory side the NRC has got all the apparatus for licensing now.

Having said that, we just announced a month ago I think roughly two awards, two consortia involving companies and labs, et cetera, one on molten salt, which is a design originated in Oak Ridge in fact some years ago, and another on pebble beds——

Mr. ROHRABACHER. Right.

Secretary MONIZ. —a pebble bed reactor. So we are moving out on those two alternative technologies.

Mr. ROHRABACHER. I appreciate that, and I would just suggest that the money that we're spending on light-water reactors is based on the past and we need to look to the future, and I think that is not based on light-water reactors.

Thank you very much, Mr. Secretary.

Chairman SMITH. Thank you, Mr. Rohrabacher.

And the gentleman from California, Mr. Swalwell, is recognized.

Mr. SWALWELL. Thank you, Secretary Moniz, for appearing before the panel.

And just a question about—in multiple prior fiscal years, Congress has directed DOE to diversify its bioenergy program and specifically support the development of technologies that hold the promise of producing energy from municipally derived biosolids. I believe your office is familiar with this because the Office of Energy

Efficiency and Renewable Energy, EERE, has yet to follow through on these directives. And our office and our constituents in the bay area has found this a little bit frustrating and troubling.

And my staff has been told that finally a DOE funding announcement for projects promising to develop energy from municipally derived biosolids is forthcoming this March or April. First, is that correct, and can you commit today that such a funding announcement will be made in late March or April? And what type of total budget is planned for the funding announcement?

And also, I did want to separately thank you for the very hard work you did and the participation with our national laboratories on the Iran nuclear agreement.

Secretary MONIZ. Thank you. Thank you for that.

First of all, the question of the biosolids, there have been solicitations where that has been an option but not singled out and then not always selected. That is correct that there will be solicitations coming forward. I don't know the exact day. We can get back to you on that. That will have biosolids as the research topic. It will also include some SBIR solicitation for biosolids.

Mr. SWALWELL. Great. And do you have any idea as to what the total budget for what the funding announcement could be?

Secretary MONIZ. I think there are three—I don't have an exact number. There were going to be three pieces that total roughly $20 million, but I don't—I think the exact breakout of that will depend upon the three awards.

Mr. SWALWELL. Great. Thank you.

And I yield back.

Mr. ROHRABACHER. [Presiding.] Mr. Hultgren.

Mr. HULTGREN. Thank you, Chairman.

Thank you, Secretary, always so good to see you and honestly do appreciate your work and your passion, especially in our labs. As you know, that's a special passion of mine.

Secretary MONIZ. See you on Lab Day.

Mr. HULTGREN. Yes, it's going to be great. And boy, our labs are excited. I know that's going to be very important, so thank you.

Along with laboratories, also passionate about basic scientific research, which the Office of Science is doing to promote innovation and the energy future where America can lead. We had a good meeting last year with the Labs Caucus where you talked about the Breakthrough Energy Coalition and ways which we might be able to work together with Mission Innovation. I'd hoped the Office of Science would take the lead on this.

While I think the gimmicks with the mandatory spending throughout the President's budget were a disappointing reversal on his negotiated budget with Congress, I hope there are still some places we can work together.

The Department is asking for $1.2 billion in new spending throughout the Science and Energy programs. The Office of Science, with the requested increase of $225 million, is only about 18 percent of this requested increase. EERE was 68 percent of your requested increase. Quite honestly, I think this is shortsighted.

AAAS estimates that across the board the President's budget cuts basic R&D by 2.3 percent while increasing applied research by

2.8 percent. Maybe you all managed to save some shortsighted cuts, but I know you can't speak to your deliberations with OMB.

So my first question is about how we can make our Office of Science programs better aligned with the private sector be it the Breakthrough Energy Coalition or anyone else. If OMB passed back your budget request and told you to realign your increases so that EERE and Office of Science were flipped, how would you propose to handle nearly $829 million in new spending? And what do you think personally the labs need to do to be more nimble and accessible to the outside?

Secretary MONIZ. Well, first of all, let me just comment. I'm not aware of the specifics of this AAAS scoring, but—and there may be also a labeling issue for—I just don't know, but for example, part of the proposal would be to add—even in its first year—five new Energy Frontier Research Centers. I would call that use-inspired basic research. I don't know how that is scored in there.

But I've said earlier that in our increase, our intent certainly is to weight more towards the earlier stages of R&D, and science plays an important role in there. There are many other proposals besides the EFRCs, but I also want to single—ARPA–E is also very, very important, and has tremendous results, I think. So anyway—so we will be having strong focus there.

I also might add that some of the proposal, for example, on the regional centers was placed in EREE even though it's across the board. It's not only efficiency and renewables. So we've already talked with some in Congress about the need to find a different budget structure for that to reflect the reality.

As far as the labs being nimble, well, I think for one thing is——

Mr. HULTGREN. Can I ask a quick question real quick? So why didn't some of the basic energy science programs get similar increases to EERE?

Secretary MONIZ. Well, again, there are complicated dynamics in there. I think what we did is we put in specific increases that we thought made a lot of sense, including like the EFRCs and BES, which was one particular area.

But again, look, obviously we're here to discuss with Congress what is the right mix there. We do want to increase energy R&D, and we'd like the increases, as I said, to be weighted towards the earlier stages.

Mr. HULTGREN. I just have about 45 seconds left. Let me get to one other thing if I could real quick, and we'll keep our conversation going. So thank you.

I'm not sure if you remember I represent Fermilab. Just kidding.

Secretary MONIZ. Do you?

Mr. HULTGREN. I'm just kidding. You hear that a lot for me, but I'm so proud of the great work that they do and really am honored to be able to represent them. And I do want to thank you for the time that you've made available to me over the last months and years.

But I want to just ask you how do you see the implementation of P5 going, and how have efforts in creating international collaboration out of LBNF been going? Are we meeting, exceeding, or behind your expectations in getting international commitments?

Secretary MONIZ. So, first of all, LBNF and P5 LBNF, strong emphasis, it's the centerpiece. We're on the ramp up for LBNF and—which does remind one that we hope we don't end up in CR land again because things like these new projects—things that go up and go down don't go up in the CR world, so let's hope we can get to a budget that has priorities in it.

In terms of international, I think the discussions are very encouraging. I've had discussions myself with two major countries in the last month, nothing you sign on the dotted line yet, but I think it's going well. And of course a critical piece is going to be the whole work with the EU and CERN——

Mr. HULTGREN. Yes.

Secretary MONIZ. —as a lead investor. But I'm very optimistic. There's a lot of excitement about this and this is going to be a great good.

Mr. HULTGREN. Well, thank you. That means a lot to us. I know it means a lot to the physics community. But any way we can be helpful, I do know this is something that pulls us together.

Secretary MONIZ. Great.

Mr. HULTGREN. Ranking Member Foster, Bill Foster and I and others obviously have met with you and our delegation about the importance of this and want to thank you for your role, and any way we can help with that, we certainly want to do that. My time is well past expired.

Secretary MONIZ. Thank you.

Mr. HULTGREN. Thank you.

Chairman SMITH. Thank you, Mr. Hultgren.

And the gentleman from Illinois, Mr. Foster, is recognized.

Mr. FOSTER. Thank you, Mr. Chairman.

Thank you, Secretary Moniz, for appearing today to discuss DOE's science budget. And I look forward also to having hearings on the Republican budget proposal. But I also would like to thank Secretary Moniz for his work on the Iran nuclear deal.

I have personally found the DOE extremely supportive in responding to Member requests for detailed briefings on this. I think I had more than a dozen classified briefings on this, many of them individual briefings, and I found—where I've had access to the DOE experts in weapons and nonproliferation. And so I just want to say that we really got our question answered in whatever detail we ask, and I want to thank you for that.

I'd also like echo the sentiments of my colleague Mr. Hultgren and take the opportunity to thank you once again for meeting with the Illinois and South Dakota delegations of both the House and Senate to reiterate your support for the Long-Baseline Neutrino Facility. Your support for this is very much appreciated. I was somewhat disappointed to see that LBNF received less than they need to to move forward at full schedule, but I trust that you and DOE are still supportive of this project?

Secretary MONIZ. Oh, yes, and my impression is that the budget proposal will allow them to move forward quite nicely.

Mr. FOSTER. Yes, the civil part was, I think, adequately funded. There was some—I think some of the approval is pending the international contribution——

Secretary MONIZ. Oh, yes, but again, Congressman Foster, no bones about it, I mean, this is a high-priority project, the highest-priority project certainly in particle physics.

Mr. FOSTER. Yes.

Secretary MONIZ. And if I may add something——

Mr. FOSTER. So your comments on the CR, I think, are very relevant——

Secretary MONIZ. Yes.

Mr. FOSTER. —as well.

Secretary MONIZ. Yes. And if I may add, I just want to thank you for the interest you took in the Iran deal. Using your physics background was really important, and we really are appreciative.

Mr. FOSTER. Thank you. I also want to thank you for your supportive words about Argonne's Advanced Photon Source to Mr. Lipinski, and I look forward to continuing to work with my colleagues to make sure that the APS upgrade has the necessary funds to complete the upgrade on time.

I was pleased to be joined by 11 of my colleagues, Democrats and Republicans, on a letter to the Appropriations Committee in support of full funding for the APS upgrade, so that's on our radar screen as well.

Let's see. One thing having to do with—you know, there's this report that's due out, I think, in May having to do with a way forward on ITER. And so I was wondering what sort of plan—we could find ourselves in one of two places on that, one—a positive indication of the letter will, I think, cause most people to think that the amount of money we're spending on ITER is too low to, you know, complete the project on the proposed schedule.

On the other hand, if we decide to withdraw, I think that some money will have—rapidly have to be reprogrammed. And so in the context of a CR, that could be very painful either way you have to adjust it. I was wondering if there's contingency planning underway in DOE to understand how you'd respond to this?

Secretary MONIZ. I am just, in fact, kicking off exactly that kind of planning for the two possible directions because frankly, we're going to be quite compressed in time with the technical report and review in April and then the May 2 report due to the Congress. So I think we're going to have to stay close on this and respond appropriately.

Certainly going forward, as you implied, the U.S. obligation of roughly nine percent of the project for both capital and operating is likely to require, you know, a significant increase in the scale of the fusion budget.

Mr. FOSTER. And now to——

Secretary MONIZ. If one goes forward, I mean.

Mr. FOSTER. And now to change subjects rather significantly, how much effort is being put into the use—to the prospect of using naval propulsion systems with, say, 20 percent enriched uranium as a way to really—you know, if that became the international standard for things like naval propulsion? It would be very positive for nonproliferation. And how much effort are we putting into that?

Secretary MONIZ. I would say modest. It is being looked at, but it's in the early stages frankly because there's a major focus on, first, the new power plants for the Ford-class aircraft carriers,

those are now done. The first one went critical last year, and the Ford will sail in the next few months. And now there's also the power plant for the next—the Ohio-class replacements to submarines——

Mr. FOSTER. So are there alternative——

Secretary MONIZ. Yes.

Mr. FOSTER. —designs being developed for the use of less enriched uranium or is that not likely to happen?

Secretary MONIZ. I would say there's early-stage work for a future generation potential LEU power plant.

Mr. FOSTER. Okay. Well, thank you.

I guess my time is expired, and I yield back.

Chairman SMITH. Thank you, Mr. Foster.

And the gentleman from Arkansas, Mr. Westerman, is recognized for his questions.

Mr. WESTERMAN. Thank you, Mr. Chairman, and thank you, Secretary, for being here today.

In the budget request for the Energy Efficiency and Renewable Energy, the proposed budget for the bioenergy program is increased by 24 percent and is largely focused on research and development on a drop in biofuels and algae feedstocks to lower the cost of biofuels without increasing the cost of food or disrupting agriculture.

While the budget mentions the Biomass Research and Development Board, the collaborative effort with the U.S. Department of Agriculture and U.S. Department of Environmental Protection—or the Environmental Protection Agency to make sure efforts made across the government are coordinated, there is no mention of collaboration with the Forest Service to assess the biomass potential for our forests.

So I've got a forestry degree and an engineering degree, so forestry and energy are two things that I like to talk about. And if we look just on federal lands last year, we had ten million acres of forest go up in smoke. If you put that on an energy equivalent using Forest Service data, that's a lot of BTUs converted back. And to put it in terms of something we understand, it's about 26 billion gallons of gasoline is the equivalent of the energy that went up on our national forests. That's about 19 percent of all the gasoline used in our country each year.

So I'm going to go out to the Berkeley Lab and visit it later this week. I'm looking forward to that, and I hope they're going to tell me they're doing a lot of research on forest biomass to drop in fuels. But has the Department explored working with the Forest Service or our research universities to incorporate forest biomass into the DOE research and development portfolio?

Secretary MONIZ. Our program does work with the Forest Service on woody biomass. I'd have to check this, but I think we are spending something around $20 million in the woody biomass area. I'll have to check that. A large focus is on combustion, and I think cofiring and these kinds of things, some work on conversion to biofuels, but I can get back to you with a more detailed answer.

But we do work with the Forest Service. We have a woody biomass program, and I'll get you the details.

Mr. WESTERMAN. And I'm familiar, you know, making pellets out of wood, which is not the most efficient way to use it——

Secretary MONIZ. Right.

Mr. WESTERMAN. —maybe, but if we're doing research on any kind of biomass, it seems like, you know, just on federal lands we had ten million acres burn up, and that doesn't even start to touch the amount of thinning that needs to be done on our federal forests. If you throw in private lands, the potential for a fuel source if we could come up with a feasible way to convert that to—or to a liquid fuel——

Secretary MONIZ. Liquid fuels, yes.

Mr. WESTERMAN. —it's tremendous. So it seems to me like it would be prudent to put more money into research biomass to biofuels.

Secretary MONIZ. Well, I was just told that, yes, $22 million in woody biomass so—but why don't we get back to you with the program specifics.

Mr. WESTERMAN. Okay. I appreciate that.

I yield back, Mr. Chairman.

Chairman SMITH. Thank you, Mr. Westerman.

And the gentlewoman from Oregon, Ms. Bonamici, is recognized for her questions.

Ms. BONAMICI. Thank you very much, Mr. Chairman.

Secretary Moniz, welcome back to the Committee.

Secretary MONIZ. Thank you.

Ms. BONAMICI. My State of Oregon is a leader in the effort to establish a marine renewable energy industry in the United States, and we're proud to host the Department of Energy-funded Northwest National Marine Renewable Energy Center that's co-managed by Oregon State University, the University of Washington, and the University of Alaska Fairbanks. The center is working with the national labs and private sector technology developers to provide research and testing capabilities.

In addition, Oregon State University is developing a DOE-funded offshore wave energy testing facility so innovators in the United States will have access to a domestic testing facility rather than going overseas.

Now, I understand that the DOE estimates that up to 20 percent of the electricity requirements of Oregon, along with California and Washington, could come from marine renewable energy resources. In places like Alaska and Hawaii, that could be up to 100 percent.

Over the years, the wind and solar industries have received substantial and ongoing federal research and demonstration funding support. That's gone on for decades and it's resulted in the maturation, cost competitiveness, and rapid development and deployment of these technologies. The marine energy industry needs the same kind of sustained federal assistance to help private companies have that certainty they need to develop promising technologies that are really on the verge of commercial viability.

So, Mr. Secretary, I've been an ongoing supporter of water power and the programs, so I've led appropriations letters and amendments requesting increase support for research.

The fiscal year 2016 omnibus bill called for the creation of a new Water Power Technologies Office, so will you please provide an up-

date on the efforts underway to set up the office and select a Director?

And then also I wanted you to also address this issue. I appreciate including in the funding for fiscal year 2017 a request to continue the construction of an offshore wave energy test facility, but my understanding is that the amount of funding proposed by the Administration, along with the cost-share requirements, is not enough to construct a robust and sufficiently sized facility.

So will you please also elaborate on the budget proposals requested funding level? Going forward, will the Department participate in discussions with interested stakeholders to develop a plan that will truly ensure successful deployment of this very promising wave energy test facility?

