

**THE PRESIDENT'S BUDGET REQUEST FOR THE
U.S. DEPARTMENT OF ENERGY FOR FISCAL
YEAR 2018**

HEARING
BEFORE THE
COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE
ONE HUNDRED FIFTEENTH CONGRESS

FIRST SESSION

JUNE 22, 2017



Printed for the use of the
Committee on Energy and Natural Resources

Available via the World Wide Web: <http://www.govinfo.gov>

U.S. GOVERNMENT PUBLISHING OFFICE

26-077

WASHINGTON : 2018

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THE PRESIDENT'S BUDGET REQUEST FOR THE U.S. DEPARTMENT OF ENERGY FOR FISCAL YEAR 2018

THURSDAY, JUNE 22, 2017

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

The Committee met, pursuant to notice, at 10:08 a.m. in Room SD-366, Dirksen Senate Office Building, Hon. Lisa Murkowski, Chairman of the Committee, presiding.

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

The CHAIRMAN. Good morning, everyone. The Committee will come to order. I apologize for the delayed start, but hopefully we will have an opportunity to hear from the Secretary and learn of the President's views for the Department of Energy (DOE).

Secretary Perry, I want to welcome you to your first hearing following your bipartisan confirmation here in the Senate. While it took us a little bit longer than we had hoped to get you in this role, we are glad to have you at the helm. We look forward to helping you get a full complement of folks there at the Department as well.

The budget request for the Department of Energy takes a different approach this year than we have seen in the recent past. The President has made a concerted effort to increase funding for the National Nuclear Security Administration to focus on our nuclear weapons program. This is a portion of the Department that falls outside the scope of our Committee here.

The Administration has also requested robust funding for the cleanup of nuclear waste left behind by our country's Cold War legacy. To offset those funding increases, the budget request proposes deep cuts to research and development for energy and science. It also proposes to phase out innovative programs, such as the Advanced Research Projects Agency-Energy (ARPA-E), that have had demonstrated success.

I understand what drove this proposal, but I am also concerned by certain parts of it. The United States is the world leader in science and energy. We like it that way, we want to keep it that way and at the core of that excellence is the work done at our national labs and universities by the men and women who dedicate their careers to furthering science. Members on both sides of this Committee want to maintain and strengthen that leadership, so we need to be careful that we do not get in the way of the good work

or the proper role of the private sector. Keeping that in mind, many of us have found good bipartisan opportunities where it makes sense to increase funding for R&D.

I appreciate the need to derive savings and balance our budget, but that cannot come at the expense of our efforts on energy innovation. Good science should not sit on a shelf, and the Department should continue to push the limits of science in order to ensure that the next generation of energy technologies is developed here in this country.

Although I do not support all of the proposals in this budget request, I believe that we do have some areas of agreement here. I also believe we can undertake reforms at the Department to help save taxpayer dollars. Our work on the loan programs is a good example, I think, of how that can work.

My goal for the Department of Energy is to drive down the costs of emerging, pre-commercial technologies to make energy more affordable, reliable, clean, diverse, and secure. Taking you back to Energy 20/20, those principles have not changed, and it is particularly important for Alaska where energy costs are orders of magnitude above those in the Lower 48.

Secretary Perry, again, thank you for being here this morning. I hope to be able to host you up in the state soon. I know that you have made similar commitments to colleagues in the Congress here. I look forward to hearing your priorities outlined before the Committee this morning.

Now I will turn to our Ranking Member, Senator Cantwell.

**STATEMENT OF HON. MARIA CANTWELL,
U.S. SENATOR FROM WASHINGTON**

Senator CANTWELL. Thank you, Madam Chair, for holding this hearing, and welcome back, Mr. Secretary. The Department of Energy is a global leader in science and technology with an unrivaled network of national laboratories. It is also key to our national security when it comes both to nuclear and cyber threats.

The President's budget proposes to slash many of the DOE's essential programs, and it would devastate emerging clean energy jobs in our economy. It would kill science and innovation and the jobs that DOE supports. The budget would raise electricity rates in the Pacific Northwest—I guarantee you a number of people on this Committee will not be supportive of that—by auctioning off federal utility assets. The budget would undermine U.S. energy leadership in a sector that is poised to grow millions of jobs around the world and, according to the International Energy Agency, more than \$30 trillion will be invested in new renewable energy facilities and energy efficiency between now and 2040.

We have heard a lot about the so-called energy dominance from this Administration. I would like to hear a lot less about exporting commodities that even nations like China are starting to have major blowback on and pledging more on how we are going to focus on winning the opportunity in energy efficiency, advanced technologies and things that consumers and businesses around the world are pledging commitment to.

As this Committee recently showed, the cost of clean energy technologies have dropped between 41 percent and 94 percent since

2008. I was very proud to join the Chair on a recent Northwest trip where we saw energy efficiency helping businesses save dollars and also how microgrids in Alaska are looking for every advantage they can get in driving down the cost of energy.

The success stories have been built on decades of strategic investment by the Department of Energy, and this is something that both Democrat and Republican administrations have supported, but President Trump's budget is a break in that bipartisan tradition. It is an attempt to turn back the clock on energy policy, I think, at the expense of the future.

During your confirmation hearing, you committed to protecting science, protecting the men and women who conduct that science, and advocating for our national labs. So I have great concerns about what I think is a proposed cut that could affect as many as 1,000 people at the Pacific Northwest National Laboratory (PNNL).

But specifically, this budget proposes to: eliminate ARPA-E, which are the advanced, high-potential, high-impact energy technologies that are too early for the private sector to either take on or advance, critically important to our nation; eliminate the Weatherization Assistance Program and State Energy Program, which provides critical state assistance to 50 states to help them; draconian cuts to the applied energy research programs, such as 70 percent for the Office of Energy Efficiency and Renewable Energy and 48 percent for the Office of Electricity Delivery and Electricity Reliability—I guarantee that is something that everybody across the board here cares about; and a 17 percent cut for the Office of Science, which is the largest federal sponsor of basic science and physical science.

This week you questioned the certainty of science behind climate change and during your confirmation hearing you said, "I am going to protect all the science whether it's related to climate or whatever aspects we are going to be doing," end quote. So, Mr. Secretary, with all due respect, I want to make sure that you and your office have all the information that you need on science.

Your budget proposal slashes the biological and environmental research within the Office of Science, the office that supports climate research, by 43 percent. Another troubling area is the important priority for DOE on energy infrastructure. Our grid and our energy networks are under cyberattack. From 2012 to 2016, the number of reported incidents against U.S. critical infrastructure more than doubled. And according to the Washington Post story last week, Russian government hackers have already shown their interest in targeting U.S. energy and utility systems.

So this threat to our grid is clearly growing and this morning I, along with 18 of my colleagues, are sending a second letter to the President reiterating that DOE should address this growing threat on our critical infrastructure.

During your confirmation hearing, you reassured me and the Committee that cybersecurity would be one of your top two priorities; nevertheless, your budget slashes the cyber funding by 30 percent. So I want to see a larger investment in this very, very critical area to our infrastructure.

I would like to mention—I know my colleague from Washington had a chance to talk to you about Hanford funding yesterday—I am

incredibly disappointed to see the Administration's approach to the Hanford cleanup. In light of the recent tunnel collapse at the Plutonium Uranium Extraction Facility followed by worker take-cover events at the Plutonium Finishing Plant and Richland's Operations Office budget being cut demonstrates a disregard for the health and safety of the individuals who are working in our state.

The Trump Administration needs to understand that if we do not prioritize Hanford funding and the potential for safety and security, we are going to have issues and serious problems. These recent incidents are a wakeup call for the Administration, and that is why I am working to ensure that the resources are there for the public.

Now I know that I have a little sheet here somewhere of all the ideas and schemes that people have come up with in the past. We had Secretary Watkins delay the Vit Plant construction in 1991 to reconsider the waste and pretreatment plant. For two years, the Clinton Administration planned the privatization authorization of the Vit Plant to pay contractors for glass logs. We saw Secretary Abraham try to accelerate cleanup by grouting the waste in the tanks and calling it good. We saw Secretary Chu convene science experts to review the Vit Plant. We had Secretary Moniz explore new ways of cesium and strontium treatment. So all I am saying is every Energy Secretary comes into office pressured—pressured more by some Office of Management and Budget (OMB) person who knows nothing about science—trying to do cleanup on the cheap. I guarantee you it cannot be done. We have to remain resolute and committed to cleaning this up and making decisions based on science. I look forward to asking more about that, but I know that many of my colleagues throughout the Pacific Northwest, both on this Committee and on the Appropriations Committee, will have a lot to say about our priorities for Hanford.

Thank you, Madam Chair.

The CHAIRMAN. Thank you, Senator Cantwell.

Secretary Perry, it is good to have you before the Committee. I will note that Alison Doone is with the Secretary this morning. She is the Acting Chief Financial Officer for DOE. I understand that you will not be providing testimony this morning but thank you for being here with the Secretary.

Mr. Secretary, with that, if you would like to begin your remarks so that we can turn to questions.

**STATEMENT OF HON. RICK PERRY, SECRETARY,
U.S. DEPARTMENT OF ENERGY**

Secretary PERRY. Senator, thank you. It's a privilege to be in front of you and the Committee again.