Secretary MONIZ. I think the answer is yes, certainly to the last question. So, as you indicated, I think the budget for marine and hydrokinetic is about a 25 percent increase proposed within the open water test facility as a central piece of that. Certainly my understanding is that that has been developed in considerable discussion with industry stakeholders in terms of what are these test requirements.

In terms of the scale, I think the issue is that this budget in fiscal year 2017 would support the design phase leading them to a kind of go/no go decision in terms of actual construction. That's my understanding, but why don't I clarify that and will get back to on that?

Ms. BONAMICI. I appreciate that. And then was that in response to the Water Power Technologies Office?

Secretary MONIZ. Oh, again, if I may get back to you for the record on that because——

Ms. BONAMICI. Sure.

Secretary MONIZ. —to be honest, I'm not quite sure where that stands.

Ms. BONAMICI. All right. Thank you very much, Mr. Secretary, and I yield back.

Chairman SMITH. Thank you, Ms. Bonamici.

The gentleman from Texas, Mr.——

Secretary MONIZ. Oh, I'm sorry. I was just given a note from—by my staff, if I may, that an announcement just went out for a new Director hiring for the water power program.

Ms. BONAMICI. Thank you very much.

Secretary MONIZ. I wasn't aware that. Thank you.

Chairman SMITH. Okay. The gentleman from Texas, Mr. Babin, is recognized.

Mr. BABIN. Yes, sir. Thank you, Mr. Chairman. And thank you, Mr. Secretary, for being here.

My question regards the fossil R&D budget proposal, which included a $240 million reduction of funds from the Clean Coal Power Initiative, or the CCPI projects to meet the total budget requirements for fiscal year 2017. This effectively pulled the remaining funding for the Texas Clean Energy Project, or TCEP, a coal gasification project with longstanding bipartisan support.

At the same time the budget touts Mission Innovation funds within the fossil R&D program as "doubling federal clean energy research and development investments." Does the administration

no longer consider CCPI projects like the Summit Power Group's Texas Clean Energy Project 400 megawatt coal gasification plant as a "clean" energy? Isn't this just the sort of project that is exactly what the administration promised would be the result of Mission Innovation?

It is my understanding that the company had every indication from DOE that they were moving forward, only to be told as the budget was released that the entirety of the remaining funding for the project was being repurposed in this year's proposal.

I'm sure that you're aware that the Texas delegation sent out a bipartisan letter to you last week asking for specifics on the Department's interactions with TCEP. And without objection, Mr. Chairman, I would like to enter this letter into the record.

Chairman SMITH. Okay. Without objection, so ordered.

[The information appears in Appendix II]

Mr. BABIN. And can you provide any additional information, Mr. Secretary, on why this decision was made with practically—virtually no notice?

Secretary MONIZ. Yes, sir. First of all, I want to emphasize this was a programmatic choice, but you asked several questions. Number one is, yes, this is a Clean Energy Project, as are all of the carbon capture utilization and sequestration projects.

Number two, we remain committed to having a strong program in this arena. And in fact, there are three large-scale capture projects that are either operating already or will be operating two more within a year. That includes the Petra Nova project in Texas with a coal combustion plant.

The issue with the Summit project, the TCEP project, is that frankly, after a long time of us trying to support them—because, by the way, the program and I think this is a good project. I mean, it's—conceptually, it's a great project. The trouble is they've been unable to meet many of their key milestones.

This discussion has been ongoing. They have had, I don't know, five or so transfers of phase 2 funding to phase 1. The program has gone out of its way to help. I personally was recruited to meet with the Chinese Exim Bank head twice. The program met in December with the CEO of the program. They asked for a financial plan. It was not forthcoming, and the program finally decided it was time to move on, giving, however, a no-cost extension to May to still give some time for the project to try to reach its milestones.

So I think this has been an ongoing, longstanding discussion, and the fact of the matter is critical milestones are way overdue and are still not met.

Mr. BABIN. Okay. Well, I hear that, but one concerning thing is that the Department of Energy continually cites these failures to secure engineering and performance contracts as one of the major missed milestones, but in fact these contracts were publicly signed in December and January, and the December signing ceremony was in Beijing, even had DOE officials in attendance at that ceremony.

Secretary MONIZ. There has been EPC contract progress; partial, not complete, and the whole issue of financial close has certainly not been addressed. Again, we're not happy about it, but at some point the question was to move on, and in fact what the program

is proposing is to repurpose those funds into new, innovative technologies at a smaller scale, chemical looping, oxy-combustion alternative approaches. So that's where the program has come down.

Mr. BABIN. Well, and I appreciate what you're saying. You're for the concept because the concept here, this project would store 90 percent of the CO_2 emitted. And carbon capture and storage is something that I think is the goal of this administration and of your department.

Secretary MONIZ. And we do have three large demonstration projects that will do that as well.

Mr. BABIN. Okay. Thank you, and I yield back.

Secretary MONIZ. Yes.

Chairman SMITH. Okay. Thank you, Mr. Babin.

The gentleman from Texas, Mr. Veasey, is recognized.

Mr. VEASEY. Thank you, Mr. Chairman.

Mr. Secretary, I have similar questions that I want to ask you, but first, let me also take the time to submit a letter to the record regarding the Texas Clean Energy Project. The Texas Clean Air Task Force, Natural Resources Defense Council, the Great Plains Institute, Third Way, the Center for Climate and Energy Solutions also sent a letter of support praising the potential for CO_2 capture.

And also, Mr. Secretary, I wanted you to know that in addition to the Texas delegation letter of support that was just mentioned, the Washington State delegation and other environmental organizations will also be sending letters of support asking for DOE's consideration.

Chairman SMITH. Okay. And without objection, those letters will be made a part of the record.

[The information appears on Appendix II]

Mr. VEASEY. Thank you. Thank you. Thank you very much.

Also, Mr. Moniz, let me ask you about just being able to work with Congress to find a fair and transparent way to approach this project. And you just kind of—and you kind of touched on it a little bit but can you delve into that just a little bit more?

Secretary MONIZ. Well, as I said, I mean, the program, first of all, has taken many, many steps to help the project to be able to reach its goals. Most especially, financial closure has not happened. The—so the—but the program, again, gave the extension into May, the no-cost extension, to provide more time. If they were to meet milestones in that period, obviously, we would be going back to work with the project. But at some point we need performance.

There's no—no one questions the desirability of the project as a project design, its objectives, its goals. That isn't the issue. But the program decided it was just time to move on and to invest in some new innovative technologies because of the lack of milestones being met.

Chairman SMITH. Would the gentleman from Texas yield just for a minute?

Mr. VEASEY. Yes.

Chairman SMITH. Secretary Moniz, just a follow-up on your—on that statement, it seems to me that in a budget of the size of the Department of Energy and with all the agreement we have on the necessity for research and development in certain areas, that the Department might be able to take another look at that project and

find some additional funds. We're just talking about several million dollars on a yearly basis, and I hope the Secretary would consider doing that.

Secretary MONIZ. We will—okay. We will certainly—I will certainly go back and——

Chairman SMITH. Okay.

Secretary MONIZ. —talk with the program about that.

Chairman SMITH. Okay. Thank you, Mr. Secretary. I appreciate that.

Thank you, Mr. Veasey.

Mr. VEASEY. Oh, absolutely, Mr. Chairman.

Also, most of the questions I wanted to ask, they were already covered, but I did want to ask you just one more thing and that is about EOR, enhanced oil recovery. You know, with carbon capture being a part of the question that I asked you earlier, what do you think of the future of EOR?

Secretary MONIZ. Well, EOR is a—has been extremely important, as you—I think in—you may know there's a lot of CO_2 flooding right now producing oil. The—a real issue has been the substantial drop in the oil price has made the EOR benefit less consequential for the overall economics. But the potential is dramatic.

There's a report now, it's quite old, it's more than a decade old that said that, conceivably, the United States could reach two to three million barrels of oil per day from CO_2 flooding, and that would require hundreds of megatons of CO_2 per year that would have to be found from commercial plants.

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

Mr. Chairman, I yield back my time.

Mr. PALMER. [Presiding] The Chair now recognizes Mr. Takano from Hawaii.

Mr. TAKANO. California.

Mr. PALMER. California, I'm sorry. Hawaii, California.

Mr. TAKANO. That's the other Mr. Takano.

Mr. PALMER. Sorry.

Mr. TAKANO. Other Mr. Takei.

Mr. PALMER. Takei. Okay. For five minutes.

Mr. TAKANO. Thank you, Mr. Chairman.

First, Mr. Secretary, I want to thank you for being here. You know my own home State of California has a 1.3 gigawatt energy storage mandate, and utilities must procure 50 percent of their energy from renewables by 2030. As a Californian and the co-Chair of the bipartisan Battery Energy Storage Caucus, I am very interested in supporting this technology.

It was recently announced that the Advanced Research Energy Projects-Energy, ARPA–E, made a big breakthrough in battery storage technology and have reached some holy grails in batteries. Can you talk a little bit about this breakthrough and how research and development dollars are so critical to fostering this type of high-risk technology?

Secretary MONIZ. Well, certainly, the—first of all, storage is a critical technology and potential game-changer, so we're all on the same page with that. And in fact in this budget there is substantial increased support for storage, both grid storage and mobile vehicle storage. The goals are—include things like doubling energy density

while halving the costs, so they're pretty aggressive goals. I think we're making excellent progress towards them.

And there are a variety of technologies being looked at. I think what you're referring to, I believe, is a flow battery advance that is still not quite at the holy grail but it's very, very, very encouraging.

Mr. TAKANO. Great. I know you've already talked about renewable energy and the grid, and could you talk a little bit more about the Department of Energy's Grid Modernization Initiative, and what about—and what the grid of the future looks like? And how does the budget request help us get there?

Secretary MONIZ. So the Grid Modernization Initiative is the so-called crosscut that—for which we have the largest increase proposed because we think it is so central. We have a lot of infrastructures that depend upon the grid infrastructure for their operations. So it's absolutely central.

So the Grid Modernization Initiative I would say at high level it certainly advances the technologies that one needs for a much more sophisticated set of sensors, IT data integration, real-time modeling of the grid for reliability and resilience and for connecting potentially very geographically diverse sources and loads. It will also go through the distribution system. We have a strong focus on the systems analysis, how do you put all of this together in a way that operates, again, emphasizing resilience and reliability.

I might also add it will address the spectrum of risks from cyber to physical to geomagnetic disturbances. We have a program on EMP going on with Oak Ridge and EPRI, so it's a pretty comprehensive program looking at this grid of the future, which will need to serve in a very different way, particularly if distributed generation becomes a large part of the picture.

Mr. TAKANO. Distributed generation meaning not so centralized?

Secretary MONIZ. The generation more at the load themselves like, for example, rooftop solar would be——

Mr. TAKANO. That's a good example——

Secretary MONIZ. —a clear example——

Mr. TAKANO. —of distributed——

Secretary MONIZ. Distributed generation. Right.

Mr. TAKANO. You know, in light of the events—you mentioned kind of the different kinds of threats to the grid. In light of the events in the Ukraine where it appears that a coordinated cyber attack was successfully carried out on the country's electric grid, how is DOE prioritizing research in grid security?

Secretary MONIZ. Quite high. I mean, cybersecurity is a very, very serious threat, and I can say that the energy infrastructure is a target of many cyber attacks, and those are increasing year by year. So we have programs looking at new technology approaches. We have programs looking at working with the utilities directly in terms of their cyber defenses.

Mr. TAKANO. Thank you, Mr. Chairman. My time is up. Thank you.

Mr. PALMER. Thank you.

The Chair now recognizes Mr. Grayson from Florida.

Mr. GRAYSON. Thank you. I'd like to ask you, Mr. Secretary, some big-picture questions about fusion energy. As it safe to say

that fusion energy is possible? In other words, it's not a like a perpetual motion machine, it's not like traveling faster than the speed of light? It's possible that we could have sustainable fusion energy reactors, right?

Secretary MONIZ. Absolutely.

Mr. GRAYSON. All right. So it's been 50 years since we started trying and we've spent, oh, probably more than $50 billion trying to accomplish this. Why hasn't it happened yet?

Secretary MONIZ. It is extremely difficult. The—certainly in confined plasma approaches, you know, the kinds of temperatures and—that are reached are extraordinary and we have materials issues, we have instability issues, and while there has been a lot of progress in terms of increasing the density of plasmas, we're not anywhere near there. We've not achieved ignition whether it's in confined plasma or in ICF.

Mr. GRAYSON. So what do we——

Secretary MONIZ. And I might add that ARPA–E did put out a program which tried to open up a new frontier in some sense intermediate between inertial confined fusion and magnetically confined plasmas.

Mr. GRAYSON. And the status of that?

Secretary MONIZ. I'm sorry?

Mr. GRAYSON. The status of that?

Secretary MONIZ. The work is—the awards were made last year, and they're typically three-year awards. The research is going on right now.

Mr. GRAYSON. What percentage of the fusion budget is now being spent on ITER—the ITER project?

Secretary MONIZ. Well, the ITER—the appropriation this year for ITER is $115 million, and the total fusion budget—I forgot exactly but it's 200 and something. It's probably, I'm guessing, 40 percent, something like that.

Mr. GRAYSON. All right. Maybe not putting all of our eggs in one basket but aren't we putting an awful lot of eggs in that one basket?

Secretary MONIZ. Well, certainly, it's a large fraction of the budget. It's actually below the nine percent that ITER calls for. As you know, we have a report due to Congress on May 2 on making a recommendation on what path to take with ITER, and that will be based in turn, among other things, on a technical review report due in April. So I think, you know, obviously the Congress has called for a decision point, and in May we will be providing a report.

Mr. GRAYSON. What would be some of the economic and social impacts if you were able to solve this problem, we had feasible fusion reaction?

Secretary MONIZ. Well, of course, I just want to emphasize that feasible here in the end does also require an economic test in terms of its being competitive in the—in a low-carbon marketplace. Certainly if that's the case, fusion has the advantage of not having some of the waste challenges that one has in fission, for example, and it could provide a major baseload power source.

Mr. GRAYSON. What do you mean by the issue that you just—the waste? Be more specific about that, please.

Secretary MONIZ. Well, in fission the dominant part of the waste are the fission products that remain the challenge for a few hundred years typically. And so it's very, very radioactive and also very temperature hot as well, at least initially, whereas in fusion where one is dealing with very light elements, you do not have anything like the fission products. You clearly have materials that have been irradiated by neutrons, you know, that need to be D&D'ed at the end of the life of the reactor, but it's nothing like the long-term radioactivity of fission-spent fuel.

Mr. GRAYSON. Do you picture the operating costs, not the capital costs but the operating costs of a fusion reactor to be high, low, or very, very low?

Secretary MONIZ. I just don't know until we see what the technology is. I just—as you said, it's been 50 years but I think we still can't answer that question.

Mr. GRAYSON. Well, a couple decades ago NASA was running into a problem with giant white elephant projects, and they decided to go by a different route that they refer to as faster, better, and cheaper. Do you think that that tells us anything about where we should be going with fusion?

Secretary MONIZ. Well, first of all, there's no way around the fact that in fusion you're going to have to, one way or another, confine a nuclei in a challenging way.

Now, what is interesting in my view is that there are about 50 companies in the United States pursuing nuclear technologies, most of them fission but some of them fusion. Some of them have been prominently displayed on the front cover of a popular magazine, for example, two months ago.

Mr. GRAYSON. All right. My time is up. Thank you.

Secretary MONIZ. Okay. Thank you.

Mr. PALMER. I now recognize myself for questions. Mr. Moniz, in February of this year a report surfaced that you, along with other senior department officials, are using private email accounts to conduct official work-related business. Have you ever transmitted sensitive or classified information over your private email?

Secretary MONIZ. Certainly not, but I do need to clarify. I believe there's a little bit of a—just to make sure we're talking about the same thing. At DOE I have two accounts, one of which is "my private account" that I get emails directly to and another which is, frankly, the public-facing account, which gets screened by the Executive Secretary. So—the—but those are both DOE accounts.

On the occasions when—if I get an email to my personal, personal account that's relevant to DOE business, I copy it to the government accounts so that there's a record of all—of everything.