Senator Cantwell, members of the Committee, each of you, it's my privilege to be here, an honor, to discuss President Trump's Fiscal Year 2018 budget request. As each of you know, it is a great privilege to serve as the 14th Secretary of Energy.

As a former legislator, I might add an appropriator as well and a Governor, I am very respectful of the budget writing process and know the importance of the work that you're undertaking, and I look forward to working with you to finalize a budget that we can

all be proud of and that serves the taxpayers of this country as well.

In my 3-1/2 months as Secretary of Energy, I have seen firsthand the impact of the Department's leadership both domestically and internationally. I've traveled around the country, been in some of your states. And Senator Cantwell, I intend to get to Hanford ASAP, most likely this summer, to look at that, to talk to the men and women who are working there, visit with those brilliant individuals that are onsite that I happen to have a lot of faith in their knowledge of what's needed and how to address these issues that are driving their mission. So I look forward to being in a lot of your states over the course of the next months ahead.

These labs truly are, as you have all noted either today or in previous conversations, national treasures. They're the future of innovation in this country. And I have been in absolute awe of the diverse scope of the Department's mission and the consequential work that we are charged with undertaking.

I have also traveled overseas representing the United States at the G7 meeting in Rome and then in Beijing for the Clean Energy Mission Innovation Ministerial. I had the opportunity to visit Japan and meet with leaders and stakeholders about the future of the energy partnership that the U.S. and Japan has. And on a very somber note, I toured the site of the Fukushima disaster and saw firsthand the absolute monumental task that they have before them.

My trip to Asia, coincidentally, began on the day that President Trump announced that we would officially withdraw the United States from the Paris Agreement. I delivered his message to the world that even though the U.S. would no longer be a part of the Paris Agreement, we are still the leader in clean energy technology and we are committed to that mission.

The Department of Energy does many things well. America has remained on the forefront of technology for over 40 years because of the amazing men and women at these labs. And Senator Heinrich, you particularly understand this with the two that you have in your state. They wake up every day knowing that they will make a real difference in the world. I told them the first time I met with them that the greatest job I ever had was being the Governor of Texas. But after working here, I've come to realize that the Secretary of Energy is officially the coolest job I've ever had, Senator. Under my leadership our experts at DOE will continue their work for the benefit of every American and our allies alike.

As Secretary of Energy, I'm also a member of the National Security Council. This council is supported by DOE and its mission is to keep our nation safe. President Trump's Fiscal Year 2018 budget request for the Department of Energy provides \$28 billion to advance our key missions and focuses on important investments, including ensuring the safety and effectiveness of our nuclear weapons arsenal, protecting our energy infrastructure from cyberattacks and other threats, achieving exascale computing and focusing the amazing network of our national laboratories on early stage research and development.

My goals are straightforward: advance our nation's critical energy and scientific R&D mission, strengthen our nuclear security, and fulfill our environmental management commitments.

I've just painted you a rather rosy picture, and while there is a lot of good news to report, there are other hard conversations that we need to have, as you're well aware. There are approximately 120 sites in 39 states that are storing spent nuclear fuel or high-level waste. In fact, many members of this Committee have waste in their states. We have a moral and a national security obligation to come up with a long-term solution, finding the safest repositories available. This is a sensitive topic for some, but we can no longer continue to kick the can down the road.

As a former legislative appropriator and agency head and Governor, I understand how important following the rule of law is. I've been instructed to move forward toward that goal. The President's budget requests 20—excuse me—\$120 million to resume licensing activities for the Yucca Mountain Nuclear Waste Repository and to initiate a robust interim storage program.

We also need to be good stewards of the taxpayers' dollars. Congress has spent \$5 billion on the MOX project that is way over budget with no end in sight. The Army Corps of Engineers estimates the cost is \$17.2 billion and a 2048 completion date. The money appropriated for this project is money that could be used toward other priorities, like national security or cleanup at other sites. There is a better, cheaper, and proven way to dispose of plutonium. In fact, we're using that process now. I look forward to having an ongoing dialogue with many of you about these tough but important issues in the days and the months to come.

This budget proposal makes some difficult choices, but it is paramount that we execute our fiduciary responsibility to the American taxpayer. The President's proposed priorities dealing with the core mission of the Department by consolidating duplication within our agency is in order and it does, in fact, respect our taxpayers. He deserves credit for beginning this discussion about how we most wisely spend our scarce federal dollars.

As for me, this isn't my first rodeo. Having been the Governor of Texas for 14 years, I managed under some pretty tight budget constraints. It wasn't always blue skies and smooth sailing. We had some substantial budget shortfalls during that period of time that I was Governor, and we were able to budget successfully. We faced limited resources at times and Texas became a shining example of energy growth, economic growth, higher educational standards, and important improvements to the environment.

I will manage the same way at the Department of Energy. And we did that in my home state by working together. That's one of the things that I want to really bring forward today, my intention of working with you. I understand this budgetary process, I understand it's a first step, but I am committed to working with you, each of you, in the ways that you direct. I understand this process, I respect it: set clear goals, manage the best and the brightest to achieve those goals, and spend scarce resources wisely. With your help, I believe we can attain many of the positive outcomes that you expect, that you want to see, that the Department of Energy is capable of delivering on behalf of the American people.

So thank you again, Madam Chairman. I look forward to attempting to answer your questions.
[The prepared statement of Secretary Perry follows:]

**Testimony of Secretary Rick Perry
U.S. Department of Energy
Before the
U.S. Senate Committee on Energy and Natural Resources
June 22, 2017**

Chairman Murkowski, Ranking Member Cantwell, and Members of the Committee, it is an honor to appear before you today to discuss the President's FY 2018 Budget Request for the Department of Energy ("the Department" or "DOE").

As you know, I was confirmed by the United States Senate on March 2, 2017. It is a privilege and an honor to serve as the 14th Secretary of Energy and fulfill this important role critical to our nation's energy and scientific pursuits along with assuring our nuclear readiness.

As a former legislative appropriator and Governor, I'm keenly aware of the budget writing process and only wish I had been confirmed by the Senate earlier so I could be a full participant in crafting this proposal.

The President's proposal focuses our priorities and reigns in spending. There is much the Department does well and stays within budget, and unfortunately there are places we need to be better stewards of our financial resources. This budget proposal makes some difficult choices. I look forward to explaining our priorities and working with you to continue the important mission of the Department of Energy.

In short, the President's FY 2018 \$28 billion Budget Request for the Department of Energy ("Budget") advances our key missions through significant investments to modernize our nuclear weapons arsenal, protect our energy infrastructure from cyber and other attacks, achieve exascale computing, and address our moral obligations regarding nuclear waste management and the Nation's nuclear legacy.

The Department's world-leading science and technology enterprise also generates the innovations to fulfill our mission. Through our 17 national laboratories, we engage in cutting-edge research that expands the frontiers of scientific knowledge and generates new technologies to address our greatest challenges. While most of this is in the energy field, the DOE also does work to support the health sector with research and recently launched a program with Veterans Affairs to use our computing ability to assist our nation's veterans.

The Budget focuses the intellectual prowess of our scientists and engineers on the development of technologies that the ingenuity and capital of America's entrepreneurs and businesses can convert into commercial applications and products that improve the lives and security of all Americans.

Restoring the Nuclear Security Enterprise

The Budget fulfills the President's vision of rebuilding and restoring our Nation's security through robust investments in the Department's nuclear security mission. The Budget provides \$13.9 billion for the National Nuclear Security Administration, \$1 billion or 8 percent above the FY 2017 Enacted level.

As a participant on the National Security Council, the Department has a unique role in our Nation's security. I undertake these responsibilities with the utmost gravity.

One of my key duties as Secretary of Energy is to annually certify to the President that the American nuclear weapons stockpile remains safe, secure, and reliable, without the need for underground explosive nuclear testing. The Budget includes \$10.2 billion for Weapons Activities to maintain and enhance the safety, security, and effectiveness of the U.S. nuclear weapons stockpile. This \$996 million increase over FY 2017 supports modernizing our nuclear weapons enterprise and meets Department of Defense requirements in accordance with the President's Memorandum on Rebuilding the Armed Forces.

The Budget supports our ongoing Life Extension Programs (LEP) and Major Alterations, which includes \$4.0 billion for Directed Stockpile work, a \$669 million increase. Funding for the W76-1 warhead LEP directly supports the Navy and will keep the LEP on schedule and on budget to complete production in FY 2019. An increase of \$172 million, or 28 percent, for the B61-12 LEP will keep us on schedule delivering the First Production Unit (FPU) in FY 2020 to consolidate four variants of the B61 gravity bomb and improve the safety and security of the oldest weapon system in our nuclear arsenal.

The Budget also supports the Air Force's Long-Range Stand-Off program through an increase of \$179 million or 81 percent from FY 2017 Enacted for the W80-4 LEP, to deliver the first production unit in FY 2025 of the cruise missile warhead. We also increase funding by \$51 million or 18 percent for the W88 Alteration 370, to provide the scheduled first production unit in FY 2020.

The Budget for Weapons Activities also increases investments to modernize our nuclear infrastructure. For example, we include \$663 million, an \$88 million

increase from FY 2017, for construction of the Uranium Processing Facility needed to replace aging facilities at the Y-12 National Security Complex, as well as \$98 million, up \$83 million from FY 2017 Enacted, to accelerate the replacement of old and unfit buildings at the Albuquerque Complex.

The Weapons Activities Budget request also includes \$161 million, a \$66 million increase, for NNSA collaboration with the Office of Science on the development of capable exascale computer systems, which I address below.

Moving on to NNSA's Naval Reactors program, the Department has the ongoing responsibility to provide militarily effective nuclear propulsion plants for Navy vessels and to ensure their safe, reliable and long-lived operation. The Budget provides \$1.5 billion to support the safe and reliable operation of the Navy's nuclear-powered fleet and continuation of the *Columbia*-class submarine program, refueling of the Land-Based Prototype reactor, and the Spent Fuel Handling Recapitalization Project.

The Budget also includes \$1.8 billion for the Defense Nuclear Nonproliferation (DNN) program to reduce global threats from nuclear weapons. This critical national security program prevents the spread of nuclear and radiological materials, advances technologies that detect nuclear and radiological proliferation worldwide, and eliminates or secures inventories of surplus materials and infrastructure usable for nuclear weapons.

The Budget proposes to terminate the Mixed Oxide Fuel Fabrication Facility project, providing \$270 million for use toward an orderly and safe closure of the project and \$9 million to develop the pre-conceptual design for the dilute and dispose approach to plutonium disposition. This is an example of a significant cost and schedule overrun that should have set off alarms earlier in the project and should have been canceled.

We will, in an orderly and responsible manner, begin to wind down the project. My staff, in coordination with other stakeholders, is already reviewing alternative, enduring missions that could potentially utilize existing infrastructure and expertise.

The Budget also provides \$277 million for Nuclear Counterterrorism and Incident Response, \$5 million above FY 2017 Enacted, to work domestically and around the world to improve our ability to respond to radiological or nuclear incidents, in conjunction with other agencies in a broader U.S. Government effort.

Finally, the Budget for NNSA includes \$419 million for the federal workforce at the NNSA. This \$31 million increase is essential to ensuring our world-class workforce of dedicated men and women can effectively oversee NNSA's critical national security missions.

Securing against Cyber Threats

Among the most critical missions at the Department is to develop science and technology that will assure Americans of a resilient electric grid and energy infrastructure. Protecting these assets means it has to be resilient and hardened to defend against the evolving threat of cyber and other attacks. Consumers need to trust when they flip the switch, their lights will come on. Unfortunately, cyberattacks pose an ever-increasing threat to the Nation's networks, data, facilities, and infrastructure.

As utilities and independent power producers and operators have integrated advanced digital technologies to automate and control physical functions in their energy systems to improve performance, sophisticated cyber threats have increased. Nation-states, criminals, and terrorists conduct sophisticated probes of energy systems that can be used to exploit cyber vulnerabilities that disrupt or destroy energy systems.

To ensure robust cybersecurity programs across the energy sector, the Budget provides funding in multiple programs. In the Office of Nuclear Energy, we add a focus in the \$20 million Light Water Reactor Sustainability program to research new technologies to address nuclear power plant cybersecurity, and we provide \$17 million for cybersecurity at the Idaho National Laboratory (INL). In the Office of Fossil Energy, we provide \$8 million for our sensors and controls research program seeking early-stage breakthroughs to help secure power plants against cyber-attacks.

Finally, the Budget includes \$42 million for energy delivery system cybersecurity in Electricity Delivery and Energy Reliability, and a renewed focus to take steps to make a difference within two years in the cybersecurity of our Nation's power grid. Our budget funds early stage activities that improve cybersecurity and resilience of the grid in order to harden and evolve critical grid infrastructure. We focus on early stage R&D at national laboratories to develop the next generation control systems and components, devices and systems with engineered-in cybersecurity features; and we fund a new activity to develop a continuous monitoring capability that will significantly increase our awareness and ability to prevent and respond to these types of events.

We also cannot ignore the risks to the Department's own science, technology, and nuclear security infrastructure. Across the Department's programs and sites, we are taking major steps to safeguard our assets against cyber threats. The Budget includes robust funding to secure our own networks. For example, the Budget increases funding for the Chief Information Officer by \$17 million from FY 2017 to modernize infrastructure and improve cybersecurity across the internal DOE IT enterprise. We also increase funding for cybersecurity in the National Nuclear Security Administration to \$150 million to step up security for our nuclear security networks. In the Environmental Management program, we consolidated \$43 million for cybersecurity into a new budget to ensure the security at our nine major cleanup sites.

Cybersecurity is one of my key goals at the Department, and the Budget will help us take concrete steps to harden our systems and our infrastructure.

Exascale Computing

Turning to the Department's role in science and technology, the United States has long led the way in computing, dating back to invention of the first computers and continuing with world-leading machines at our national laboratories. Our leadership in developing and building the world's fastest computers has faced increasingly fierce global competition in the last decade. Maintaining the Nation's global primacy in high-performance computing is more critical than ever to ensure our national security, our continuing role as a science and innovation leader, and our economic prosperity.

The Budget includes \$508 million to accelerate development of an exascale computing system, including \$347 million in the Office of Science (Science) and \$161 million in NNSA. This unprecedented investment, which is \$249 million—or 96 percent—above the FY 2017 level, reflects the Department's intention to deliver an exascale machine in 2021 and a second machine with a different architecture by 2022. To get there, the Science/NNSA partnership will focus on hardware and software technologies needed to produce an exascale system, and the critical DOE applications needed to use such a platform.

By accelerating our progress towards exascale computing, we will take back American primacy in computing science and technology. This world-leading exascale program will bolster our national security by supporting the nuclear stockpile, while also supporting the next generation of scientific breakthroughs not possible with today's computing systems.

Addressing the Obligation of Nuclear Waste and Legacy Management

The President's FY 2018 Budget Request for the Department deals with the issue of nuclear waste disposal and supports accelerating clean-up of our Cold War legacy.

Addressing the Imperative of Nuclear Waste Management

For too many years, the prior Administration has literally kicked the can down the road on nuclear waste.

The Budget Request takes significant steps forward for the country in other critical areas. First, recognizing that we must move ahead in fulfilling the Federal Government's responsibility to dispose of the Nation's nuclear waste, the Budget includes \$120 million, including \$30 million in defense funds, to resume licensing for the nuclear waste repository at Yucca Mountain and initiate a robust interim storage program.

The Budget devotes \$110 million to restart Nuclear Regulatory Commission (NRC) licensing activities for the nuclear waste repository at Yucca Mountain, including funding for management, site operations and maintenance, as well as technical, scientific, legal and other support.

In addition, the Budget includes \$10 million to initiate a robust interim storage program that complements the nuclear waste repository by developing a capability for earlier acceptance of spent nuclear fuel to accelerate removal from sites in 39 states across the country. An interim storage capability also adds flexibility to the system that will move materials from sites across the country to its ultimate disposition.

By restarting the long-stalled licensing process for Yucca Mountain and committing to establishing interim storage capability for near-term acceptance of spent nuclear fuel, our Budget will accelerate fulfillment of the Federal Government's obligations to address nuclear waste, enhance national security, and reduce future burdens on American taxpayers. This also will increase public confidence in nuclear safety and security, thus helping nuclear energy to remain a significant contributor to the country's energy needs for generations to come.

Fulfilling Legacy Cleanup Responsibilities

The Budget also includes \$6.5 billion for Environmental Management (EM), \$89 million above the FY 2017 Enacted level, to address its responsibilities for the

cleanup and disposition of excess facilities, radioactive waste, spent nuclear fuel, and other materials resulting from five decades of nuclear weapons development and production and Government-sponsored nuclear energy research.

To date, EM has completed cleanup activities at 91 sites in 30 states and Puerto Rico, and is responsible for cleaning up the remaining 16 sites in 11 states—some of the most challenging sites in the cleanup portfolio.

New in the Budget is \$225 million to address specific high-risk contaminated excess facilities at the Y-12 National Security Complex and the Lawrence Livermore National Laboratory.

The Budget includes \$1.5 billion, \$4 million above FY 2017, for the Office of River Protection at the Hanford Site, for continued work at the Hanford Tank Farms and to make progress on the Waste Treatment and Immobilization Plant. This budget will continue progress toward important cleanup required by the Consent Decree and Tri-Party Agreement to include a milestone to complete hot commissioning of the Low Activity Waste Facility by December 31, 2023. The Budget also includes \$800 million to continue cleanup activities at Richland, including continued K-Area decontamination and decommissioning remediation and the K-West Basin sludge removal project.

For Savannah River, the Budget provides \$1.4 billion, \$214 million above FY 2017, to support activities at the site including the Liquid Tank Waste Management Program, continued construction and commissioning to achieve startup of the Salt Waste Processing Facility in 2018, continued construction of the Saltstone Disposal Unit #7, and support for facilities that receive and store nuclear materials.

The Waste Isolation Pilot Plant (WIPP) is essential for the disposition of transuranic defense-generated waste across the DOE complex, and the Budget provides \$323 million to safely continue waste emplacement at WIPP. The Budget Request will continue WIPP operations, including waste emplacements, shipments, and maintaining enhancements and improvements, and progress on capital asset projects, including \$46 million for the Safety Significant Confinement Ventilation System and \$19.6 million for the Exhaust Shaft. These steps will increase airflow in the WIPP underground for simultaneous mining and waste emplacement operations.