Mr. PALMER. So you're testifying that you've got two official accounts——

Secretary MONIZ. At DOE——

Mr. PALMER. —at DOE——

Secretary MONIZ. —correct.

Mr. PALMER. —and that occasionally you've used your personal account? Have you ever transmitted classified—

Secretary MONIZ. Absolutely not.

Mr. PALMER. —sensitive data over your personal account?

Secretary MONIZ. Absolutely not. And everything——

Mr. PALMER. Right.

Secretary MONIZ. And everything is—if that comes in—mostly coming-in mail, then I copy it and any response into my DOE—in my DOE account——

Mr. PALMER. Do——

Secretary MONIZ. —so there'll be a complete government record.

Mr. PALMER. Do other members of—or officials in the Department of Energy use personal email accounts to your knowledge?

Secretary MONIZ. To my knowledge, no. Again, with—no, at least not—if—again, we can't avoid receiving an email——

Mr. PALMER. Right.

Secretary MONIZ. —but then the direction is everything has to be copied to the government account.

Mr. PALMER. Well, that's interesting because the—are you aware of this report about federal agencies and particularly DOE and FERC using personal emails for business?

Secretary MONIZ. My understanding—I've not seen the report, but my understanding is that was this confusion over having the two emails——

Mr. PALMER. Well, it's not just you——

Secretary MONIZ. —in DOE.

Mr. PALMER. —it's some of the officials at DOE.

Secretary MONIZ. To my knowledge, no one is using personal email for government business without having it in the government record.

Mr. PALMER. Without having it in the government record. Title 44 covers that and requires that if you do use a personal email account that you've got to copy that to your government account within 20 days. Do you have a policy to ensure that any employee who may use a personal email account complies with the law?

Secretary MONIZ. I—well, I assume since it's the law that it is a policy, but I'd have to check with general counsel in terms of how explicitly we have that. But I can assure you with me it's 20 seconds.

Mr. PALMER. That's very reassuring, and we're all grateful for that.

Secretary MONIZ. Right.

Mr. PALMER. I do think, though, that considering the reports that are out there and considering what's going on in other agencies and it is going on in other agencies—and the reason I bring this up is that we've had this come up with—I'm on the Oversight Committee. It's come up with this. One of the things that I'm trying to do is ensure that we protect our information systems and particularly our most sensitive information systems.

As we've had some discussions here—I think Mr. Grayson raised this about some of the things—or I think it was you that says it shows up in some of the Popular Science or whatever magazines. But there are some things that need to be protected, and——

Secretary MONIZ. And, sir, I'm happy, by the way—I'll go back and check with the counsel, and we're happy to reinforce the guidelines to everyone. Again, I don't know of any issue, but we can reinforce that.

Mr. PALMER. Well, the reason I'm bringing this up is that the same information that we had made the claim that there was a

FOIA request that the department officials declined to respond to because it involved information transmitted over your private email account. Now, private email account, can you distinguish between the two accounts that you have at the Department of Energy? Is—one of those might be considered a private account versus your personal email account?

Secretary MONIZ. The—again, the—one account at the Department of Energy is private in the sense that that——

Mr. PALMER. Okay.

Secretary MONIZ. —email address is certainly not available to the public, but it is a government account. It is completely a government account.

Mr. PALMER. Are you aware of anyone in your department refusing to comply with a FOIA request?

Secretary MONIZ. I am not aware of it, no. I'd have to check with the General Counsel.

Mr. PALMER. Can you check with the General Counsel and get back with us——

Secretary MONIZ. Yes.

Mr. PALMER. —and we can submit some very specific questions that you can respond to. So we would like to know whether or not there had been a FOIA request that involved any of your email accounts in which the Department did not respond. And so if you could do that, we'll get the questions to you, and we'd like an answer, I think, within 10 days. Would that be sufficient?

Secretary MONIZ. I would think so. I will—again, I'll talk to my counsel.

Mr. PALMER. Okay.

Secretary MONIZ. Yes.

Mr. PALMER. Well, I'd like to thank the witness for his testimony and the members for their questions. The record will remain open for two weeks for additional written comments and written questions from members.

This hearing is adjourned.

Secretary MONIZ. Thank you.

[Whereupon, at 12:06 p.m., the Committee was adjourned.]

Appendix I

Answers to Post-Hearing Questions

ANSWERS TO POST-HEARING QUESTIONS

Responses by The Hon. Ernest Moniz

QUESTIONS FROM CHAIRMAN LAMAR SMITH

Q1. The federal government is currently facing extreme budget constraints. With limited federal resources, how should we prioritize energy R&D activities to maximize the federal government impact on technology development?

A1. In the same way that a diversified investment portfolio spreads risk, a fully-stocked research, development, demonstration and deployment portfolio maximizes the potential impact of the Department of Energy's investments and best positions the Nation to lead globally in the clean energy economy of the future. To that end, the Department's Fiscal Year (FY) 2017 Budget Request puts forth a robust science and energy program, with investments spanning from discovery science to applied energy technology solutions and late-stage commercialization activities.

Q1a. Do you think basic and early-stage foundational research or late-stage deployment and commercialization activities have a greater impact on producing *new* technology?

As the international commitment to Mission Innovation makes clear, investments in early-stage research and development (R&D) directly contribute to unearthing and cultivating game-changing new technologies. These emerging technologies often leverage the platforms and research made possible by investments in basic science facilities and research (e.g. advances in materials) and ultimately will require extensive field testing and commercial demonstration prior to broader deployment. However, early-stage R&D is often too early for private investors to finance, and federal leadership and investment is critical to help mature and de-risk these technologies to the point where the private sector can make a business case for further investment.

Q1b. The budget requests a 40% increase the Office of Energy Efficiency and Renewable Energy, with over $800 billion in new spending, plus another $1.3 billion in proposed mandatory spending for clean transportation. This is an enormous increase in an office that focuses on late stage commercial applications, not basic research at universities and national labs. By contrast, the budget for the Office of Science—which funds basic research—increases by only 4% in the budget request. Are the Office of Science's basic research programs a lower priority for this Administration when compared with these renewable programs?

A1b. The Office of Science (SC) is a top priority for this Administration, and the SC budget request includes an increase of $225 million in funding for basic research programs and the infrastructure and user facilities that support American leadership in discovery science. This Budget Request recognizes tight budget caps but puts SC on a sustainable growth pathway that enables expansion of the research mission while securing future leadership with investments in the renewal of the National Laboratory enterprise and the construction of new, world-leading facilities.

Q2. In the FY 2017 budget request, you propose $110 million for Regional Energy Innovation Centers, designed to help set up non-profit research consortiums to conduct research to address regional energy challenges. What prevents regional collaborations like this under the current budget?

A2. Current Department of Energy (DOE) research, development, and demonstration (RD&D) programs typically target funding at well-defined scientific and engineering challenges, not geographic regions. Under this proposal, the Regional Partnerships would be geographically-focused to address the regional differences in energy resources, market structures, infrastructures, economies, and innovation ecosystems, including research universities, laboratories, industries and workforces.

The Regional Partnerships would have latitude to identify the challenges, set priorities, assemble teams, award funding to RD&D performers, and manage new activities. Furthermore, the Department's competition for Partnerships would be technology neutral, allowing the Partnerships to propose activities that fall anywhere within the clean energy RD&D space, including activities in fossil, nuclear and renewable energy, as well transportation, electric grid and energy efficiency.

There is no single office or program within DOE that has both the authority to undertake such a technology-neutral effort and the resources to fund it without significantly diminishing the scope of existing programs. Reprogramming of current funding would only enable limited start-up of a program, and it would still fall short of the scale needed for impactful regional coordination around the country.

Q2a. If there is nothing preventing a consortium approach to research under the current DOE programs, why hasn't it happened organically in the research community? Don't universities and the national labs already collaborate on a vast number of DOE projects?

A2a. National Labs and universities have a longstanding and productive history of collaboration that will continue. However, through the proposed Regional Energy Innovation Partnerships (REIP), federal research funding can be leveraged to create synergies among disparate regional stakeholders that may currently lack sufficient resources and incentive for robust and long-term, multi-party collaboration. This model could attract energy stakeholders and RD&D performers not typically engaged through other government-funded research or technical assistance programs.

The proposed REIP would help achieve what leaders from government, academia, and industry have called for, a regional approach to innovation. The National Research Council 2012 Report, Rising to the Challenge, noted that:

- "Historically, federally funded R&D has not been connected to state and regional industrial development. Bridging that gap can create the local talent and technology base needed to convert these U.S. investments into domestic companies, industries, and jobs."
- "Private businesses and local education institutions and economic-development agencies are in the best position to identify opportunities, gauge competitive strengths, and mobilize wide community support for regional cluster initiatives."
- "Regional innovation cluster initiatives should be built upon existing knowledge clusters and comparative strengths of a geographic region."

Q2b. The FY 2017 budget request states that the centers are designed to facilitate the diverse energy resources across the country – but this proposal is housed in EERE, the office that conducts energy efficiency and renewable energy R&D. Doesn't this encourage research consortiums to only propose renewable energy and energy efficiency projects?

A2b. The current DOE budget and appropriations structure organizes funding by fuel type and technology. The budget proposed a 'new' crosscutting line item within the Energy Efficiency and Renewable Energy (EERE) appropriation that is broader than the scope of

EERE. The Department intends to make awards to Regional Partnerships based on a range of considerations, without specifying technology directions, and would welcome an opportunity to work with Congress to take the steps necessary to ensure that funding for the Partnerships program is appropriated consistent with the stated goal of the program to remain technology neutral.

Q3. You are a nuclear physicist by training so surely you can appreciate the importance of fusion energy research. As I noted in my opening statement during the hearing, the House-passed America COMPETES Act authorized fusion at $90 million above the President's request for fiscal year 2017. Can you explain why the President continues to undermine support for the American fusion research community?

A3. The President's FY 2017 Budget Request supports investments in key areas that will enable continued U.S. leadership in research to overcome the scientific challenges to achieving fusion energy. The Request will enable maximum usage of our largest domestic fusion facilities to address a wide range of high-priority scientific challenges in fusion. Also, the Request will advance first-of-a-kind research in fusion materials science, strengthen our computing effort targeting whole fusion device modeling that ultimately will require exascale computing capability, advance world-leading capabilities in high energy density physics, research in discovery plasma science, and leverage new facility developments overseas through smart partnerships.

Q4. Secretary Moniz, in early 2015 the House passed HR 35 – the Low Dose Radiation Research Act of 2015 which intends to establish a research plan to more accurately ascertain whether there are health risks associated with low dose radiation. Regrettably, the President's requested budget intends to terminate this important research.

Can you explain why DOE is not prioritizing research that could provide immense value to physicians, workers at industrial sites, and emergency planners? How does this decision to terminate low dose radiation research comport with the President's new "war on cancer"?

A4. The primary human health risk due to radiation is cancer. DOE's Low Dose Radiation research program has been able to demonstrate remarkable metabolic mechanisms that cells use to sense, repair and adapt to radiation damage. While the program has made important scientific advances demonstrating how radiation impacts biological processes in cells, these results do not translate to assessing the risk of cancer in humans. An extended effort to understand cancer initiation in humans due to low dose radiation is

more within the scope of the National Institutes of Health (NIH) programs with a mission in human cancer research, particularly in light of the increased use of radiation-based medical diagnostics.

All the research results from the low dose radiation research program are available in the scientific literature and available to cancer researchers investigating and diagnosing the causes and cures of cancer in humans. While the President's Cancer Moonshot effort is more appropriately targeted towards agencies with a human cancer research mission, the DOE Labs do have unique capabilities that could aid NIH and other researchers engaged in this research.

For example, DOE and the National Cancer Institute (NCI) have launched a partnership to advance cancer research and high performance computing in the U.S. called the Joint Design of Advanced Computing Solutions for Cancer. This partnership will facilitate the allocation of high performance computing time for use in joint DOE-NCI pilot projects.

Q5. In the FY 2017 budget proposal, the Bioenergy Technologies program references goals of $3.00 per gallon gasoline equivalent for biofuels. Similarly, the Hydrogen and Fuel Cell Technologies program refers to a goal of $4.00 per gallon of gasoline equivalent for hydrogen fuels. With today's gas prices, there is no way that a $3.00 or $4.00 cost without taxes would be competitive in the commercial marketplace, and there is no indication in the energy market that energy prices will increase significantly in the short term. Do you see any time in the near future where these fuels could realistically compete with conventional fuels without subsidies?

Why does DOE continue to set "cost competitive" price goals that are not cost competitive with today's energy prices?

A5. While EERE does establish interim cost targets to bring technologies down the cost-curve and gauge progress within our R&D portfolio, the ultimate cost goals are set such that technologies can be competitive without subsidies. However, comparing two fuels solely on a cost–per-gallon basis, may not provide a complete basis upon which to determine cost-competitiveness. For example, hydrogen as a fuel can be competitive at a cost that is higher than gasoline because fuel cell electric vehicles can be more than twice as efficient as gasoline vehicles.

The Office of EERE designs its portfolio to make a significant impact in transforming the national energy landscape and maximizing the value it delivers to the taxpayer. Ultimately, EERE's goal for its investments is to make clean energy technologies and services more available and reliable while lowering their direct and indirect costs, both to energy users and society as a whole. EERE performs extensive analyses, based on a detailed understanding of energy costs and market structures, to project which investments offer the highest impact. The EERE investment approach is designed to address specific gaps in the technology development pathway–areas where the private sector or other non-government stakeholders are unable to make the required investments to the scale or in the timeframe required for clean energy technologies to be commercialized.

EERE's cost and performance targets for our applied R&D efforts are established based on rigorous analysis of the technological feasibility for cost and performance improvements through technology R&D in various components or individual processes, roadmapping the pathways through which these improvements can be made, and timelines by which they could be realized. Determining cost and performance targets of a finished product—whether a solar photovoltaic module or biomass-derived jet fuel, for example—require additional analysis and modeling to understand the dynamics between individual components/processes and how that relates to performance of the integrated product/system, and modeling to estimate the cost of that product when manufactured at scale.

In our applied R&D portfolio, we focus on technologies with the potential to deliver large societal benefits, but the high initial cost and uncertainty about the timing of product development and market acceptance impede sufficient private investment to bring the technologies into the market. As a technology progresses down the cost-curve and nears direct market competitiveness, private capital is typically brought in to validate and scale the technology to manufacturing and deployment. EERE invests, when appropriate, in testing and validating performance, reliability, and cost through full-scale technology demonstration and analyses of the technology's market competitiveness to help catalyze and leverage additional private sector investment, decrease the barriers to private

investment, open up development of business models and supply chains and further reduce cost.

In order to achieve its strategic goal of accelerating the development and adoption of sustainable transportation technologies, EERE pursues two key parallel solution pathways: (1) using less petroleum-derived fuel to move people and freight (vehicle efficiency) and (2) replacing conventional fuels with cost-competitive, domestically produced, sustainable alternatives (alternative fuels) that reduce carbon pollution. Biofuels and hydrogen are important elements of EERE's alternative fuels solution pathway to improve American energy security, reduce transportation-related emissions of air pollutants, and support job growth and investment in America.

The U.S. transportation sector accounts for two-thirds of U.S. petroleum use, and on-road vehicles consume nearly 85 percent of the petroleum used for transportation. U.S. dependence on oil for transportation affects the national economy and its potential for future growth–the U.S. sends more than ten billion dollars per month overseas for oil (this amount has been well over one billion dollars per day in recent years). The average U.S. household spends nearly one-fifth of its total family expenditures on transportation, making it the second-most expensive spending category after housing. Oil price volatility also affects the national economy and household budgets. Over the past ten years U.S. regular conventional retail gasoline prices have fluctuated from around $1.50 to over $4 per gallon, causing fluctuations in annual household budgets by as much as $1,200 per year for the average personal vehicle. In addition, the U.S. transportation sector accounts for approximately one-third of U.S. carbon pollution and, despite recent progress in reducing other emissions, remains a significant source of air pollution.