The Budget includes \$359 million, \$30.9 million below FY 2017 enacted level, to continue major clean-up projects at the Idaho site, such as the Integrated Waste Treatment Unit, and to process, characterize, and package transuranic waste for

disposal at offsite facilities. It provides \$390 million for Oak Ridge, \$108 million below FY 2017, to continue deactivation and demolition of remaining facilities at the East Tennessee Technology Park, continue preparation of Building 2026 to support processing of the remaining U-233 material at the Oak Ridge National Laboratory, and support site preparation activities for the Outfall 200 Mercury Treatment Facility at the Y-12 National Security Complex.

For Portsmouth, the Budget includes \$418 million, \$36 million above FY 2017, to continue progress on the deactivation and decommissioning project at the Portsmouth Gaseous Diffusion Plant, safe operation of the Depleted Uranium Hexafluoride Conversion Facility, and continue design and construction activities at the On-Site Waste Disposal facility. And at Paducah, the Budget includes \$270 million to continue ongoing environmental cleanup and depleted uranium hexafluoride (DUF6) conversion facility operations at the Paducah site. In addition, the FY 2018 Budget Request supports activities to continue the environmental remediation and further stabilize the gaseous diffusion plant.

Together, these investments for Environmental Management will make significant progress in fulfilling our cleanup responsibilities while also starting to address our high-risk excess facilities at NNSA sites.

Refocusing Priorities on Core Missions

The Budget refocuses the Department's energy and science programs on early-stage research and development at our national laboratories to advance American primacy in scientific and energy research in an efficient and cost-effective manner. The Budget funds \$6.4 billion in early-stage R&D while reducing later-stage research, development, demonstration, and deployment programs by \$3.1 billion from the FY 2017 Enacted levels.

As part of transitioning later-stage R&D, demonstration, and deployment responsibilities to the private sector and the States, the Budget terminates five Energy Innovation Hubs and five Clean Energy Manufacturing Institutes, which together constitute an annual taxpayer burden of over \$187 million. The Budget eliminates the Supercritical Transformational Electric Power demonstration program and SuperTruck II, together saving \$44 million annually, and terminates deployment activities like Weatherization and the State Energy Program in the Office of Energy Efficiency and Renewable Energy, saving a total of \$265 million.

Also in line with Administration priorities, the Budget terminates the Advanced Research Projects Agency—Energy, known as ARPA-E, and the Department's

Loan Programs, while maintaining necessary federal staff to oversee existing awards and loans. We also close the Office of Energy Policy and Systems Analysis, to avoid duplicative efforts already accomplished by the program offices. Termination of these three programs will save over \$300 million in FY 2018 alone while significantly reducing financial risk to the taxpayer moving forward.

Focus on Innovation

The FY 2018 Budget focuses its investments on the basic, early-stage R&D conducted by the scientists and engineers at our 17 national laboratories who are constantly on the path to developing the next great innovations that can transform society, and bring forth a new era of prosperity for the American people. The Budget provides \$6.4 billion, \$4.5 billion in the Office of Science and \$1.9 billion in energy research and development programs, with a renewed focus on cutting-edge innovation and transitioning those breakthroughs to the private marketplace.

The Budget consolidates programs focused on bringing technologies to the market in the Office of Technology Transitions. Through concerted effort and coordination with our labs, this will reduce costs to the taxpayer while at the same time providing a robust technology transfer program to transfer breakthroughs from the national laboratories to the private sector.

Nuclear Energy

The Budget provides \$703 million for Nuclear Energy, \$313 million below the FY 2017 level, to continue innovating new and improved ways to generate nuclear power. The budget refocuses funding on early-stage research and development, such as the Nuclear Energy Enabling Technologies program, that enables innovation driven by the private sector. While the Budget ends the Consortium for Advanced Simulation of Light Water Reactors (CASL), it increases funds for Nuclear Energy Advanced Modeling and Simulation (NEAMS) by \$7 million to integrate VERA, the virtual reactor developed by CASL, and RELAP-7, a safety analysis and simulation tool developed at the INL, into the existing NEAMS program.

From 2012 through 2017, the Department spent \$390 million on the Small Modular Reactors (SMR) Licensing Technical Support program. With NuScale Power submitting its application to the Nuclear Regulatory Commission and the completion of planned activities in FY 2017, the Department closes the SMR Licensing Technical Support program having achieved its goal to commercialize SMR technology. Given the ongoing promise of SMR technology, the FY 2018

Budget includes \$20 million for early-stage R&D supporting advanced SMR designs.

Finally, the Budget for Nuclear Energy also supports robust safeguards and security funding of \$133 million—a \$4 million increase—for protection of our nuclear energy infrastructure and robust infrastructure investments at INL facilities.

Fossil Energy Research and Development

The Fossil Energy Research and Development program advances transformative science and innovative technologies which enable the reliable, efficient, affordable, and environmentally sound use of fossil fuels. Fossil energy sources currently constitute over 80% of the country's total energy use and are critical for the nation's security, economic prosperity, and growth. The FY 2018 Budget focuses \$280 million on cutting-edge fossil energy research and development to further our energy security, advance strong domestic energy production, and support America's coal industry through innovative clean coal technologies.

In FY 2018, we invest \$30 million in a new initiative to repower coal-fired plants through research on advanced technologies and systems that improve the reliability and efficiency of existing coal units and incorporate new, advanced technology components and systems. We also will support research on coal combustion to help support potential U.S. coal exports, as well as research on carbon utilization efforts to develop materials and chemicals for new business opportunities, in support of a strong American energy sector and vibrant coal industry.

As part of the Department's effort to operate more efficiently, the Budget proposes the initial stages of footprint consolidation for the National Energy Technology Laboratory. In a phased approach, we propose to consolidate NETL's Albany, Oregon site into the NETL's Eastern sites and initiate a Mission Alignment study in FY 2017 to evaluate alternatives for the consolidation of NETL's eastern sites.

Energy Efficiency and Renewable Energy

The Energy Efficiency and Renewable Energy budget funds \$636 million to support research at our national laboratories to drive energy innovations in renewable energy, next-generation transportation, and energy efficiency.

The FY 2018 investments support development of battery technologies and advanced combustion engines, and new science and technology for developing biofuels. The Budget funds research into the underpinnings of future generations

of solar photovoltaic technology, into the design and manufacturing of low-specific power rotors for tall wind applications, and on wind energy grid integration and infrastructure challenges.

The Budget also funds early-stage R&D for advanced manufacturing processes and materials technologies. These efforts, combined with the research that leverages the unique high-performance computing assets in the national laboratories, we can drive the breakthroughs that will promote economic growth and manufacturing jobs in the United States.

Electricity Delivery and Energy Reliability

All power generation, regardless of the fuel, relies on the power grid to deliver electricity to our homes and businesses across the nation. The Budget provides \$120 million for Electricity Delivery and Energy Reliability to support research and development at the national laboratories to develop technologies that strengthen, transform, and improve energy infrastructure so that consumers have access to reliable, secure, and clean sources of energy.

In addition to the cybersecurity program described earlier, the Budget funds foundational research to ensure the reliability and resiliency of the U.S. electric grid, to support modernization of the distribution of electric power, and to advance the state of the science and technology underpinning grid energy storage, transformers, and other grid components.

World-Leading Science Research

The Department of Energy is the Nation's largest Federal supporter of basic research in the physical sciences, and the President's FY 2018 Budget provides \$4.5 billion for the Office of Science to continue and strengthen American leadership in scientific inquiry. By focusing funding on early-stage research, this Budget will ensure that the Department's National Laboratories continue to be the backbone of American science leadership by supporting cutting-edge basic research, and by building and operating the world's most advanced scientific user facilities—which will be used by over 27,000 researchers in FY 2018.

We provide \$722 million for Advanced Scientific Computing Research, an increase of \$75 million above FY 2017. This funding will continue supporting our world-class high-performance computers that make possible cutting-edge basic research, while devoting \$347 million in the Office of Science to reflect the Department's intention to accelerate our achievement of exascale computing by 2021. This focused effort will drive the innovations necessary for computing at

exascale speeds, resulting in computing systems at unprecedented speeds at Argonne National Laboratory in 2021 and Oak Ridge National Laboratory in 2022.

The Budget also provides \$1.6 billion for Basic Energy Sciences, supporting core research activities and the Energy Frontier Research Centers. We will continue construction of the Linac Coherence Light Source-II at SLAC National Accelerator Laboratory and operations of the light sources across the DOE science complex, supporting research across the Nation and ensuring our continued world leadership in light sources and the science they make possible.

The Budget also provides \$673 million for High Energy Physics, including \$54.9 million for construction of the Long Baseline Neutrino Facility and Deep Underground Neutrino Experiment, \$5 million above FY 2017. By supporting the highest priority activities and projects identified by the U.S. high energy physics community, this program will continue cutting-edge pursuit to understand how the universe works at its most fundamental level.

The Budget for the Office of Science provides \$310 million for Fusion Energy Sciences, including \$247 million for domestic research and fusion facilities and \$63 million for the ITER project. For Nuclear Physics, the budget provides \$503 million to discover, explore, and understand nuclear matter, including \$80 million for continued construction of the Facility for Rare Isotope Beams and operations of facilities, including the newly-upgraded Continuous Electron Beam Accelerator Facility. For Biological and Environmental Research the Budget includes \$349 million to support foundational genomic sciences, including the Bioenergy Research Centers and to focus on increasing the sensitivity and reducing the uncertainty of earth and environmental systems predictions.