Policymakers at the federal, state, and local levels have established financial incentives for myriad clean energy technologies and domestically-produced alternative fuels, including hydrogen and cellulosic biofuels, recognizing the significant societal benefits that these technologies and fuels provide. EERE's goal for all technologies within its portfolio is for them to compete with incumbent technologies without subsidy.

Q6. The FY 2017 budget request includes a significant change in the structure of the Fossil R&D program, specifically a proposal to remove designation by fuel type within the office's research and development portfolio. The budget states that "categorization by fuel type is no longer appropriate for this portfolio." But the EERE budget is divided by fuel type – what's different between EERE and fossil energy?

A6. The technologies developed within the Fossil Energy (FE) R&D portfolio have applicability to multiple fuel sources. For example, carbon capture and storage (CCS) technologies developed in the FE R&D program have applicability not just to coal, but natural gas and industrial sources of carbon dioxide (CO_2) emissions. Power generation technologies such as advanced turbines and fuel cells are also applicable to multiple fuel sources. However, many of the programs in EERE are separate and distinct and do not align well with each other because the R&D needs are inherently different. For example, the technologies developed by the solar program are different and do not align from a technical perspective with other fuel types in the EERE portfolio, an example as such is wind.

Q6a. The budget is already thousands of pages – and with the change proposed in the budget, it is even more difficult to see if research is focused on coal, oil, or gas. What prompted DOE's choice to make the budget proposal even less transparent?

A6a. FE proposes a budget restructuring in FY 2017 to support clarity in the Budget Request, streamline the structure, align subprograms that support related efforts under the same program, and eliminate categorization by fuel type. While these are still primarily coal and natural gas programs, the focus is on the work rather than the fuel source.

Moreover, the request consolidates and re-organizes several budget lines to provide transparency and accountability. For example, the Coal/CSS and Power Systems budget line will be renamed to CCS and Advanced Power Systems to reflect that the R&D portfolio under this program is focused on developing CCS technologies, best practices for carbon storage, and innovative power systems that reduce the cost of CCS. This has benefits for both coal and natural gas power generation. The Natural Gas Technologies program has been renamed to Fuel Supply Impact Mitigation to clarify its priority on R&D to ensure that fossil fuel development and delivery to power systems is safe and environmentally sound. Finally, a new budget line for Natural Gas Carbon Capture is

included in the overall Carbon Capture Budget Request. This is responsive to prior Congressional language[1] and including it as part of the Carbon Capture Budget Request allows FE to strategically leverage the existing knowledge and activities of this R&D portfolio.

Q6b. What impact could less budget transparency have on the ability for independent producers or universities to partner with DOE on fossil energy R&D?

A6b. The funding mechanisms used by the DOE remain the same, thus the restructuring of the budget has no impact on the ability of an organization to partner with DOE on fossil energy R&D activities.

Q7. While the overall budget for the Office of Electricity Delivery and Energy Reliability receives a 27% increase, from $206 million in FY 2016 to $262 million proposed for FY 2017, DOE proposes cuts for individual accounts for research and development for smart grids, transmission and reliability, and cybersecurity. Can you explain why these research and development accounts are being cut while deployment focused accounts are receiving significant increases?

A7. The FY 2017 Budget Request for the Office of Electricity Delivery and Energy Reliability includes an increase of $18.6 million, or 13%, for R&D. This includes a new Grid Clean Energy Manufacturing Innovation Institute to facilitate the transition of innovative material processes and production technologies for grid application to industry, as well as significant R&D increases for Energy Storage and for Transformer Resilience and Advanced Components.

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[1] U.S. House. Committee on Appropriations. Departments of Defense, Interior, Energy, and related Agencies Appropriations Bill, 2015, (to accompany H.R.4923) Together with Additional Views (113th House. 2d Session Rpt. 113-486)

Smart Grid Research and Development is reduced by $5 million due to one-time funding in FY 2016 for advanced, secure, low-cost sensors that measure, analyze, predict, and control the future grid during steady state and under extreme conditions.

Cybersecurity for Energy Delivery Systems (CEDS) R&D funding is reduced by $5 million for the Wireless Testbed project at Idaho National Laboratory. FY 2016 funding will complete that project's development. The remainder of the CEDS reduction results from the completion or transfer of non-R&D activities.

The Clean Energy Transmission and Reliability R&D reductions are primarily to industry cost-shared technology deployment programs for synchrophasor applications. As a result of past program investments and outreach, these technologies are gaining acceptance independent of DOE investment. Reductions are also made to early stage R&D in grid modeling with resources redirected to enhance technology in existing innovations.

Q7a. I'm particularly concerned about the 27% cut proposed for Cybersecurity for Energy Systems R&D. This committee has held 2 hearings on this critical issue – and it's clear that the cyber threat to our electric grid is only increasing. Shouldn't R&D to make our grid more secure be a priority for the Department?

A7a. Securing the Nation's power grid remains an urgent concern and a priority for the Department. The R&D portion of the CEDS request is reduced by $5 million for the Wireless Testbed project at Idaho National Laboratory because the Department expects that project's development to be completed using fiscal year 2016 funding. The completion or transfer of the following non-R&D activities accounts for the remaining $11.5 million decrease to CEDS.

- The Virtual Energy Sector Advanced Digital Forensics Analysis Platform is a two-year project with a planned funding reduction from $10 million in FY 2016 to $5 million in FY 2017. FY 2017 requested funding supports the completion of platform implementation and begins transitioning the platform to the private sector.

- Incident coordination is moved to the Infrastructure Security and Energy Restoration (ISER) budget line in FY 2017, a $1.5 million decrease to CEDS. ISER will provide a comprehensive all-hazards response to incidents.

- A $5 million reduction reflects the Advanced Control Concepts project, which is fully funded in FY 2016.

QUESTIONS FROM REPRESENTATIVE BILL POSEY

Q1. Over the past half-century, the National Aeronautics and Space Administration (NASA) have relied on nuclear-powered Radioisotope Power Systems (RPSs) to support deep space exploration. The nuclear fuel used in RPSs is a plutonium (Pu) isotope known as Pu-238. To meet the continuing need for RPSs, Congress in 2012 directed that NASA provide funding for DOE to resume Pu-238 production. NASA is currently providing about $50 million annually for this effort. GAO has documented that DOE projects and programs often run into schedule and cost difficulties. More specifically, GAO has designated since 1990 DOE's National Nuclear Security Administration (NNSA) and its predecessor organization's contract management (both contract administration and project management) as a high-risk area because DOE's record of inadequate management and oversight of contractors has left the department vulnerable to fraud, waste, abuse, and mismanagement.

Q1a. What analyses have been done to assess the cost-effectiveness of the current plans for resuming production of Pu-238 and any alternative approaches to meeting U.S. needs for power to support deep space missions?

A1a. Each year starting in Fiscal Year (FY) 2012, NASA has provided project funds to re-establish Pu-238 production ranging from $10-$17M, averaging $14.2M per year. The $50 million amount cited in the question refers to the separately funded activity to sustain existing skills and capabilities at the Department of Energy (DOE) laboratories and contractors to provide radioisotope power systems for NASA missions, an activity for which the funding was transferred from DOE appropriations to NASA in FY 2014.

As informed by an alternatives analysis conducted early in the project, the project is achieving cost effectiveness by leveraging use of existing facilities and demonstrated processes, including the use of existing reactors for irradiating targets and existing hot cells for processing targets to extract Pu-238. This approach was deemed to be the most cost effective approach with the lowest technical risk for re-establishing Pu-238 production in the desired timeframe. The project is subject to periodic independent review, both for technical content and project management effectiveness.

Q1b. What are the cost, schedule and key milestones for DOE's resumption of Pu-238 production and are these estimates are realistic?

A1b. To best meet NASA's needs within the funding available from NASA, the project has adopted a two-stage approach to resuming Pu-238 production. The first goal is to begin sustained production below the full rate at an earlier date than full production, in order to assure supply for NASA's near-term missions. This interim operation is expected to begin in FY 2019 and will be followed by a ramp-up to the full rate as funds allow. DOE is preparing and independently reviewing the project baseline in "segments" for milestones aligned with predictable funding windows (approximately two years) and tracking an overall planning estimate that may change depending on funds. This approach allows DOE to assure near-term supply while allowing NASA flexibility in how it prioritizes the production ramp-up with its other needs. The current estimated total project cost is approximately $138 million. Under current budget assumptions, the full production rate of 1.5 kilograms per year would be achieved not earlier than 2023. The first end-to-end demonstration of the Pu-238 production process at a small scale was demonstrated this in FY 2016 with the production of 50 grams of Pu-238 in December 2015.

Q1c. What are the potential implications if the Pu-238 production schedule is delayed?

A1c. DOE and NASA are working together to ensure that production plans are aligned with NASA mission needs. DOE can support currently planned missions using existing inventories, and expects to have new production underway well before new material is needed. Any unexpected schedule delays or NASA decisions to adjust the funding profile would not be expected to have major consequences to any specific mission. However, overall progress must continue on a steady pace now to ensure that supply is built up over time. This will allow NASA to confidently consider radioisotope-enabled missions in its mid- to long-term plans that may require significant quantities of new material.

QUESTIONS FROM REPRESENTATIVE RANDY HULTGREN

Q1. The U.S. nuclear industry, including three of the largest fleet operators: Exelon, Duke and Southern Company, has designated the development of accident tolerant fuel as a top industry priority with an objective of testing fuel pins in operating reactors as early as 2019.

Q1a. Is DOE supportive of this aggressive schedule?

A1a. The Department's aggressive schedule to develop accident tolerant fuel results from 2012 Congressional direction to the Department to demonstrate by 2022 lead accident tolerant fuel rods or assemblies in an operating commercial reactor. We are pleased that several U.S. utilities have designated this as a top industry priority with a recommended objective of fuel pin testing as early as 2019.

In the April 2015 Report to Congress, Development of Light Water Reactor Fuels with Enhanced Accident Tolerance, requested in the Senate Appropriations Committee Report (Senate Report 112-75) accompanying the H.R. 2055 Consolidated Appropriations Act, 2012, the Department laid out a timeline to demonstrate by 2022 lead accident tolerant fuel rods or assemblies in an operating commercial reactor. We are pleased to hear that several U.S. utilities have designated this as a top industry priority with a recommended objective of fuel pin testing as early as 2019. We are supportive of this aggressive schedule as it appears consistent with our mandate and plans.

Q1b. What additional funding would DOE need to support such a schedule?

A1b. We are currently in the process of determining the future work effort and negotiating with our three industrial accident tolerant fuel development teams the actions necessary to achieve our mandated goal. The proposed year by year funding needed to carry out the mandate will be known later this year when we complete preparation for the next fiscal year and beyond.

Q2. The nuclear industry has recommended continuing to fund the different technology paths for the foreseeable future vs. down-selecting one or more technologies at this time. Is DOE amenable to this recommendation?

A2. The Department broadly supports Research & Development (R&D) for multiple technology paths through both laboratory conducted technology development work and cost-shared awards to industry for further concept development. These efforts will continue to fund different technology paths for the foreseeable future, and awards to industry are not intended to constitute down-selecting of certain technologies. Competitive awards for industry solicitations are based on evaluation of proposals in response to merit selection criteria, which typically include technical merit, furtherance of the reactor concept and applicant team capabilities.

QUESTIONS FROM REPRESENTATIVE BRIAN BABIN

Q1. Secretary Moniz, you told Chairman Smith that you would "certainly go back and talk with the [FE] program" about releasing Summit's $11MM CCPI budget request to get it to financial closing. Have you done so and what progress has been made towards releasing those funds?

A1. Yes, we have. Following an extensive and careful review, the Office of Fossil Energy determined that advancing additional Federal funds at this time would not substantively increase the likelihood of the project's success, and that no additional taxpayer funds should be put towards the project absent further progress on unmet milestones.

Q2. Why wasn't Summit told DOE was de-obligating $240 million in funds in the FY 2017 budget request long before the budget was publicly released on 2/9/16?

A2. The President's proposed Fiscal Year (FY) 2017 Budget does not become official until it is presented by the President to both houses of Congress and to the public. It would not have been appropriate for Department of Energy (DOE) to begin implementation of a proposal contained in the President's proposed FY 2017 Budget before it became official and before it was presented to Congress for consideration.

Q3. Summit has kept DOE fully informed of its activities on its weekly calls with NETL, including planned meetings with potential investors such as Google on 2/2/2016. Why did your team allow Summit to continue developing TCEP in good faith, including meeting with these high-profile potential equity investors, if you knew you were going to pull the plug on TCEP's CCPI funding on 2/9/16?

A3. In the FY 2017 budget request, the Department proposed to reinvest the remaining $240 million in Clean Coal Power Initiative (CCPI) funding from projects that have not reached financial close in other fossil energy research and development activities, including Carbon Capture Utilization and Storage (CCUS). DOE has extended the cooperative agreement to allow the Texas Clean Energy Project (TCEP) an opportunity to make additional progress towards reaching financial close and meeting other key milestones.

Q4. You stated during the hearing that DOE requested a financial plan from Summit at a December 2015 meeting, but it was "not forthcoming." In Summit's letter to you, it includes an email from NETL's Jason Lewis, requesting financial models six days before

that meeting, in preparation for that meeting. Summit sent those models within three hours, for which Lewis thanked them. Were you made aware before the hearing of Summit's cooperation in providing documents requested for the December meeting at DOE HQ, as well as the apparently extensive follow-ups?

A4. The financial plan requested by DOE was a description of the path to secure debt and equity financing for the detailed design and construction of the project. In other words, a plan that describes how Summit would secure the $3.9 billion necessary to build the project. In the absence of such a plan, the Department has little assurance that the project will reach financial close. The financial *model* that Summit provided would be used to assess the economic feasibility of the project based on assumptions about debt terms, costs, operating expenses, revenue, and other factors. The model provided, while helpful and appreciated, was not a plan to finance the project.

Q5. Were you made aware that during that December 2015 meeting, Summit showed a 17-page slide presentation with 54 different model outputs looking at different sensitivities? During the last weeks of December and throughout January, this meeting was followed up by six phone calls, a draft budget proposal, two memos requested by the DOE team, a formal budget proposal, and three follow-up emails answering DOE's questions regarding that budget. Were you informed of that? If so, do you think the continued cooperation between Summit and DOE should have had an impact on DOE's decision regarding TCEP?

A5. DOE communicates regularly with project participants as it continues to evaluate project progress and strives to ensure that taxpayer funds are properly utilized. Following an extensive and careful review, which was informed by the information provided by Summit, DOE determined that advancing additional Federal funds at this time would not substantively increase the likelihood of the project's success, and that no additional taxpayer funds should be put towards the project absent further progress on unmet milestones.

QUESTIONS FROM REPRESENTATIVE DAN LIPINSKI

Q1. I was pleased to see the requested increase in the Vehicle Technologies program. What do you see as the main research challenges still facing us in this sector? And, how will your FY 2017 budget request get us there?

A1. Vehicle Technologies research, development, and demonstration (RD&D) plans are informed by detailed technology roadmaps and research targets that we develop jointly with our auto industry partners to ensure that public investment in advanced vehicle technologies remains focused on high-impact activities to overcome the most critical, high-risk barriers to technology commercialization, and that our efforts do not duplicate those of industry. In general, cost and performance are the key barriers to the widespread use of advanced vehicle technologies. Specific technical challenges that the Fiscal Year (FY) 2017 Request helps address are listed below.

Battery Technology R&D

The FY 2017 Budget Request of $130 million for Battery Technology research and development (R&D) continues support to significantly advance next generation lithium-ion technology in the three major R&D areas of Battery R&D: Advanced Battery Materials, Advanced Battery Development, and Advanced Processing. Based on battery performance modeling efforts, next generation lithium-ion technology has the potential to meet the 2022 cost target of $125/kWh, while meeting vehicle battery performance targets. In addition, the FY 2017 Budget Request supports an increased emphasis on beyond lithium-ion R&D, which complements and strengthens recent beyond lithium-ion advances and is a potential pathway to decrease battery cost below the 2022 target. RD&D has reduced the cost of advanced batteries from $325/kWh in 2012 to $264/kWh in 2015 – with a target of $125/kWh by 2022. Next-generation plug-in electric vehicle batteries that have the potential to achieve our cost and performance targets suffer from (1) large first-cycle irreversible capacity loss, (2) low cycle life/ high capacity fade, (3) poor coulombic efficiency, and (4) inferior power capability.

Electric Drive Technologies R&D

The FY 2017 Budget Request of $39 million for Electric Drive Technologies R&D continues support for the EV Everywhere Grand Challenge, specifically toward the long-term electric drive system (motor and inverter) goal of a 50 percent cost reduction (compared to a 2012 baseline) by 2022 to $8/kW ($440/system). An Electric Drive Technologies Development Funding Opportunity Announcement (FOA) topic in FY 2017 will develop integrated electric drive systems that can achieve performance and cost targets with improved reliability and power density. An Electric Drive Technologies Research FOA topic in FY 2017 will develop advanced materials and technologies for Wide Bandgap (WBG) packages and power module designs to accelerate power electronics innovation. Funding also continues at the National Laboratories to strengthen and accelerate advancements in WBG power electronics and non-rare earth motors.

Advanced Combustion Engine R&D

The FY 2017 Budget Request of $74.8 million for the Advanced Combustion Engine R&D subprogram will competitively award cost-shared projects with industry to support the development of cost-competitive engine and powertrain systems for light-duty passenger vehicles capable of attaining at least a 35 percent fuel economy improvement for gasoline fueled vehicles and at least 50 percent fuel economy improvement for diesel fueled vehicles while meeting future emissions standards by 2020. The subprogram will continue to support SuperTruck II and the Co-Optimization of Fuels and Engines effort and increase funding for fundamental combustion and emission control research at the National Laboratories. The subprogram will support complementary combustion and emission control research at universities.

Materials Technology

The FY 2017 Budget Request of $82.7 million for Materials Technology provides supports for the Advanced Materials Crosscut to develop and apply tools and techniques to predict optimized polymeric precursors and processing for low-cost carbon fiber

designed specifically to meet the mechanical and cost requirements for high volume automotive applications. The activities under Lightweight Materials also continue to support the EV Everywhere Grand Challenge and SuperTruck II. The higher cost of lightweight materials when compared to conventional materials is a major barrier to adoption. The cause of the increased cost is often technical in nature, such as the need for higher stamping temperatures with advanced metals or the relatively long cycle time for manufacturing conventional carbon fibers and composites. Propulsion Materials efforts will target improved integrated computational materials engineering tools to accelerate the development of advanced low cost alloys for high efficiency engines and SuperTruck II powertrain materials requirements to enable increased peak cylinder pressure, reduced friction, and increased system efficiency.

Fuel and Lubricant Technologies

The FY 2017 Budget Request of $20.5 million for Fuel and Lubricant Technologies continues funding for fuel properties R&D for the Co-Optimization of Fuels and Engines effort, with the ultimate goal of cost-effective, lower-carbon fuels for high-performance efficient engines. Support continues for developing technologies that reduce petroleum consumption by displacing it with alternative fuels and the development of advanced lubricants that are compatible with future and legacy vehicles to reduce friction loss in engines, transmissions, and axles.

Q2. In the budget request there is $150 million requested in additional "mandatory" spending to expand the scope of ARPA-E's current work to move from innovating individual technologies and components to developing system level innovations. Would you describe in some detail the different roles of ARPA-E and the Department's applied energy programs, and how promising technologies can transition from ARPA-E to the applied offices? How are you measuring whether this coordination to advance new energy technologies is successful?

A2. The Advanced Research Projects Agency-Energy (ARPA-E) advances high-potential, high-impact energy technologies that are too early for private-sector investment. ARPA-E awardees are unique because they are developing entirely new ways to generate, store, and use energy. By statute, ARPA-E's activities are "[t]o the maximum extent practicable…coordinated with, and do not duplicate the efforts of, programs and

laboratories within the Department and other relevant research agencies."[2] For instance, the Office of Energy Efficiency and Renewable Energy (EERE) supports the Department's mission by supporting RD&D of cutting-edge clean energy technologies and working to break down market barriers in sustainable transportation, renewable power, and energy efficiency. The research funded by EERE is guided by technology-specific roadmaps evaluating the future market potential and public benefits of clean energy technologies by incorporating in-house expertise, market awareness, and knowledge of private investment. This work typically moves down the current or known techno-economic learning curves. In contrast, ARPA-E's mission is to create entirely new approaches or new techno-economic learning curves that have the potential to be disruptive in the marketplace. Successful ARPA-E projects may continue their development work with the support of a wide range of entities, including EERE, other DOE programs, Department of Defense programs, and the private sector.

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 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 successfully clarifies and confirms the existence of a suitable technological white space, ARPA-E may issue a FOA containing market-based cost and performance metrics that, if achieved, would displace the prevailing technology.

[2] 42 U.S.C. §16538(i)(1), available at: http://arpa-e.energy.gov/arpa-e-site-page/authorization

ARPA-E tracks precursors of eventual success by measuring several different types of "hand-offs" across its entire portfolio of completed and active projects. These hand-offs include new company formations, partnerships with other government agencies, and partnerships with existing companies. Since the inception of ARPA-E in 2009, as of February 2016 ARPA-E has successfully facilitated many hand-offs:

- At least 45 ARPA-E project teams have cumulatively received more than $1.25 billion in private sector follow-on funding;
- At least 36 ARPA-E project teams have formed new companies to advance their technologies;
- Several ARPA-E awardees have announced strategic partnerships with established industry participants, ranging from jointly developing a demonstration site to being acquired by the larger company; and
- Over 60 ARPA-E projects have partnered with other government agencies for further project development.

In addition to the hand-offs described above, as of February 17, 2016, ARPA-E projects have resulted in more than 1,000 Subject Invention Disclosures, more than 350 U.S. Patent Applications, and approximately 100 issued U.S. Patents (based upon performer reporting).

QUESTIONS FROM RANKING MEMBER EDDIE BERNICE JOHNSON

Q1. The Department claims that TCEP has missed four major milestones as its justification for repurposing these funds for other activities within the Office of Fossil Energy.

Q1a. What are these milestones, and what step have the project developers taken to address them?

A1a. These milestones included:

- The final Engineering, Procurement, and Construction (EPC) pricing by February 28, 2015
- A complete Decision Point application; no later than March 31, 2015
- Executed EPC with all material terms resolved; no later than March 31, 2015
- Copies of all documentation submitted to the Recipient's lead lender as the "due diligence package;" no later than March 31, 2015
- The complete set of signed Term Sheets for equity from project contractors and other equity investors; no later than March 31, 2015
- Signed Term Sheets and draft credit agreement from its lead lender; no later than March 31, 2015. Collectively, all of the equity and debt terms sheets/agreements must demonstrate that there is sufficient commitment of the total amount necessary to support the entire project construction financing (exclusive of the Department of Energy (DOE) funds).

As the objective and, therefore, ultimate milestone of Phase 1 is to close on construction financing, DOE's intent in establishing these milestones was for the Recipient to have collectively satisfied them all at one given time so that the Recipient could close on construction financing very shortly thereafter.

Q1b. Were these milestones, including the specific dates to achieve them, ever communicated to the project developers as necessary in order for the Department to continue to support the project? If so, when?

A1b. Yes, these milestones, including the specific dates to achieve them, were communicated to the Recipient through an amendment to the Cooperative Agreement, with an effective date of October 7, 2014.

Q1c. It is my understanding that the project has completed all of the necessary engineering, procurement, and construction (EPC) contracts. According to the project developers, these signed contracts should fulfill a key milestone for TCEP as laid out by DOE. Do you agree that these contracts are signed thus the milestone is complete? If not, please explain why DOE does not consider this milestone complete.

A1c. The EPC contracts provided by Summit are not final or fully executed; key unresolved matters remain. Most notably, the Parties have not agreed to a final price for the construction of the project. Therefore, the milestone is not yet complete. Previously, the Recipient was in a similar position with a different Chinese engineering firm and failed to secure project financing.

Q1d. It is also my understanding that the project developers have previously secured CO_2 offtake agreements. The signed CO_2 offtake agreements completed the intent of the related DOE milestone at that time, but these agreements lapsed due to other project delays. Do you agree that the project previously completed the milestone related to CO_2 offtake agreements and has demonstrated an ability to secure these agreements in the future? If not, please explain why.

A1d. No, as CO_2 offtake agreements are subject to market conditions and generally include terms of expiration. The fact that offtake agreements were reached previously does not necessarily guarantee that they can be easily renegotiated, as changing market conditions can impact the economics of these offtake contracts.

Q1e. According to the project developers, the required power purchase agreement had also been signed previously, renewed after lapsing, and eventually TCEP, with the knowledge and concurrence of DOE, decided not to renew the agreement in the hopes of securing a more financially beneficial agreement when the project was nearer to financial close. Do you agree that the project has successfully pursued and previously secured a power purchase agreement to fulfill the related milestone? Do you also agree that by delaying this agreement in concurrence with DOE that the developers may have been making a more advantageous financial decision for the project? If you do not agree with any of the explanation above, please explain why.

A1e. Offtake agreements and required power purchase agreement have been signed and have repeatedly lapsed due to delays in reaching financial close. The key driver for the continued delay of the project is its inability to reach financial close which leads to expired offtake contracts.

Q2. During the hearing, when asked about the Texas Clean Energy Project, you said, "I think this is a good project, I mean conceptually, it's a great project." You also commented that the Department has extended the cooperative agreement until May 2016 and went on to say, "If [TCEP] were to meet the milestones in that period, obviously, we would be going back to work with the project. But at some point we need performance. No one questions the desirability of the project as a project design, its objectives, its goals. That isn't the issue. But the program decided it was just time to move on and to invest in some new innovative technologies because of the lack of milestones being met."

Q2a. If you believe that TCEP is conceptually a great project and your team has worked hard to make it a success, why wouldn't you provide the project with $11 million requested of the remaining $240 million in previously appropriated funding, which TCEP's developers believe is necessary to reach financial close this year?

A2a. Following an extensive and careful review, DOE determined that advancing additional Federal funds at this time would not substantively increase the likelihood of the project's success, and that no additional taxpayer funds should be put towards the project absent further progress on unmet milestones.

Q2b. In the event the project does reach financial close this year, what would happen to your budget proposal for the Office of Fossil Energy (FE)? Given your clarification that DOE would go back to work with the project should TCEP reach financial close, would this not, in essence, cut the FY 2017 FE R&D budget by $240 million of the $600 million that the Department is currently requesting for these activities? Does the Department have a contingency proposal for FE R&D in the event that TCEP reaches financial close?

A2b. The Department remains committed to advancing Carbon Capture Utilization and Storage (CCUS) through deployment at commercial-scale and the development of next generation technologies that help to increase efficiency and continue to further drive down cost. Should the Summit project reach financial close this year prior to termination of the Cooperative Agreement, DOE would need to take under consideration all available information and reevaluate.

Q3. How has the natural gas boom in the past 6 years impacted the progress of the Texas Clean Energy Project? Have there been changes to other economic factors since the project's inception that have influenced the progress or the ability to complete milestones? What has the Department done to adjust expectations, milestones, or timelines in response to any of these changes?

A3. Over the past six years, DOE has worked closely with the Texas Clean Energy Project (TCEP) to help enable the success of their project. At the time DOE entered its cooperative agreement with TCEP, there were no commercial-scale CCUS electric power projects anywhere in the world. Developing a project like TCEP, with all its technical and commercial complexity, was simply not something that had been done before. Thus, while DOE set milestones and other requirements in its cooperative agreement with TCEP, it did so knowing that it is common for first-of-a-kind projects to confront delays and other risks in their development and that some measure of flexibility would be required. With each decision to modify the cooperative agreement, DOE weighed the potential benefits of accelerating the development of commercial-scale CCUS technologies against the significant risk of failure inherent in any major demonstration project. DOE modified the cooperative agreement in some cases in which additional time and grant funding markedly enhanced the project's viability and likelihood of advancing to construction. For example, DOE modified the agreement to allow TCEP to update front-end engineering design to identify cost savings and performance efficiencies, which would strengthen cost estimates for potential financing partners.

A number of factors have affected this project, not the least of which are the dramatic changes in the domestic energy market that have had an adverse effect on the demand for coal-based power plants.

QUESTIONS FROM REPRESENTATIVE ELIZABETH ESTY

Q1. The U.S.-Israel Strategic Partnership Act, which Congress passed and the President signed into law in late 2014, established that it is a policy priority for the United States to pursue every opportunity to deepen our energy relationship with Israel. Managed by DOE with strong bipartisan support in Congress, the U.S.-Israel Energy Cooperation Program has set the stage for long-term strategic cooperation in the development of new energy technologies.

Israel is a world leader in technological research and development, with expertise in areas such as clean-tech, water resource management and cyber protection technologies that may be applicable to our critical infrastructure.

Q1a. As DOE increases its investments in R&D, does the Department have plans to expand its current programs with Israel?

A1a. The Department of Energy (DOE) is fully committed to continuing a robust and expanding energy cooperation program with Israel. There are several recent and upcoming examples of bilateral energy cooperation that illustrate this commitment. In October 2015, DOE hosted a meeting of the U.S.-Israel Energy Dialogue. During the event, U.S. officials and scientists shared expertise and best practices in the areas of natural gas development; cybersecurity in the energy sector; the energy – water nexus, including desalination; and clean energy innovation. These exchanges continue regularly at the working level, and our experts are already working to set up the venue for the 2016 Dialogue.

During the 2015 Energy Dialogue, both parties agreed to explore deeper cooperation in several areas, including expanded cyber security cooperation to include DOE, the Department of Homeland Security (DHS) and the Federal Energy Regulatory Commission (FERC), together with Israeli counterparts. Both parties plan to develop a flexible desalination design challenge, where researchers would offer creative designs of integrated energy and desalination systems and a post-doctorate exchange program, with leading energy scientists selected to collaborate with laboratories in the other country.

On April 4-5, 2016, I travelled to Israel to continue the progress made at the October meeting of the Energy Dialogue. With regard to water resource management, my visit resulted in progress towards a new energy-water desalination design challenge, which will address desalination systems design for flexible interoperation with the electric grid. We anticipate that the Israeli and U.S. parties will each identify and support research teams to pursue the

challenge. We plan that challenge winners will be selected by a panel of judges at a workshop co-organized by the U.S. and Israel in 2017. The challenge is being coordinated by the Israeli Ministry of National Infrastructure, Energy and Water and the DOE.

On April 5, 2016, in Israel, Minister Steinitz and I announced enhanced scientist-to-scientist exchanges between DOE-funded research programs and Israeli scientists in energy-related topics of mutual interest. These exchanges will allow leading Israeli scientists to work and study at the Department's Energy Frontier Research Centers, while U.S. scientists will have the opportunity to further their research at leading Israeli facilities.

With regard to clean energy research, while in Israel I signed an amendment to our cooperative Memorandum of Understanding that expands energy research cooperation between the U.S. and Israel. Also, I met with companies participating in the U.S.-Israel Bi-national Industrial Research and Development (BIRD) Energy program. The Department continues to support joint research and development between U.S. and Israeli companies through BIRD Energy, a program funded through annual contributions from the U.S. and Israel in support of clean energy technologies.

In addition to the expanded cyber security work begun in October 2015 with DHS and FERC, during my recent trip I discussed other ways in which the U.S. and Israel can strengthen our cyber security partnership. We agreed that DOE's Chief Information Officer, Michael Johnson, will attend a cyber security event in Israel in June 2016, and that we share a plan for expanded efforts at our next Energy Dialogue meeting.

Q1b. Increased investment in R&D will also serve to improve cybersecurity in the electric power and natural gas subsectors. How will this benefit a region like the Northeast, where the natural gas supply is strained during winter months?