Strategic Petroleum Reserve

In addition to our nuclear security responsibilities, the Department of Energy, in conjunction with other federal agencies, is responsible for ensuring the Nation's energy security. The Strategic Petroleum Reserve (SPR), one component of that effort, protects the U.S. economy from disruptions in critical petroleum supplies and meets the U.S. obligations under the International Energy Program. The Budget includes \$180 million, \$43 million below FY 2017 Enacted, to support the Reserve's operational readiness and drawdown capabilities.

Looking forward, the President's Budget proposes to sell approximately 270 million barrels of SPR crude oil by 2027, roughly half of the remaining SPR inventory after all sales currently authorized by law are completed, resulting in

estimated receipts of \$1 billion by FY 2019 and \$17 billion through 2027. The SPR program will conduct a comprehensive analysis to determine the sites to be decommissioned as the SPR footprint is reduced from four to two sites. The Budget continues the sale of SPR oil for the Energy Security and Infrastructure Modernization Fund authorized by the Bipartisan Budget Act of 2015 to support an effective modernization program for the SPR, but at half the previous funding level because of the anticipated closure of two SPR storage sites.

Finally, as the Northeast Gasoline Supply Reserve (NGSR) is operationally ineffective and not cost-efficient as a regional product reserve, the President's Budget proposes to liquidate the NGSR and sell its one million barrels of refined petroleum product in FY 2018, resulting in an estimated \$69 million in receipts.

Power Marketing Administrations

The Budget includes \$82 million for the Power Marketing Administrations, the same as FY 2016 Enacted. The Budget also proposes the sale of the transmission assets of the Western Area Power Administration (WAPA), the Bonneville Power Administration (BPA), and the Southwestern Power Administration (SWPA). The Budget also proposes to repeal the \$3.25 billion emergency borrowing authority for WAPA authorized by the American Recovery and Reinvestment Act of 2009.

Conclusion

In conclusion, I reaffirm my commitment to ensure that the Department of Energy, through its National Laboratories, will continue to support the world's best enterprise of scientists and engineers who create innovations to drive American prosperity, security and competitiveness for the next generation. The President's FY 2018 Budget Request for the Department of Energy positions us to take up that challenge while continuing to ensure our national security.

In my opening I mentioned my time as Governor of the State of Texas. Over my 14-year tenure, I proposed seven budgets. Some had spending increases. Others had deep spending cuts to deal with economic downturns and uncertainties. Every one of them directed the spending of billions of dollars of our taxpayer's dollars.

As we move forward over the coming weeks and months, I look forward to working with you and your colleagues in the United States House of Representatives. I am committed to ensuring DOE is run efficiently, effectively, and we accomplish our mission driven goals.

Thank you, and I look forward to answering your questions.

The CHAIRMAN. Thank you, Mr. Secretary.

I appreciate your enthusiasm for your new role. I am sure that will help you get through every day, and some days are easier than others, we all know that around here.

Let me start my questioning with ARPA-E because I am a big fan of ARPA-E. I recognize that when we think about the Department of Energy and the cool things that you get to do, one of the cool things is to really help facilitate some of these great, fabulous ideas that change the country, change the world. But as we all know, cool ideas that start in somebody's garage do not always end up making it through.

We talk a lot around this Committee about the so-called "valley of death" with energy innovations, and good things happen, but they just cannot make it to that point of commercialization. When I think of the role of ARPA-E and how it has really helped to be that bridge, its investments have reportedly spurred nearly \$2 billion in follow-on private sector funding and spin-off companies to advance technology and market. This is exactly the type of thing that we should be doing.

So the question to you this morning to start things off, do you support the mission of ARPA-E? And if so, if we eliminate it, where are we? Really, where does that put the Department of Energy and that space that you should be occupying, which is to help really revolutionize and change the world here?

Secretary PERRY. Yes, ma'am. Senator, you asked the perfect question and I think, from my perspective, the result of being able to deliver the next big thing, if you will. And when you think about the Department of Energy and other ARPA type of agencies, not directly DARPA, for instance, and the Internet, hydraulic fracturing was greatly assisted by the Department of Energy. I mean there are, as you shared, extraordinary stories about the technology and the innovation that has come out of the Department of Energy.

ARPA-E was created about a decade ago, and it was funded the first time in '09. So my point with this—and listen, again, as I said, I understand this budgetary process, and I'm going to follow your lead when it comes to—I know how the money is appropriated, I know how the instructions come. And so if the result is we want the Department of Energy to be really focused on pushing these new ideas out, getting them to commercialization, I am incredibly in support of that because—

The CHAIRMAN. Do you think that is a role of the Department?

Secretary PERRY. I do. I think that there is a real role to play on getting basic research funded, gap funding, to get that to the point where you can commercialize it.

We're going to argue, Senator Franken, about whether, you know, "Is it this much or is it this much?" or what have you, but I don't think we're going to have an argument about—I truly believe—and you look at my history. I mean, as the Governor of Texas, we helped create an Emerging Technology Fund in that state that commercialized technologies that would have died in that "valley of death," as you referred to, if the gap funding had not been there. I understand that. I support that.

Now, Senator, we're going to have a discussion here and debate about, what's the proper structure? Is it the ARPA-E structure? If that's what the Congress decides, "Perry, this is the structure we're going to have, you go make it work," and I will salute and I will go get that done.

The CHAIRMAN. Do you think that the structure has not worked in recent years?

Secretary PERRY. I will tell you that I think it's worth having a conversation about, and looking at each of these programs, having a good open discussion about, "Is this the proper structure? Is this the right way to deliver the result?" And I've got a pretty good background of 14 years of managing a pretty big entity.

What I would ask you, Senator, and each of you, in both a personal and a professional way is, I hope you will trust me, if you will, to manage this agency to deliver the results that you want. Is it absolutely in the structure that we have today? I can't tell you yes or no. What I'm going to tell you is I'm going to work with you very closely.

Senator Franken asked me this offstage, and I answered it yesterday as well, when somebody said, "Defend this budget." I said the budget was written before I got here. It was written before the second day of March, the best I can tell, but my job is to robustly defend that budget, and I am going to. With that said, I highly respect this process, and this is the first step of this budgetary process.

As a Governor, I put a lot of budgets forward. Senator Cantwell, I never got one back the way I sent it. But with that said, we're in a process. I respect that. I want you to know that on the ARPA side of things, I will work diligently to deliver for you the results that you expect, you demand, and that the American people will salute and say, "Well done."

The CHAIRMAN. Well, I think you will find, at least among this Committee, that there is good support for what comes out of ARPA-E, so I am hearing that you are willing to work with us on that and I think that that is important. But again, you have good supporters here.

Senator Cantwell.

Senator CANTWELL. Thank you, Madam Chair.

Mr. Secretary, I would like to follow up. I know Representative Newhouse had a chance to talk to you about the Pacific Northwest labs. And I think when he raised the question about the potential of 1,000 layoffs, you tried to reassure him that you would manage the lab, "in a way that continues to keep the employment at levels, deliver innovation and technology that is needed in this country, that this country is going to need." Are you suggesting that those thousand employees would not lose their jobs or would those employees—I am trying to understand where you think this is going—

Secretary PERRY. Yes, ma'am.

Senator CANTWELL. —because they are so involved in innovation. I would say DOE experts from PNNL have been key partners in the Fukushima cleanup and the Hanford cleanup, and so many other things. I just want to understand where you think this is going.

Secretary PERRY. Senator, there are a lot of numbers that have been thrown out about there are going to be this many people lose their jobs at the labs, and I'm not going to sit here in front of you and the Committee and tell you I guarantee there is not going to be one person lose their job at a lab. I'm not going to do that because that's not realistic. What is realistic is to tell you that my priorities are going to be to make sure that we get the job done at these labs. It obviously requires a lot of really capable, smart, brilliant individuals.

We have the flexibility with our budget. I hope you will consider giving me even more flexibility than maybe previous Secretaries had to be able to manage those dollars the best that we can to keep those labs both functioning at the high level that they are and to keep as many of those individuals employed that you're going to need.

So I understand how to manage during some times that you have budgetary challenges. There may be some hard decisions that get made about whether or not this number of employees is the right amount or not, with the goal being using our unexpended balances, using our flexibility for that not to be a challenge for our labs.

Senator CANTWELL. Well, look, I will give you this, you are not the first Energy Secretary to come before this Committee with ideas of changing things, but most of the time I think our Committee and the appropriators have probably set those administrations straight because we have been the stewards of these concepts and prioritizations and continually focus on them as regional issues or as national issues. But I am just curious, what area do you think we do not need innovation in? I mean, in the context of these lab workers and what they are working on—cybersecurity, nuclear nonproliferation, Hanford cleanup, grid reliability, building efficiency—are any of those areas that you do not think that we need to continue to innovate in?

Secretary PERRY. No.

Senator CANTWELL. Okay. So none of those would be on the chopping block?

Secretary PERRY. Senator, everything is going to get analyzed. And again, I'm not going to tell you publicly or privately that there is not an employee that's going to get—lose their job in the process. I'm going to manage it and I'm going to manage it in a very well way. But, you know, nothing that you said is not an important part of what the Department of Energy does. Can we do it better? I think we can. Can we do it more efficiently? I think we can. And I'm not just talking from a, you know, political standpoint.