A1b. DOE continually evaluates its international cooperation with an eye toward U.S. energy security and technology opportunities, as is part of the Department's mandate. The knowledge gained through our partnership with Israel, an innovation and R&D leader in the areas of natural gas development; cybersecurity in the energy sector; the energy-water nexus, including desalination; and clean energy innovation will have important shared benefits for our work in the U.S., including in the Northeast. In addition, future efforts like the results of

the U.S.-Israel Desalination Design challenge may be used to support potential applications by laboratories and other entities throughout the U.S. Similarly, the post-doctorate exchange program will benefit the work of DOE's Energy Frontier Research Centers, including those located in the northeast region of the U.S.

QUESTIONS FROM REPRESENTATIVE SUZANNE BONAMICI

Q1. Secretary Moniz, I am interested in our country's Exascale Computing Initiative. Recently I sent a letter to House Appropriators asking for increased funding for Exascale projects. The United States must make strategic investments in High Performance Computing to meet increasing computing demands and emerging technological challenges. Foreign governments are aggressively investing in HPC and other related technologies, and it is critical that we make a strong investment to maintain our global leadership. Your agency is named as a lead agency along with NSF and DOD in the National Strategic Computing Initiative (NSCI).

Q1a. NSCI has stated goals of being an "all of government" effort to increase high performance computing use. As a 'lead' agency, will DOE and its Laboratories reprioritize their efforts to carry out this initiative, and if so, how?

A1a. The NSCI Executive Order underscores the importance of high performance computing (HPC) to the Department and to the United States for National security, scientific discovery, and economic competitiveness. The focused attention on HPC in the NSCI is therefore consistent with the Department's own priorities. Within Department of Energy (DOE), the Office of Science (SC) and National Nuclear Security Administration (NNSA) are jointly responsible for executing the Department's Exascale Computing Initiative (ECI). SC and NNSA have already initiated research and development (R&D) efforts in extreme-scale development of key mission applications. In Fiscal Year 2017, these two offices will pursue greater engagement with the Department's applied energy offices to provide leadership and assist with enabling the next generation of important applications for applied energy problems. As an NSCI lead agency, DOE will also work with other agencies – some doing more foundational research, and others more application-oriented work – to support the objectives of the NSCI and to address the wide variety of needs across the Federal Government. The ECI is a high priority for the Department. To ensure its success, the Department will draw upon the programmatic and technical strategies that have allowed SC and NNSA to establish a long track record of successfully executing large, technically complex scientific projects. In addition, due to the breadth and complexity of the ECP, an Integrated Project Team will be established with defined roles and responsibilities to support the Federal official. Within DOE, responsibilities will be shared among SC and NNSA, taking advantage of the core capabilities of the partnership between these two offices. Collaborative teams selected

through competitive merit-based peer review processes and drawn from DOE laboratories, small and large businesses, and/or universities, will conduct research, development, and engineering.

Q1b. How will NSCI collaborate with other federal agencies to address challenges with cybersecurity related to protecting federal and private networks?

A1b. The NSCI is a whole-of government effort that holds collaboration among Federal agencies as a core principle. The Department is an active participant in the interagency working group that developed the NSCI implementation plan, which includes networking technology as a component of an enduring HPC ecosystem. In addition, the Department collaborates with other NSCI agencies to address cybersecurity challenges through activities such as the National Science and Technology Council and the Networking and Information Technology Research and Development Program.

Appendix II

Additional Material for the Record

DOCUMENTS SUBMITTED BY REPRESENTATIVE BRIAN BABIN

Congress of the United States
Washington, DC 20515

March 18, 2016

The Honorable Ernest Moniz
Secretary
U.S. Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585
United States

Dear Secretary Moniz:

In the President's budget request for Fiscal Year 2017, the Department of Energy (DOE) de-obligated $240 million from the Texas Clean Energy Project (TCEP), which is planned for construction in Odessa, Texas. As you are well aware, this project is a first-of-a-kind commercial power plant that will employ innovative technology to capture 90% of the plant's carbon emissions. We know you join us in support of an all-of-the-above energy strategy with the ultimate goal of providing clean affordable energy to all. It is for this reason that we are perplexed at the Administration's decision to withhold the remaining funding for TCEP when the project has so much potential, and appears to be so close to reaching financial close.

Summit Power, as the lead developer and owner of TCEP, secured vital engineering and construction contracts in December 2015 and January 2016. Following this major milestone, it is our understanding that Summit requested that DOE release an advancement of $11 million in funds already obligated to TCEP, which would be the final Phase 1 budget request before the project reaches financial close. The Department responded on February 9th, the day that the President's budget request was released, by informing Summit Power of the decision to not only decline this request for the $11 million advance, but to propose repurposing all remaining funding for the project for other activities. We cannot find a reasonable justification in the President's budget for this last minute shift. Furthermore, we do not believe that the Department provided the company with reasonable notice or warning of the conditions that would lead to this decision, let alone the decision itself. Such significant, poorly justified actions like this could damage the potential for cooperative partnerships between government and industry in the future, especially with those working on carbon capture technologies.

Since the release of the President's budget request, DOE claims that TCEP has missed four major milestones. Based on staff inquiries it appears this claim is not accurate. It appears that

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DOE did not treat milestones as hard deadlines and continually renegotiated with Summit in good faith with the shared goal of the project reaching financial close and commencing construction. DOE failed to provide notice to Summit that renegotiating milestones could result in the total loss of funding. Most concerning is that DOE continually cites the failure to secure engineering and performance contracts as one of the major missed milestones, when in fact these contracts were publicly signed in December and January. The December signing ceremony in Beijing even had DOE officials in attendance. During this entire time Summit has continued to meet with investors and secure private investments in the project to meet the cost share requirements without any indication from DOE that with the release of DOE's FY 2017 budget request, the agency would no longer support TCEP.

Please provide us with any documentation relevant to our current understanding of these missed milestones and the justification behind DOE's decision. We acknowledge that TCEP did not accelerate to the full-scale construction phase as quickly as DOE or Summit Power would have preferred. However, given that the project originally received funding in 2009 prior to the height of the natural gas boom and the accompanying market shifts, we believe DOE should reconsider its assessment of the project's progress and release the requested $11 million in funding, while also maintaining the potential for Phase 2 funding. In addition, we request that you make milestones and related deadlines more clearly defined for all parties so DOE and Summit can return to a productive relationship with the shared goal of seeing TCEP built and demonstrating these vital carbon capture technologies, all while continuing to ensure appropriate protections for investments of taxpayer dollars.

Currently, the Office of Fossil Energy is refusing to consider alternative options for this project and we fear that without the immediate financial support this project will never be built. First-of-a-kind technologies have a long history of government support to move them across the finish line, enabling industry to deploy these innovations at commercial scale across the country and the world. Federal assistance accelerated the development of nuclear power, shale gas, utility-scale solar, and many other energy industries, advancing private sector innovation.

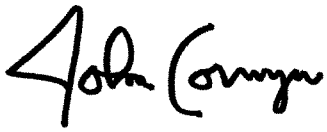
We look forward to your response. Thank you for your assistance with this matter.

Sincerely,

Eddie Bernice Johnson
Member of Congress

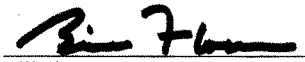
K. Michael Conaway
Member of Congress

Lamar Smith
Member of Congress

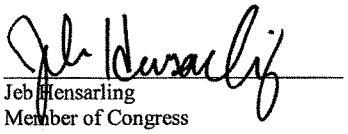


John Cornyn
United States Senator

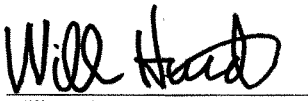
Joe Barton
Member of Congress



Bill Flores
Member of Congress

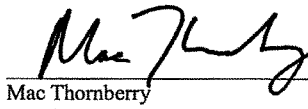


Jeb Hensarling
Member of Congress

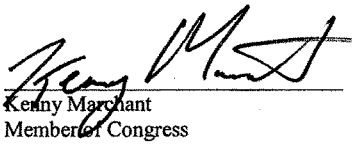


Will Hurd
Member of Congress

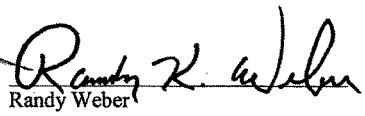
Pete Olson
Member of Congress



Mac Thornberry
Member of Congress



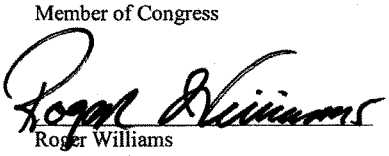
Kenny Marchant
Member of Congress



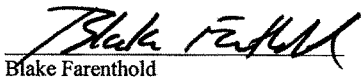
Randy Weber
Member of Congress

Ted Poe
Member of Congress

Randy Neugebauer
Member of Congress



Roger Williams
Member of Congress



Blake Farenthold
Member of Congress

Pete Sessions
Member of Congress

Rubén Hinojosa
Member of Congress

Michael McCaul
Member of Congress

Brian Babin
Member of Congress

Marc A. Veasey
Member of Congress

Joaquin Castro
Member of Congress

John Culberson
Member of Congress

Gene Green
Member of Congress

Henry Cuellar
Member of Congress

Filemon Vela
Member of Congress

Al Green
Member of Congress

Sheila Jackson Lee
Member of Congress

DOCUMENTS SUBMITTED BY REPRESENTATIVE MARC VEASY

March 21, 2016

The Honorable Ernest Moniz
Secretary of Energy
Department of Energy
1000 Independence Avenue, SW
Washington, DC 20585

Dear Mr. Secretary:

We share your view that carbon capture and storage (CCS) is an important climate change abatement technology to reduce CO_2 emissions from both the industrial and power sectors.

One CCS project, Summit's proposed Texas Clean Energy Project (TCEP), is especially important, and we would like it to succeed. TCEP will capture 90% of its CO_2 emissions, storing them deep underground through enhanced oil recovery. The $2.5 billion plant will involve significant participation from Chinese companies, opening up new paths to promote U.S.-China cooperation on climate change solutions.

We are informed that the Department of Energy (DOE) does not want to make additional advances to TCEP from its Clean Coal Power Initiative (CCPI) contract. We would like to better understand the reasons for this position. We agree that DOE needs to exercise care in managing taxpayer support dollars but it would be unfortunate if the project fails, both for the loss of the substantial taxpayer dollars already provided to the project and for the loss of an important opportunity to add a significant project employing a high level of carbon capture for power and chemical processes.

We urge DOE to work closely with Summit to resolve any differences concerning the best path to bring this project to completion.

Thank you in advance for your consideration,

Armond Cohen
Executive Director,
Clean Air Task Force

David G. Hawkins
Director, NRDC Climate Programs

Brad Crabtree
Vice President for Fossil Energy
Great Plains Institute

Bob Perciasepe
President
Center for Climate and Energy Solutions

Josh Freed,
Vice President for Clean Energy
Third Way

DOCUMENTS SUBMITTED BY REPRESENTATIVE LAMAR S. SMITH

SUMMIT POWER
Summit Power Group, LLC
801 2nd Avenue, Suite 1150
Seattle, WA 98104
206.780.3551 phone
www.summitpower.com

March 23, 2016

VIA EMAIL

Chairman Lamar Smith
Ranking Member Eddie Bernice Johnson and Members
House Committee on Science, Space, and Technology
2321 Rayburn Office Building
Washington, DC 20515

Dear Chairman Smith, Ranking Member Johnson, and Members:

On behalf of our company, Summit Power Group ("Summit"), we wish to address two statements made by Secretary Ernest Moniz at yesterday's budget hearing about our company's alleged lack of performance on the Texas Clean Energy Project.

1. Secretary Moniz testified that DOE requested a financial plan from Summit at a December 2015 meeting, but it was "not forthcoming."[1]

   In fact, Summit provided the requested material three hours after the DOE request in December, and six days before the 12/16/15 meeting referred to by the Secretary.

   On 12/10/15, DOE (Jason Lewis) emailed Summit (Bret Logue) and requested Summit provide the "latest financial model…**today** [sic] in preparation for the meeting at [DOE] next week." Lewis requested two versions of the financial model.[2]

   The same day – three hours later – Summit (Logue) responded to DOE (Lewis), providing both versions.[3]

   Two hours later, DOE confirmed receipt of the financial models, stating: "Thank you for the models and explanation."[4]

2. Secretary Moniz testified that critical Summit project milestones were overdue and not met.[5]

   In fact, on 12/8/15, Summit, accompanied by DOE, among other government representatives, signed an engineering, procurement and construction (EPC) contract

[1] At 11:42:56 ET, Moniz: "They met in December with the CEO, the program; they asked for a financial plan, it's not forthcoming, and the program finally decided it was time to move on…"
[2] See Exhibit 1, 12/10/15, 1:29 am email from Lewis to Logue.
[3] Id., 4:42 am, email from Logue to Lewis.
[4] Id., 6:39 am, email from Lewis to Logue.
[5] At 11:43:24 ET, Moniz: "So I think this has been a longstanding, ongoing discussion, and the fact of the matter is critical milestones are way overdue and still not met."

with China Huanqiu Contracting & Engineering Group (HQC) and SNC-Lavalin Engineers & Constructors, Inc. (SNC-Lavalin) in Beijing, China.[6]

On 12/9/15, Summit emailed DOE, thanking it for attending the signing.[7]

DOE responded the same day, saying: "Glad to hear it. Congratulations on this critically important milestone."[8]

On 01/21/16, Summit signed an additional EPC contract with Siemens Energy, Inc. ("Siemens"), and notified DOE the following day.

In short, contrary to the testimony at yesterday's hearing:

(1) Summit did provide two different financial models six days before the 12/16/15 meeting, a fact confirmed by DOE on 12/10/15, and provided additional financial models and supporting documents at the 12/16/15 meeting.[9]
(2) On 12/8/15, Summit reached a critical milestone, a fact confirmed by Deputy Assistant Secretary Julio Friedmann on 12/9/16; on 1/21/16, Summit achieved another milestone, signing a separate EPC contract with Siemens, and promptly notified DOE.

Other project goals have been met recently as well, including Summit signing an Operations & Maintenance (O&M) contract with SNC-Lavalin on 3/16/16.

We hope this clarification sets the record straight and that our funding will be restored.

With kind regards,

Donald P. Hodel
Founder and Chairman

B. Jason Crew
Chief Executive Officer

cc: Secretary Ernest Moniz (via email)
Texas Congressional Delegation (via email)
Washington Congressional Delegation (via email)

[6] See Exhibit 2, 12/8/15 press release from BusinessWire.
[7] See Exhibit 3, 12/9/15, 3:05 pm email from Logue to Smith, Mohler, Friedmann and six others at DOE.
[8] Id., 3:32 pm, email from Friedmann to Logue, Smith, Mohler and six others at DOE.
[9] Summit met with DOE on 12/16/15, showing Smith, Mohler, Friedmann and others a detailed presentation including a financial model covering 54 different economic sensitivities and a high-level closing budget proposal; follow-up discussions were held on 12/23/15, 12/30/15, 1/7/16, 1/15/16, 1/22/16, and 2/3/16. Based on these discussions, Summit submitted a draft budget proposal to DOE on 1/22/16 for funding through financial closing. After further consultation with DOE, an updated final budget was submitted on 2/1/16 (for $15MM: $11MM in DOE funds and $4MM in private cost share from Summit and its partners), with answers to NETL questions provided on 2/1/16, 2/2/16, and 2/3/16.

WELLFORD ENERGY

Bret Logue <blogue@wellfordenergy.com>

Request Financial Models with (1) Chexim and (2) LPO

Lewis, Jason <Jason.Lewis@netl.doe.gov> Thu, Dec 10, 2015 at 6:39 AM
To: Bret Logue <blogue@wellfordenergy.com>
Cc: "Goodman, Kelly" <kgoodman@summitpower.com>, Ryan Cooper <rcooper@summitpower.com>, "Knaggs, Michael" <Michael.Knaggs@netl.doe.gov>, "Webler, Martin J." <Martin.Webler@netl.doe.gov>, "Detwiler, Paul" <Paul.Detwiler@netl.doe.gov>

Bret,

Thank you for the models and explanation.

Respectfully,
Jason

From: Bret Logue <blogue@wellfordenergy.com>
Sent: Thursday, December 10, 2015 4:42:55 AM
To: Lewis, Jason
Cc: Goodman, Kelly; Ryan Cooper; Knaggs, Michael; Webler, Martin J.; Detwiler, Paul
Subject: Re: Request Financial Models with (1) Chexim and (2) LPO

Please see the attached models. Once everything is taken into account, the returns are roughly comparable between Chexim and the LPO. With the LPO we are assuming a return of the grant and a credit support charge of $[redacted] million at financial closing ([redacted]% of the loan value). We are also assuming that the LPO, with a longer tenor ([redacted] years versus [redacted] years), can support a higher total loan amount ($[redacted] billion versus $[redacted] billion). The combination of these things more or less cancel each other out and the returns are with a few basis points of each other. Should the Chexim terms end up worse that what we model here, then the LPO would end up more advantageous since we have a higher confidence at this point in the LPO terms than the Chexim ones. The main problem with the LPO is that it would likely take significant additional time before financial closing.

On Thu, Dec 10, 2015 at 1:29 AM, Lewis, Jason <Jason.Lewis@netl.doe.gov> wrote:

All,

David Mohler has informed NETL that a meeting with Summit is being planned at HQ DOE-FE next week and that the discussion will include the economics of the project (1) with Chexim and (2) with the LPO. We understand that he has seen the returns or has been told that the returns show going with the LPO is more advantageous than with Chexim.

David asked that NETL obtain the latest financial model from you (Summit) **today** in preparation for the meeting at HQ next week. He asks that we obtain two versions: one with financing through Chexim; and, another with a loan guarantee from the DOE LPO, so that DOE can better understand the economics of these two options.

Please provide these two versions of the financial model today. If you are unable to do so today, please let us know when you can provide the model versions as this will effect HQ's time frame for meeting with Summit.

Respectfully,

Jason Lewis

NETL Major Projects Division

--
Bret J. Logue
Managing Partner, Wellford Energy Group
Managing Director, Summit Texas Clean Energy
---
110 E. 42nd Street, Suite 1310
New York, NY 10017

Mobile: 510-967-7645
China Cell: +86 132 4079 7597
email: blogue@wellfordenergy.com

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SUMMIT POWER

SUMMIT POWER GROUP ANNOUNCES SIGNING OF EPC AGREEMENT WITH HQC AND SNC-LAVALIN FOR THE TEXAS CLEAN ENERGY PROJECT WITH FINANCIAL CLOSING EXPECTED IN SPRING 2016

BEIJING, China and HOUSTON, Texas, USA (December 8, 2015) – Summit Power Group, LLC (Summit) today announced a major step toward financing and construction of the Texas Clean Energy Project (TCEP). A large commercial power and chemicals project near Odessa, Texas, TCEP will capture more than 90 percent of its CO_2 emissions from coal while producing 400MW of clean power and enough urea to reduce annual U.S. imports by more than 10 percent. The captured CO_2 will be permanently sequestered geologically in West Texas oilfields.

At an event today in Beijing, Summit signed the engineering, procurement and construction (EPC) contract with China Huanqiu Contracting & Engineering Corp. (HQC) and SNC-Lavalin Engineers & Constructors Inc. (SNC-Lavalin). The contract covers engineering, procurement, construction, commissioning, and performance testing of the chemical and carbon capture block for the project, which will be integrated with a Siemens combined cycle power block. Siemens, which has its global Oil and Gas Headquarters based in Houston, is also expected to supply the coal gasification equipment for the chemical block.

HQC, a wholly owned subsidiary of China National Petroleum Corporation, is a leading engineering and construction management firm, operating in nearly 20 countries, that has completed more than 17 major EPC contracts for chemical and power-oriented gasification complexes. "HQC is excited to work with Summit and SNC-Lavalin to pursue this project, which is a leading example of the clean, low carbon use of domestic coal for the production of chemicals and power," said Wang Xinge, CEO of HQC. "In particular, we look forward to partnering with SNC-Lavalin in implementing such an important project."

SNC-Lavalin and HQC have entered into a consortium agreement for the project. SNC-Lavalin's major responsibilities include engineering and procurement for the balance of plant activities outside the licensed technology areas as well as construction for the entire chemical block portion of the project. SNC-Lavalin is a

world-leading engineering and construction group with offices in over 50 countries, including the USA and its Houston office, which will lead the project on SNC-Lavalin's behalf. Its 40,000 employees provide EPC and related services to clients in power, oil and gas, mining and metallurgy and infrastructure. "We see great potential for the principles of the Texas Clean Energy Project to reduce carbon emissions in the U.S. and around the world," said Neil Bruce, CEO of SNC-Lavalin. "SNC-Lavalin has been active in carbon capture for years and has implemented real-world deployment of these technologies, including retrofitting power facilities. Partnering with HQC and Summit provides a great opportunity for SNC-Lavalin."

TCEP is a leading carbon capture, utilization and storage (CCUS) project for the U.S. Department of Energy, which has awarded TCEP more than $450MM as part of the Office of Fossil Energy (FE) Clean Coal Power Initiative (CCPI). The project is also the recipient of $811MM in investment tax credits (ITCs) under section 48A of the Internal Revenue Code, awarded to qualifying advanced coal projects that generate at least 400MW of power and capture a minimum of 65 percent of their CO_2.

The signing comes 16 months after HQC and Summit launched an effort to improve the design of the project with a goal of reducing project costs, which rose sharply in 2013 as a result of soaring Texas labor rates due to the oil and gas boom. With the completion of updated engineering work and the addition of SNC-Lavalin to the team, this contract brings that effort to a successful conclusion. TCEP's financial closing is targeted for spring 2016.

"The U.S. and China have a shared opportunity and responsibility to develop and deploy solutions that help the world transition to lower carbon energy," said Summit CEO Jason Crew. "TCEP will demonstrate that through thoughtful design, proven technologies, and best practices. Sino-U.S. cooperation not only delivers low carbon power and chemicals but also supports economic growth and thousands of jobs in both countries. We are excited to work with HQC and SNC-Lavalin, and grateful to the U.S. Department of Energy for its continued support. We look forward to achieving financing soon and commencing construction shortly thereafter."

For more information please go to the TCEP website: http://www.texascleanenergyproject.com. Or contact Laura Miller, Director of Projects, Texas, for Summit Power Group at lmiller@summitpower.com.

WELLFORD
ENERGY

Bret Logue <blogue@wellfordenergy.com>

Photos from the Beijing Signing Ceremony

Friedmann, Julio <Julio.Friedmann@hq.doe.gov> Wed, Dec 9, 2015 at 3:32 PM
To: Bret Logue <blogue@wellfordenergy.com>, "Mohler, David" <David.Mohler@hq.doe.gov>, "Smith, Christopher A" <Chris.Smith@hq.doe.gov>, Sarah Kemp <Sarah.Kemp@trade.gov>, Bradley Harker <Bradley.Harker@trade.gov>, "Conrad, Regis" <Regis.Conrad@hq.doe.gov>, "Carlson, Nicholas" <carlsonnx@state.gov>, "Fu, Helena W" <FuHW@state.gov>, Wenjuan Zhan <Wenjuan.Zhan@trade.gov>
Cc: "HLasko, Andrew" <Andrew.HLasko@hq.doe.gov>, "Petrucci, Danielle" <Danielle.Petrucci@hq.doe.gov>, "Duran, Stephanie" <Stephanie.Duran@nnsa.doe.gov>, "Lewis, Jason (NETL)" <jason.lewis@netl.doe.gov>, "Smith, Robert J" <RobertJ.Smith@hq.doe.gov>

Glad to hear it. Congratulations on this critically important milestone.

J

From: Bret Logue <blogue@wellfordenergy.com>
Date: Wednesday, December 9, 2015 at 3:05 PM
To: Mohler David <David.Mohler@hq.doe.gov>, Mac Environment <julio.friedmann@hq.doe.gov>, "Smith, Christopher A" <Chris.Smith@hq.doe.gov>, Sarah Kemp <Sarah.Kemp@trade.gov>, Bradley Harker <bradley.harker@trade.gov>, "Conrad, Regis" <Regis.Conrad@hq.doe.gov>, "Carlson, Nicholas" <carlsonnx@state.gov>, helena fu <FuHW@state.gov>, Wenjuan Zhan <Wenjuan.Zhan@trade.gov>
Cc: Andrew HLasko <Andrew.HLasko@hq.doe.gov>, "Petrucci, Danielle" <Danielle.Petrucci@hq.doe.gov>, Stephanie Duran <Stephanie.Duran@nnsa.doe.gov>, "Lewis, Jason (NETL)" <jason.lewis@netl.doe.gov>, "Fee, Robert" <Robert.Fee@hq.doe.gov>
Subject: Photos from the Beijing Signing Ceremony

Dear all,

Attached are some photos from Tuesday's signing event in Beijing. It was a really great event and we very much appreciate the strong showing by the U.S. government. All together we had seven attendees from the U.S. government.

Thank you,

Bret

--
Bret J. Logue
Managing Director, Summit Texas Clean Energy

110 E. 42nd Street, Suite 1310
New York, NY 10017

Mobile: 510-967-7645
China Cell: +86 132 4079 7597
email: blogue@wellfordenergy.com

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DOCUMENT SUBMITTED BY REPRESENTATIVE ELIZABETH H. ESTY

ELIZABETH H. ESTY

Statement and Questions for the Record
Hearing of the House Committee on Science, Space, and Technology
"An Overview of the Budget Proposal for the Department of Energy for Fiscal Year 2017"

March 22, 2016

Thank you, Chairman Smith and Ranking Member Johnson, for holding today's hearing to review the U.S. Department of Energy's science and technology priorities within its budget request for 2017. Secretary Moniz, please allow me to congratulate you for your part in securing the historic climate deal at the Paris Climate talks. While it is only a first step, we all must work together to take action on climate change.

The U.S.-Israel Strategic Partnership Act, which Congress passed and the President signed into law in late 2014, established that it is a policy priority for the United States to pursue every opportunity to deepen our energy relationship with Israel. Managed by DOE with strong bipartisan support in Congress, the U.S.-Israel Energy Cooperation Program has set the stage for long-term strategic cooperation in the development of new energy technologies.

Israel is a world leader in technological research and development, with expertise in areas such as clean-tech, water resource management and cyber protection technologies that may be applicable to our critical infrastructure.

DOCUMENTS SUBMITTED BY REPRESENTATIVE THE HON. ERNEST MONIZ

Department of Energy
Washington, DC 20585

August 5, 2016

The Honorable Lamar Smith
Chairman
Committee on Science, Space, and Technology
U.S. House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

On May 4, 2016, we sent you the edited transcript of the March 22, 2016, testimony given by Secretary Ernest Moniz, regarding *An Overview of the Budget Proposal for the Department of Energy for Fiscal Year 2017.*

Enclosed are three Inserts for the Record that were requested by Representatives Lipinski, Westerman, and Bonamici.

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

Sincerely,

Janine Benner
Deputy Assistant Secretary for House Affairs
Congressional and Intergovernmental Affairs

Enclosures

cc: The Honorable Eddie Bernice Johnson
Ranking Member

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I wanted to start out by asking about the Advanced Photon Source at Argonne National Lab. It's my understanding that the APS is slated for a major facilities upgrade and is the next project in line for an upgrade. So could you talk about the importance of upgrading the Advanced Photon Source and the importance, more broadly speaking, of maintaining our global leadership in light sources?

Secretary MONIZ. Yes, it is extremely important and, as you have said, we're on a systematic march towards upgrading our light sources. Just last year, we completed the Brookhaven upgrade for very high brightness. Our current project is on the coherent light source, so-called x-ray laser at SLAC, and we are in the early engineering phases now of designing the APS upgrade, which will provide much greater coherence in the beam--and it'll be an absolutely world-leading tool.

So we're systematically upgrading our light sources, which are premier tools, the biggest drivers really of our user communities in this country. And I think, as you know, others may not, also spending about 40 percent of their time in the life sciences and making enormous contributions.

Mr. LIPINSKI. Yes, so thank you for that, and it's important. As you said, we continue to move forward here.

The second thing, as you know, an interest of mine is commercialization of DOE-funded research from universities

and national labs. Last year, there were a couple of advancements on this front. First, the Office of Technology Transitions was tasked with supporting commercialization activities across the DOE; and second, the LabCorp program was created to accelerate the transfer of clean energy technologies from national labs such as Argonne to the commercial marketplace. Now, LabCorp is based on NSF's I-Corps model, and the program trains researchers on how to turn the discoveries into real-world technology.

As I mentioned, work going on at Argonne includes developing energy-efficient material for windows, processes for deionizing water, and devices for charging electric vehicles.

So LabCorp just began the second round of training sessions. Could you give us an update on the LabCorp program and also on the activities of the Office of Technology Transitions?

Secretary MONIZ. Yes, thank you. And I hope the Committee recognizes that we apparently can listen to these suggestions moving forward in these directions. So number one is the establishment of the Office of Technology Transitions under Jetta Wong, and I think that is making tremendous progress in multiple dimensions, including, I might add, implementing the 2005 Energy Policy Act call for a Technology Commercialization Fund. And that is approximately

a $20 million fund specifically for commercializing laboratory technologies.

I might say there is one--at least one difficulty that we would like to see addressed in that, and that is that currently, the $20 million fund is quite atomized by having the contributions to it siloed according to the program from which those funds came. And that leaves very, very small amounts, as opposed to what we might accomplish by further aggregation, so that's an issue with the Congress that we would need authorization to address that.

I might also add in the energy--in the Office of Technology Transitions, we just established--and in January hired a person to head--an energy-investment activity that will provide much greater transparency for all investors to be able to access our technologies laboratory and university grants, et cetera.

LabCorp and other specific programs such as a voucher program, as well we have in the budget, and there's a lot of enthusiasm at the laboratories for advancing these. We can get you some statistics then for the record if you'd like. But I'm very pleased at the--I believe the focus on technology transfer has been elevated quite dramatically.

Mr. LIPINSKI. Thank you, and I appreciate your responsiveness and the Department's responsiveness, and these are things that I think are important for us to work together

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Part of Department of Energy's (DOE) National Laboratory Impact Initiative, Lab-Corps is a program to create a market-based commercialization mindset among DOE National Laboratory researchers. Modeled after the National Science Foundation's successful Innovation Corps (I-Corps) program, Lab-Corps trains researchers from the national labs on how to move high-impact national laboratory-invented technologies into the marketplace. Lab-Corps aims to (1) increase the rate at which National Laboratory clean energy discoveries are successfully transitioned into the private sector; (2) train Lab researchers to better understand the commercialization process and private sector needs; and (3) transform Lab culture to value commercialization and entrepreneurial activities.

On May 4, 2016, the Energy Efficiency and Renewable Energy office (EERE) within DOE graduated its second cohort of 14 teams of researchers from seven DOE national laboratories. A total of 28 teams from the National Labs have now gone through the program, and a third Cohort, consisting of 8 teams, will kick off training on July 12, 2016. A further 14 teams were selected to participate Cohort 4 this autumn. Eight DOE EERE technology offices, and the new addition of the Fossil and Nuclear Energy offices, are sponsoring teams in the upcoming cohorts, with new technologies spanning sustainable transportation, renewable power, energy efficiency, industrial carbon capture, and thermodynamics.

Lab-Corps has received resoundingly positive feedback from Cohort 1 and 2 participants. A preliminary report out of an ongoing evaluation of the Lab-Corps pilot by NMR, Inc. showed that the proportion of trainees indicating they understood the technology commercialization process increased to 87% post-training from 13% pre-training.

Evaluators also found that 92% of researchers indicated the seven-week course greatly accelerated their understanding of market needs essential to having their technologies reach the marketplace.

The new Office of Technology Transitions (OTT) was established in February 2015 to expand the commercial impact of DOE's portfolio of Research, Development, Demonstration and Deployment (RDD&D) activities over the short, medium and long term. Through these efforts, the OTT works to increase the return-on-investment from federally-funded scientific and energy research.