Senator CANTWELL. Thank you.

Secretary PERRY. I've done that before.

Senator CANTWELL. I wanted to ask you about worker safety at Hanford. This is a critical—I know we only have a few minutes here, but all of these issues are critically important to our state and very much in the forefront of what is concerning. What specific steps are you taking on worker safety and will you look at this air tank issue for us? The workers at various sites have come up with what they think are more workable solutions that are being implemented at other DOE locations to help the workers continue to do

the cleanup that they need, but to be safe and secure on their air systems.

Secretary PERRY. Senator, one of the things that I want to, in a global way, just kind of share with you, one of the first videos I sent out agency-wise was about worker safety, about our commitment to it, about if they see—if workers see an issue, that they should never fear that they cannot report that back to the Secretary of Energy, all the way up, if that's what's required. And I think that was an important message that we sent out there, our commitment to the safety of these workers. We're going to continue to find ways to implement programs, whether it's—you know, your site may be the biggest challenge that this country has got, Hanford.

Senator CANTWELL. No, Hanford is the largest nuclear waste cleanup site in the entire world.

Secretary PERRY. Yes, ma'am.

Senator CANTWELL. And that is why you cannot do it on the cheap. So anyway—

Secretary PERRY. There's a difference between doing it on the cheap and doing it as efficient as you can, and I want to have that conversation with you and the Committee often.

Senator CANTWELL. We can't wait to welcome you to Hanford as soon as possible.

Secretary PERRY. Yes, ma'am.

Senator CANTWELL. Thank you.

The CHAIRMAN. Thank you.

Senator Flake.

Senator FLAKE. Thank you.

Thank you, Mr. Secretary. Good to see you again.

Secretary PERRY. Thank you, sir.

Senator FLAKE. During the confirmation process, we discussed some of the issues that customers in Arizona have had with WAPA, the Western Area Power Association. The effective delivery of federal hydropower around Arizona and the rest of the West, as you know, is very important to rural and urban customers alike. And as the chairman of the Water and Power Subcommittee, I see our oversight role as improving the efficiency and transparency at WAPA.

Ratepayers and taxpayers deserve to know how their money is spent, to know that it is spent wisely, and for the intended purpose. I know that WAPA is staffed with a lot of good people, but unfortunately a string of past fraudulent spending has cast a shadow over the agency's finances. Fraudulent spending of ratepayer money has been recently reported by Arizona television stations and by newspapers. This March, the DOE Inspector General (IG) reported a list of actions taken by WAPA to address concerns over fraudulent or improper spending in the Government's Purchase Card Program; however, the DOE report did not, "determine the effectiveness of corrective actions in addressing the identified weaknesses."

Then just last week it came to my attention that on several instances in sworn testimony this spring, a senior WAPA official has said that problems with the Government's Purchase Card Program have not been adequately fixed. Now, it is troubling to see that

there is disagreement at the highest levels of WAPA over whether sufficient safeguards are in place to stop this from happening again.

My question for you is—obviously it is unacceptable what we have seen—the investigation’s news stories, hearings, audits, and after all that, there could still be waste, fraud, and abuse at WAPA. Do you agree that that is an untenable situation?

Secretary PERRY. Yes. And if I may just resound on that. We, at this particular point in time, after the IG’s investigation, are unaware of any current fraud or waste or abuse, for that matter, at WAPA. It is unacceptable. We hopefully will send that message loud and clear, that the IG inspection did that as well, that, number one, that we’re watching and we’re paying attention.

If from your perspective or any individual that you make reference to, if you think that there is a continued investigative effort that needs to come from DOE, can we have that conversation and go forward from there? Because it’s just unacceptable, sir. Anytime those kind of activities occur, people lose faith in government. And I came to this job to be of assistance, to help, and I hope I can be.

Senator FLAKE. Well, thank you. What I think would be helpful is to follow up with the IG at DOE to ensure that procedures are put in place to ensure that this cannot happen again.

Secretary PERRY. Yes, sir.

Senator FLAKE. Apparently some believe that they are not, and that the IG—their report is saying that it did not determine the effectiveness of corrective actions in addressing the identifying weaknesses. So obviously they need to do that. And also, if you could request of the IG to ensure that money from the fraudulent and improper purchases has been recovered.

Secretary PERRY. Yes, sir.

Senator FLAKE. Thank you.

Just in the minute I have left, research done at DOE. Obviously, the budget makes some tough choices. In a time of tight budgets, we have to prioritize this kind of spending. I am exploring a bipartisan effort to help DOE identify some specific clean energy goals in the area of advanced nuclear reactor technology and grid-scale storage.

With intermittent power coming on increasingly, particularly in the West, then we have to have clean baseload power. This puts pressure on nuclear power that was not there before. We have to make sure that research done at DOE can help us into the next generation of nuclear and also grid-scale storage to take advantage of intermittent sourcing.

Secretary PERRY. Yes, sir. I’ll just quickly—I happen to think—and Senator Murkowski and I have had this discussion from our first meeting—small modular reactors and the work that has been done and the work that will be done, I happen to think, is one of the areas that we need to spend some substantial time and resources on in our national labs. INL, in particular, is working on that. We’ve got the private sector, we help fund NuScale—that’s out now, moving toward commercialization. So I think we’re making some good progress—not fast enough to suit me and not broad enough to suit me.

Senator FLAKE. Thank you.

The CHAIRMAN. Thank you.

Senator Heinrich.

Senator HEINRICH. Thank you, Madam Chair.

It is great to see you, Mr. Secretary. I want to start by thanking you for your trip to New Mexico. I think it meant a lot to the folks at the Waste Isolation Pilot Plant (WIPP). It certainly meant a lot to the folks at Los Alamos. I know Sandia is looking forward to getting to connect with you at some point as well. I think one thing you have heard from multiple perspectives this morning is the importance of safety. And in my conversations with you, I want to thank you for your commitment to that because whether it is Los Alamos, WIPP, Hanford, all these places, worker safety has to be number one.

As you know, Los Alamos, which I believe you visited in May, has long been the nation's Center of Excellence on plutonium research. Is it correct that this budget, FY18, the request maintains Los Alamos's central role in the nation's plutonium mission and that it is your intent to stay on schedule and meet the statutory requirements for production?

Secretary PERRY. Yes.

Senator HEINRICH. That is good to hear. Is it also your intention that Los Alamos continue into the future to fill that important mission for the nation as was approved by the Nuclear Weapons Council?

Secretary PERRY. Yes, sir.

Senator HEINRICH. I will just ask you one more thing on this front. Can you assure me that you will make the final decision on additional plutonium facilities based solely on strictly objective criteria, things like cost, schedule, compliance, with your mission requirements?

Secretary PERRY. Yes.

Senator HEINRICH. Great. I want to ask you something that is not strictly a budget-related item, but it is certainly timely and is incredibly important from an economic perspective. As you well know, wind generation in West Texas has really taken off over the last few years. Now it accounts for about 23 percent of power generation for the Electric Reliability Council of Texas, ERCOT, as you probably know it. Further, ERCOT believes that close to 100 percent of the new electricity generation that is going to be added to Texas over the next 10 years is likely to be wind or solar. Do you agree with ERCOT's technical assessment that they can accommodate such high penetration levels of renewable energy?

Secretary PERRY. I'm going to be cautious about answering that with definiteness. We're in the process of doing a grid study now—

Senator HEINRICH. That is why I bring it up.

Secretary PERRY. —that I think will give a better, certainly more in-depth, answer than I could just off the top of my head today. So if I could punt this to the first week in July, we should be getting that finalized. You obviously, and the members, will have access to that as we talk about it. But you know my history with wind. You know my history with having a very broad portfolio, and I bring that to the Department of Energy. Nothing has changed from that perspective.

Senator HEINRICH. I raised it largely because ERCOT is already managing dramatically higher levels of renewables than most states in the nation. So I think looking at what they have been able to do is instructive for whether or not we actually have a problem anywhere else.

Secretary PERRY. Yes, sir. And what I would remind folks is that Texas has a rather substantial baseload energy production as well. And that's probably where we're going to be getting down into the weeds on this, Senator, is that, what is the percentage of baseload, whether it comes from fossil fuels either from coal or natural gas or from nuclear that maintain that baseload? And obviously, having solar and wind as part of your overall mix we think is a good—I think, let me put it that way, is a very good thing.

Senator HEINRICH. Yes. I do not actually remember baseload being a term when I was studying engineering because we have always had a situation where for maintenance purposes, you take entire facilities offline. So just like solar does not work at night, also coal-fired and natural gas-fired facilities get taken offline in their entirety in many cases.

I think we ought to be looking at reliability and being able to manage the grid effectively for that reliability as opposed to saying, well, this is good and that is bad, or vice versa.

Secretary PERRY. Absolutely. I think you're correct in that, particularly in the sense of making sure that you have enough energy sources that are going to be reliable and stable and economical. That's what the public wants. I mean, you and the engineers and myself, we'll all have a great discussion about some intricacies here, but the American people want to know that when they flip that switch on—when it's 117 degrees in Las Vegas as it was two days ago—that that air conditioning is working.

Senator HEINRICH. There might be something to this global warming thing after all. Thank you, Secretary.

The CHAIRMAN. Thank you, Senator Heinrich.

Senator Barrasso.

Senator BARRASSO. Thank you, Madam Chair.

Great to see you again, Mr. Secretary.

Secretary PERRY. How are you?

Senator BARRASSO. Thanks for being here today.

I want to talk a little bit about some things in the budget request. The budget request includes some steep cuts to the Fossil Energy Research and Development Program. That is a program that includes carbon capture and storage research, which the Department proposes to cut by more than 80 percent. I am concerned that these proposed cuts conflict with what the President has said in terms of his goals to bring back coal jobs and increase coal production.

In 2005, coal accounted for about half of the U.S. power generation. This past year, it declined about 30 percent. So I think we have to reverse this decline in order to maintain a reliable and resilient electric grid. I think it is critical that we need to have all of the energy sources.

Now, there are emerging technologies, like carbon capture and storage, that have the potential to reverse coal's decline while also reducing emissions. I think successfully achieving the commer-

cialization of these technologies is both going to protect the environment and ensure that coal plants remain in service and competitive in energy markets.

So could I just ask you to talk a little bit about the assurances that you can give us and give me that the Department's budget request is sufficient to support the development and the commercialization of the clean coal technologies?

Secretary PERRY. Senator, as I said earlier, maybe before you stepped in, I'm going to do my best to vigorously defend this budget. Again, it was written before I got here. But with that said, I understand this budgeting process, and prioritizing parts of it that may on the face of this budget look like there's been massive cuts over here, I hope we'll have the back-and-forth in the management of this budget where we prioritize some things and we fund them and we get good results. CCUS is one of those.

On our trip to China at the Clean Energy Ministerial, we were able to get them in an international way to agree to put that carbon capture utilization and sequestration issue at the forefront of the Clean Ministerial to do some investigative work to have that conversation internationally. I think that's good not only for the environment, I think it's good for American technology.

As you know, one of my first acts as Secretary of Energy was to go to the Petra Nova plant right outside of Houston, the world's largest sequestration utilizing coal capture—

Senator BARRASSO. Sure.

Secretary PERRY. —and it is a fascinating—we had this conversation with Zhang Gaoli who is the Vice Premier in China. They are interested in this technology.

I mean, I think we're doing what not only the American people but this Congress wants us to do as a country, and that is to promote these technologies that are coming out of, in this case, DOE in a lot of the cases, and the private sector, working together.

So I'm committed to promoting that technology, committed to this "all of the above" approach, which the carbon capture side of coal utilization is very important. We're going to use it, we're going to use it wisely, and we're going to use it in a way that affects our environment in a positive way and in a way that affects our economy in a positive way.

Senator BARRASSO. One other thing. The Department's budget proposal includes a significant cut to the Office of Electric Delivery and Energy Reliability, and that is the program that is responsible for research and development to improve grid reliability and security in terms of attacks.

I know you talked about in your prepared remarks among the most critical missions of the Department is to develop the science and the technology that will assure Americans of a resilient electric grid and energy infrastructure. We all agree. According to the North American Electric Reliability Corporation's report last year on the terms of cyber and physical security threats to the grid, they said they continue to increase, becoming even more serious. We are hearing it all across the country, and not just to the electric grid, but all components.

So I am just concerned that less research and development for this innovative work could place our nation's grid at risk to these

threats. So if you could spend a little bit of time talking about how we can make sure that the security is there for the grid for the future.

Secretary PERRY. Yes, sir. I am deeply aware of the President's Executive Order, the Department of Homeland Security, the Department of Energy, taking a lead on cybersecurity. Even before that was done we had stood up three of our national labs in what is referred to as the CyberCorps to be working on. It is a prioritization.

When I had all the lab directors in, that was one of the things they heard, that we were going to spend the resources, we're going to spend the focus, and we're going to have the result of being able to deliver to the private sector and to the government the challenges and the fixes, if you will. And we're working on that diligently.

And I'm committing to you, Senator, that that is a top-tier priority at the Department of Energy, and I suggest to you again that those labs have the capability. INL has its own grid out there where they can go and break things and infest it, if you will, and duplicate what we're seeing.

So I'm concerned about it, as an American citizen. I am confident that the Department of Energy has the intellect, the capability, and I will suggest to you the funding, to do what both the President and you, as Members of Congress, expect us to deliver.

Senator BARRASSO. Thank you, Mr. Secretary.

Thank you, Madam Chairman.

The CHAIRMAN. Thank you, Senator Barrasso.

Senator Franken.

Senator FRANKEN. Thank you, Madam Chair.

Welcome back to the Committee, Secretary Perry. I do not envy your position. You seem to be a defense counsel for someone charged with murder, and you seem to be saying, "I know he's guilty, but I'm going to give him a robust defense." So you are doing a great job.

Secretary PERRY. That's an interesting observation, sir.

[Laughter.]

Senator FRANKEN. Two days ago, the American Energy Innovation Council, a group of ten current and retired corporate leaders, including Norman Augustine, former CEO of Lockheed Martin, and Bill Gates, released a report about the importance of federal investment in energy research and development. The group recommends vastly increased funding for ARPA-E from \$300 million to \$1 billion a year, and increasing federal investment for advanced energy innovation to \$16 billion per year, 2-1/2 times the total amount for energy research proposed in your budget.

Secretary Perry, the President's budget is frankly anti-innovation. It does the exact opposite of what the American Energy Innovation Council recommends. It absolutely guts private investment and research, including slashing energy research programs by \$3.1 billion, and cutting renewable energy and energy efficiency research by nearly 70 percent. And, again, on ARPA-E, the President's budget completely eliminates them.

You said at a hearing yesterday that the budget was written before you were confirmed, and you said that today. But do you support this Administration's budget cuts?

Secretary PERRY. Senator, I'm going to do everything I can to deliver to the American people within the bounds of the budget that you write. And again, I understand and support, respect, this process.

Senator FRANKEN. Okay. Of course.

Secretary PERRY. Is ARPA-E, the result of ARPA-E, a good thing? Yes. Is ARPA-E the holy grail of how government needs to be structured? I will suggest to you maybe not.

Senator FRANKEN. Let's talk about some of these things. During your confirmation hearing you talked about how the Federal Government helped in developing technologies central to hydraulic fracturing.

Secretary PERRY. Yes.

Senator FRANKEN. And if we talk about baseload, if we are talking about baseload, natural gas, that is really important, right?

Secretary PERRY. I will suggest to you they are, as is nuclear, as is clean coal.

Senator FRANKEN. So that would be a yes. Now, the most successful one-fifth of ARPA-E projects have raised \$1.8 billion in private funding and launched at least 56 new companies. You know, that is—\$1.8 billion is much more than ARPA-E has expended during the first seven years of its funding. This whole idea that there is not a role—and I am not going to make you defend it because—I just want to say it is the whole idea that the valley—that the government's job is not to take things through the valley of death is wrong, and it is just that is the government's job in certain technologies, and we need to do that.

We tried in the '80s, the government cut energy funding by 52 percent. Do you know what happened to private research investment then?

Secretary PERRY. No, sir.

Senator FRANKEN. Okay. Well, they fell by 40 percent. Private industry does not fill in in these kind of emerging technologies when the government does not do it. What the government does is incentivizes private industry to jump in. So industry—well, actually industry cut energy research by 79 percent when the overall R&D expenditures were cut.

So let me turn to climate change because that is what we are—oh, I am out of time. I did wait a while here because of the health care thing that you guys were doing.

[Laughter.]

Senator FRANKEN. So do you think—

The CHAIRMAN. Senator Manchin is [off microphone] here.

Senator FRANKEN. I know he is. Okay.

The CHAIRMAN. [Off microphone.]

Senator MANCHIN. Can I start?

Senator FRANKEN. Yes, I guess you can.

[Laughter.]

Go ahead.

The CHAIRMAN. I think we will go to Senator Manchin.

Senator FRANKEN. Yes.

The CHAIRMAN. But we will have a second round, Senator Franken.

Senator FRANKEN. Okay.

Senator MANCHIN. Thank you so very, very much, Madam Chairman.

First of all, Secretary Perry, it is good to see you back again. You were here last on January 19th for your hearing. At that time, I want the Committee to know that we talked, we had a very good conversation, and you committed when I asked, "Would you come to West Virginia?" You are coming to West Virginia July 7th to see the National Energy Technology Laboratory (NETL) and to see all the advances we have made in clean coal technology, and I appreciate that.

Secretary PERRY. Yes, sir.

Senator MANCHIN. You are a person of your word, and I thank you.

Secretary PERRY. Yes, sir.

Senator MANCHIN. I also remember, Mr. Secretary, when we were Governors together in 2005, I never forgot this. We were sitting in the Southern Governors Association meeting, if you recall.

Secretary PERRY. Yes, sir.

Senator MANCHIN. Hurricane Katrina was getting ready to hit. I asked you at that time, I said, "Rick, is this hurricane going to have any effect on you?" and you said, "Joe, I've been told by my weather people that it's going to miss us." It might have missed you, but you got hit directly—

Secretary PERRY. The results didn't miss us.

Senator MANCHIN. The results did not miss you. I will never forget that. You had over a quarter of a million people come to your state looking for refuge, and you took them all in.

Secretary PERRY. Yes. Senator Murkowski, if I could just add one thing here, and I know it's a little bit off subject, but I think it's important, about working together. This was a Democratic Governor of West Virginia and a Republican Governor of Texas. I got a call from the Governor of Louisiana then, and she said, "Can you handle 25,000 people?" and I said, "Send them." About 125,000 later, I'm on the phone to him saying, "Hey, Joe, can you send some aircraft to help us move some people?" because we had another hurricane that came in and moved all those people.