The OTT is focused on the "transition" of technology, specifically recognizing the multiple, interlinked connections among different stages of research and demonstration that are needed to reach commercial impact. Technology transfer related activities are just one category of activities needed to bridge early stage research to commercial impact. "Technology transitions" more accurately reflects the wider scope of the efforts to which DOE is committed.

The OTT works closely with stakeholders and in collaboration with departmental elements like NNSA's Office of Strategic Partnerships and the Office of Energy Efficiency and Renewable Energy's Technology-to-Market program, to ensure the development of the best policies and to maintain awareness of the latest issues. Additionally, the OTT Director serves in a dual capacity as the statutory Technology Transfer Coordinator[1] to ensure that the OTT is aligned with the Secretary's vision and that the Secretary is advised on all matters relating to technology transfer and commercialization activities.

OTT develops statutorily mandated technology transfer-related reports annually that consist of data collected from across the DOE enterprise. This information is used to encourage laboratory planning, evaluation, and professional development. Second, the OTT conducts evidence-based impact evaluations. The office helps analyze evaluation

[1] Energy Policy Act of 2005, Public Law 109-58, August 8, 2005
http://energy.gov/sites/prod/files/2013/10/f3/epact_2005.pdf

metrics, outputs and outcomes, and other information from DOE's National Laboratories and DOE grantees to understand the Department's impact on the commercial sector. Third, OTT pursues stakeholder engagement through roundtables, workshops, and other meetings to exchange information. The office also engages with DOE's National Laboratories and stakeholders to promote rapid technology transitions to U.S. commercial sectors through pilot programs and services focused on connecting DOE's National Laboratories with external stakeholders.

For example, the OTT is responsible for implementing the Technology Commercialization Fund (TCF), focused on commercializing promising energy technologies developed by DOE's National Laboratories in accordance with the Energy Policy Act of 2005.[2] OTT began to implement the TCF in the second quarter of FY16.

[2] Energy Department Announces New Office of Technology Transitions, U.S. Department of Energy press release: February 11, 2015. http://energy.gov/articles/energy-department-announces-new-office-technology-transitions.

research and development portfolio?

Secretary MONIZ. Our program does work with the Forest Service on woody biomass. I think a lot of the--and I think--I'm--I'd have to check this, but I think we are spending something around $20 million in the woody biomass area. I'll have to check that. A large focus is on combustion, and I think co-firing and these kinds of things, some work on conversion to biofuels, but I can get back to you with a more detailed answer.

But I--we do work with the Forest Service. We have a woody biomass program, and I'll get you the details.

Mr. WESTERMAN. And I'm familiar, you know, making pellets out of wood, which is not the most efficient way to use it--

Secretary MONIZ. Right.

Mr. WESTERMAN. --maybe, but if we're doing research on any kind of biomass, it seems like, you know, just on federal lands we had 10 million acres burn up, and that doesn't even start to touch the amount of thinning that needs to be done on our federal forests. If you throw in private lands, the potential for a fuel source if we could come up with a feasible way to convert that to--or to a liquid fuel--

Secretary MONIZ. Liquid fuels, yes.

Mr. WESTERMAN. --it's tremendous. So it seems to me like it would be prudent to put more money into research

biomass to biofuels.

Secretary MONIZ. Well, I was just told that, yes, $22 million in woody biomass so--but why don't we get back to you with the program specifics.

Mr. WESTERMAN. Okay. I appreciate that.

I yield back, Mr. Chairman.

Chairman SMITH. Thank you, Mr. Westerman.

And the gentlewoman from Oregon, Ms. Bonamici, is recognized for her questions.

Ms. BONAMICI. Thank you very much, Mr. Chairman.

Secretary Moniz, welcome back to the Committee.

Secretary MONIZ. Thank you.

Ms. BONAMICI. My State of Oregon is a leader in the effort to establish a marine renewable energy industry in the United States, and we're proud to host the Department of Energy-funded Northwest National Marine Renewable Energy Center that's co-managed by Oregon State University, the University of Washington, and the University of Alaska Fairbanks. The center is working with the national labs and private sector technology developers to provide research and testing capabilities.

In addition, Oregon State University is developing a DOE-funded offshore wave energy testing facility so innovators in the United States will have access to a domestic testing facility rather than going overseas.

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DOE's Bioenergy Technologies Office's (BETO's) FY17 funding request supports work on woody biomass through its Feedstock Supply and Logistics subprogram at the request level of $22M.

Woody biomass is a significant feedstock in BETO's portfolio. It comes from the land as logging residues, as whole tree biomass, and as fast growing plantations. Other sources of woody biomass include mill residues and municipal solid waste (MSW) as well as waste from home construction and deconstruction.

Wood is the primary feedstock for thermochemical processes for biofuels and chemicals. To optimize the supply chain from stump to product, efforts are underway to improve the quality of the raw material and transform it into high-value feedstocks that reduce the cost of the final product. In some cases, woody biomass can be easier to harvest and convert to biofuel, bioproducts, or biopower than herbaceous biomass.

BETO, USDA, and DoD (Defense Protection Act project) are currently supporting the development of Red Rock Biofuels' Biomass-to-Liquids plant. The facility is being designed and engineered to convert forestry-derived biomass into greater than 1,000 barrels per day of liquid fuels. The project produces renewable diesel and jet fuel using novel reactor technology developed by Velocys (initially a spinoff company from Pacific Northwest National Laboratory).

To mitigate environmental impacts and ensure sustainability of this feedstock, BETO is focused on developing several underutilized woody biomass resources and some new dedicated woody energy crops:

- **Whole-tree biomass**—Due to current market conditions in the U.S. pulp and paper industry, some U.S. pulpwood producers are looking for other viable market options for their wood and wood wastes such as those offered by biofuels, bioproducts, or bioenergy. Logging residues resources are typically burned at the logging site or left to decay. However, these residues could provide additional value to the industry. Methods are being developed to collect and deliver these resources more economically such as an integrated by-product of conventional harvesting.

- **Municipal solid wastes**—Large amounts of wood such as pallets, furniture, and yard trimmings are landfilled annually. Separating and using these resources to produce biofuels, bioproducts, or bioenergy can reduce landfills and result in net GHG emission benefits.

- **Construction and demolition waste**—Much wood comes from taking down old houses and building new ones. The wood is usually already separated and easier to recover.

- **Short rotation woody crops** – Short rotation woody crops, such as hybrid poplar, shrub willows, and pine can be grown for energy on marginal lands.

BETO recognizes the significant importance of woody biomass in its feedstock portfolio. Developing the integrated systems, supply chains and infrastructure to efficiently grow, harvest, collect, transport, and convert large quantities of woody biomass in a sustainable way could support the transition to a low-carbon economy.

biomass to biofuels.

Secretary MONIZ. Well, I was just told that, yes, $22 million in woody biomass so--but why don't we get back to you with the program specifics.

Mr. WESTERMAN. Okay. I appreciate that.

I yield back, Mr. Chairman.

Chairman SMITH. Thank you, Mr. Westerman.

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In addition, Oregon State University is developing a DOE-funded offshore wave energy testing facility so innovators in the United States will have access to a domestic testing facility rather than going overseas.

Now, I understand that the DOE estimates that up to 20 percent of the electricity requirements of Oregon, along with California and Washington, could come from marine renewable energy resources. In places like Alaska and Hawaii, that could be up to 100 percent.

Over the years, the wind and solar industries have received substantial and ongoing federal research and demonstration funding support. That's gone on for decades and it's resulted in the maturation, cost competitiveness, and rapid development and deployment of these technologies. The marine energy industry needs the same kind of sustained federal assistance to help private companies have that certainty they need to develop promising technologies that are really on the verge of commercial viability.

So, Mr. Secretary, I've been an ongoing supporter of water power and the programs, so I've led appropriations letters and amendments requesting increase support for research.

The fiscal year 2016 omnibus bill called for the creation of a new Water Power Technologies Office, so will you please provide an update on the efforts underway to set up the office and select a Director?

And then also I wanted you to also address this issue. I appreciate including in the funding for fiscal year 2017 a request to continue the construction of an offshore wave

energy test facility, but my understanding is that the amount of funding proposed by the Administration, along with the cost-share requirements, is not enough to construct a robust and sufficiently sized facility.

So will you please also elaborate on the budget proposals requested funding level? Going forward, will the Department participate in discussions with interested stakeholders to develop a plan that will truly ensure successful deployment of this very promising wave energy test facility?

Secretary MONIZ. I think the answer is yes, certainly to the last question. So, as you indicated, I think the budget for marine and hydrokinetic is about a 25 percent increase proposed within the open water test facility as a central piece of that. I--certainly my understanding is that that has been developed in considerable discussion with industry stakeholders in terms of what are these test requirements.

In terms of the scale, I think the issue is that this budget in fiscal year 2017 would support the design phase leading them to a kind of go/no go decision in terms of actual construction. That's my understanding, but why don't I clarify that and will get back to on that?

Ms. BONAMICI. I appreciate that. And then was that in response to the Water Power Technologies Office?

Secretary MONIZ. Oh, again, if I may get back to you for the record on that because--

Ms. BONAMICI. Sure.

Secretary MONIZ. --to be honest, I'm not quite sure where that stands.

Ms. BONAMICI. All right. Thank you very much, Mr. Secretary, and I yield back.

Chairman SMITH. Thank you, Ms. Bonamici.

The gentleman from Texas, Mr.--

Secretary MONIZ. Oh, I'm sorry. I was just given a note from--by my staff, if I may, that an announcement just went out for a new Director hiring for the water power program.

Ms. BONAMICI. Thank you very much.

Secretary MONIZ. I wasn't aware that. Thank you.

Chairman SMITH. Okay. The gentleman from Texas, Mr. Babin, is recognized.

Mr. BABIN. Yes, sir. Thank you, Mr. Chairman. And thank you, Mr. Secretary, for being here.

My question regards the fossil R&D budget proposal, which included a $240 million reduction of funds from the Clean Coal Power Initiative, or the CCPI projects to meet the total budget requirements for fiscal year 2017. This effectively pulled the remaining funding for the Texas Clean Energy Project, or TCEP, a coal gasification project with

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Water Technology Office Director:

The Department is actively working to create a new Water Office and to recruit a Director to lead that Office. The Office of Energy Efficiency and Renewable (EERE), in which the new Water Office will reside, has developed a re-organization plan to stand up a new and separate Water Office, including creating a new organizational chart and staffing plan. EERE has also prepared the hiring package for the Water Director position for competitive announcement, and identified an interim Acting Water Director candidate to help stand up the new organization while the permanent Director position is being competed. The official stand-up of the new Water Office is pending a formal review and approval from the Department's Office of Human Capital, Senior Management Review Board, and federal employee Union, and is expected to be completed in June.

Wave Test Facility:

Fully-energetic, open-water, grid-connected testing berths are a high priority to demonstrate and test wave energy converter components and systems at full scale under all operating conditions.

In Fiscal Year 2013, the DOE Water Program selected two projects to develop preliminary designs and cost estimates for a U.S. wave energy test site. The project teams were led by Oregon State University and California Polytechnic University, San Luis Obispo (Cal Poly). In the fiscal year 2015 appropriation, Congress requested that DOE, "continue marine hydrokinetic wave testing infrastructure development work,

including preliminary development of an open water, fully energetic wave energy test facility." In order to carry out this Congressional request, the DOE Water Program awarded additional funds to the Oregon State University and Cal Poly University wave test site development projects, to further advance the design, cost estimate, and permitting process.

The FY 2016 Water Program appropriation included $5 million for the final detailed design of an open-water test facility. Moreover, the FY 2017 President's Budget Request supports the development and construction of the test facility. The Department plans to issue a single, multi-year funding opportunity announcement in FY 2016. The planned funding opportunity will sufficiently fund the entire scope of the open water wave energy test facility, including engineering and design (Phase 1), and procurement and construction (Phase 2, subject to availability of funds). Prior to expending funds on facility construction, DOE plans a go / no-go evaluation of the final facility design and cost estimate. A "go" decision would allocate out year funding, subject to appropriations.

The planned funding opportunity announcement will contain provision for cost share for the construction activities to leverage industry support. The total anticipated cost to construct a multi-berth (minimum of 3 berths) wave test facility, based on preliminary cost estimates generated from the Oregon State University and the Cal Poly design projects, is approximately $45 million (Federal share plus cost share) utilizing FY 2016 and FY 2017 funds, subject to appropriations. DOE plans to reduce the construction cost share requirements to 20% for Institutions of Higher Education, national laboratories, nonprofit entities, small businesses, and FFRDCs.

Commissioning of this wave energy test facility will provide affordable access to world-class test facilities for emerging MHK components and systems to accelerate development and deployment of U.S.-developed technologies through reductions in technical and financial risk, testing cost, and time-to-market.

DOCUMENTS SUBMITTED BY RANKING MEMBER
EDDIE BERNICE JOHNSON

OPENING STATEMENT
Ranking Member Eddie Bernice Johnson (D-TX)

House Committee on Science, Space, and Technology
Full Committee
"An Overview of the Budget Proposal for the Department of Energy for Fiscal Year 2017"
March 22, 2016

Thank you, Chairman Smith for holding this hearing. I would also like to thank Secretary Moniz for being here today to discuss the proposed DOE budget and for his continued service to our nation.

Let me start by reminding my colleagues that we have many examples of how government-supported energy research in a wide range of areas can pay off. For example, DOE-supported research was key to the development of high-efficiency gas turbines for coal plants, nuclear reactors, and the directional drilling and hydraulic fracturing technologies and techniques that have led to the shale gas boom of today. But we should remember that those achievements required decades of federal investment.

This is why I was so pleased with the announcement of Mission Innovation, a commitment that the President and leaders from 19 other nations made to double their government-supported clean energy R&D investments over the next five years. And I was equally excited by the concurrent announcement of the Breakthrough Energy Coalition. This private sector initiative consists of 28 of the world's top private capital investors – recruited and led by Bill Gates – who have pledged to support potentially transformative clean energy technologies, with a focus on opportunities in Mission Innovation nations.

Given these recent developments, I looked forward to reviewing the President's Budget Request this year to learn more about how these initiatives are being implemented, as well as the other important programs that the Department is undertaking.

The FY 2017 budget request has many positive features. I certainly support the Department's full requests for the Office of Energy Efficiency and Renewable Energy, ARPA-E, and the Office of Electricity. I am also pleased to see that the Department is continuing to make progress in coordinating several critical research areas that cut across its various programs, including the energy-water nexus – about which I personally am very concerned. The proposed new Energy-Water Desalination Hub is another important step in the right direction.

However, I do have concerns with some other areas of the Department's proposed budget. Similar to last year's budget request, the fusion energy program within the Office of Science and the advanced reactor program within the Office of Nuclear Energy would both receive sizable cuts under this proposal. Over the long term, both of these types of advanced technologies have the potential to play a major role in enabling a vibrant low-carbon economy. So I hope we can discuss this topic further and see if, perhaps, these funding levels – and in the case of fusion, the program's continued inability to support innovative new research areas – should be reconsidered.

In addition, I have concerns with the proposed budget for the Office of Fossil Energy. The Department is proposing large cuts to or the outright elimination of a number of worthwhile programs carried out by this Office with little justification provided in the budget request. You are also proposing to reprogram funds previously appropriated for the Texas Clean Energy Project, an important first-of-a-kind commercial power plant that aims to capture 90% of the plant's carbon emissions. And by all accounts you are doing this with virtually no warning provided to either the project or those of us in Congress who have been such strong supporters of it over the last several years.

I certainly understand that sometimes new research projects are unsuccessful in meeting their initial goals and difficult decisions must be made to ensure that taxpayer dollars are used wisely. But this needs to be done in a clear and transparent fashion, with mutually understood milestones and potential consequences for not achieving them. Unfortunately, that does not appear to be the case regarding the Department's recent actions that would effectively terminate this project, a project which could be a major step toward meeting our nation's – and indeed the world's – long-term goals to prevent and mitigate the effects of climate change.

I look forward to working with you, Mr. Secretary, and my colleagues on the Committee, to address the concerns we have and to ensure that you have the direction, tools, and resources you need to help secure our nation's energy future.

Thank you, and I yield back the balance of my time.

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