Senator MANCHIN. Rita came right behind.

Secretary PERRY. Yes, sir.

Anyway, had it not been for Joe Manchin and the people of West Virginia, and the National Guard of West Virginia, we'd have had some people in some real sling. I will never forget that, sir. Thank you.

Senator MANCHIN. Well, I think that is the way we are supposed to work here, too.

Secretary PERRY. Yes, sir.

Senator MANCHIN. I know how we did it as Governors, but it is the way it should work in Congress, the Senate, and Congress, and we are trying. The Chairman and I work very much along those lines. But anyway, we sent six C-130's and we sent 1,200 troops.

Secretary PERRY. Yep.

Senator MANCHIN. And we worked well together. With that being said, I want to thank you again that you are coming and we are looking forward to your visit. Senator Capito is looking forward to your visit, and we will entertain you in a bipartisan way. With that, we say thank you.

Let me go to the thing I am concerned about. I understand that the study of our grid's reliability and resilience that you have undertaken—and I want to thank you for undertaking this—has drawn some criticism. I do not know why you would draw criticism from finding out how secure the grid system is and what it takes to energize this grid system. As being both former Governors, I think we are on the same page regarding what is best to be left alone and we should be collaborating with the Federal Government because we have got to make sure this thing does not collapse on us. And the study fits into that collaboration column.

In West Virginia, our existing installed capacity is over 90 percent coal, and we have eliminated all of the old plants. We have basically supercritical plants with scrubbers, low-NO_x boilers, baghouses, and we are looking for that new technology. I believe the Department of Energy is taking a good look at this issue of how coal should play a part in our national defense, and I thank you for that. It is not about one fuel type over another, it is, "how do we energize and secure the grid?"

So can you please comment on why you believe the study is so important and, basically, focus on ensuring the reliability that the country depends on? I think you said, "When it is 115 degrees and they flip the switch, they want something to work."

Secretary PERRY. Yes, sir. Senator, it is very much, I think, one of the—I'm so glad that we got tasked with—

Senator MANCHIN. Yes.

Secretary PERRY. —this grid reliability because I think it is important for us to have this conversation. I think all of us would love to see blue skies and clean air everywhere in the world.

Senator MANCHIN. So everyone knows what we are talking about, Mr. Secretary, we are talking about baseload. Baseload runs 24/7 uninterrupted.

Secretary PERRY. Yes, sir.

Senator MANCHIN. When you have 60 days of coal laying there, you are not going to interrupt that, they are going to feed it, and that is going to give you power.

Secretary PERRY. Yes, sir.

Senator MANCHIN. Nuclear gives you that. Gas is coming on strong. We are depending on it.

Secretary PERRY. Senator, I'll just mention this in passing. Yesterday there were places where they had either brownouts or blackouts in some of the western states. I saw this on the news. I'm not reporting it as guaranteed fact, I'm just telling you we know that when there is that kind of stress on our grid system, that we need to be prepared for that. And so, it's so important that we economically, and from a national security standpoint, have these multiple sources of energy that will be there when we need it, when it's called on. You know, having 60 days of coal on the ground I happen to think is important. Having nuclear plants that are functioning and being able to move the waste offsite of those so that that in-

dustry knows that there's going to be a future for them is important.

I think the natural gas that we are blessed to be able to retrieve now is an incredibly important part of that. Our wind energy and our solar energy and our hydro—all of those collectively are part of a portfolio that we've got to protect—and making sure that our grid, when it's stressed to its highest levels, will still be able to keep that air conditioning running in a place that temperatures are reaching 120 degrees outdoors. I don't want to take that call that a family has been put in distress or even died because we didn't do our work to make sure that there is a baseload of energy to take care of the needs that this country has 24/7, 365 days out of the year.

Senator MANCHIN. Well, I think it is one of the most important studies you all have taken on and I thank you for it, because I think it is going to be imperative for the American people and the security of our nation that we find out, how do we keep these grids alive and keep the energy flowing?

Secretary PERRY. Yes, sir.

Senator MANCHIN. So I want to thank you very much, Mr. Secretary.

Secretary PERRY. Yes, sir.

The CHAIRMAN. Thank you, Senator Manchin.

Senator Daines.

Senator DAINES. Thank you, Madam Chair.

Mr. Secretary, it is good to see you.

Secretary PERRY. Yes, sir. Thank you, sir.

Senator DAINES. As you know, Montana is an incredible state known for fly fishing, elk hunting, for the great outdoors, Glacier National Park, Yellowstone National Park. We are also an energy state. We have more recoverable coal than any state in the United States. And I think, as Montanans, we strike a pretty good balance, one that believes in the importance in developing our natural resources because without doing that, we do not have jobs; low-cost, affordable, reliable energy sources; tax revenues for our schools and our teachers. At the same time, we work to protect our environment.

As Montanans, may we always be a state where that Mom or Dad can go down to Walmart and buy their elk tag, that we do not become a state where only the rich and famous can afford to live there.

Secretary PERRY. Yeah.

Senator DAINES. One of the ways to do that is ensure that we keep developing our natural resources responsibly. Coal, oil, gas, they are an important component of our economy, yet we also have a large amount of hydroelectric power and some wind. We have these large deposits of coal. We have critical minerals, which we develop responsibly and safely. And I really do believe we could bring this Montana balance on a national scale. I think clean coal technology will play an important role in that going forward.

Global energy demand is slated to grow, and so is the need for coal. I really do believe, as we think about the longer-term here, we need to lead in this important technology development.

I want to talk for a moment about energy exports, Mr. Secretary. I was struck by some data I saw, in fact, at an energy summit that I put on in Billings, Montana, last year. We took a look at the big picture, the long-term, and there are projections around what is going to happen between now and 2050 globally. And every projection is simply that, it is a projection, but it was from the U.S. Chamber, a reliable and good source of information. They tell us that the global population will increase by about 1.6 billion people between now and 2050. They also told us that energy demand is going to increase about 85 percent between now and 2050.

With the growth in global energy demand, with the U.S. now playing a larger role in supplying Europe and East Asia with coal and liquid natural gas, how do you see the Department's budget supporting energy exports? Because I think, and I have heard you say it, you said it is not about energy independence, it is about global energy dominance, and I completely agree. I think it is so strategic from an economic viewpoint going forward but also from a national security viewpoint and the world's security.

Secretary PERRY. Yes, sir. Thank you, Senator Daines.

Spending some time up in Montana this last year, I was struck by two things. One, just the natural beauty of the state—it's extraordinary. I understand why some folks from my part of the world want to spend their summers up there.

Senator DAINES. And spend their money, too.

Secretary PERRY. But the other thing, the fact that really hit me, and I didn't understand initially, was that Montana is 49th in the nation in wages. And one of the reasons is because of the attack that we have seen historically on that form of energy, on coal and also the timber industry. The regulations—and generally speaking, these are government regulations, and Federal Government regulations—have really impacted your state in a very negative way. President Trump has clearly given us instructions, whether it's myself or all of us—

Senator DAINES. Yes.

Secretary PERRY. —you know, Congress—or I should say Secretary Zinke, for instance, who knows your state very well, that putting regulations into place that absolutely take care of our beautiful resources that we have but also keep in mind the men and women, whether they're tribal members or whether they're citizens of a coal strip, that we understand the rules and regulations that we're going to be making. Being able to sell that coal.

I had the President of Ukraine in the office on Monday. Poroshenko and I were talking about U.S. coal being able to be delivered to Ukraine so that they don't have to rely upon the pressures from Russia at this particular point in time. President—or, excuse me—Prime Minister Modi is in town soon to talk to the President, and I can assure you that country is going to be the most populous country in the world in the very near future. Their electricity demand is going to be monumental. We can be a part of that: American LNG, American coal, American technology. And it's that CCUS that I was talking to the Vice Premier of China about, and our being able to deliver that.

America, I don't think, has had a greater opportunity in our history than to be able to play a powerful role in securing our national

defense, making sure economically that we are a massive player in the global marketplace, and having an impact on the environment. Because the way Texas drove down its emissions back in the 2000's partly was transferring away from those older inefficient power plants to natural gas, and American LNG can help do that.

So we have an extraordinary opportunity, Senator, and I hope that the DOE, and I feel very confident that we will be working with you to find those strategies which we can put in place to promote American energy, American technology, and strengthen our security and our economy.

Senator DAINES. Secretary Perry, thank you. I am out of time, but I want to thank you for your support in that area and your vision. I will tell you when Vice President Pence came out to Montana several weeks ago, he met Secretary Zinke in Billings. I flew out with the Vice President from DC and the very first place that he went as Vice President, his first visit to Montana as Vice President, we jumped in the Suburban and we drove out to the Crow Indian Reservation——

Secretary PERRY. Yes, sir.

Senator DAINES. ——to the Westmoreland coal mine——

Secretary PERRY. Yes, sir.

Senator DAINES. ——and we rode horseback with the Secretary and the Vice President, the three of us rode horses up to tour the mine. Those jobs for Indian Country are critical. If they lose those jobs there, their unemployment rate goes to 80 percent. So——

Secretary PERRY. Yes, sir. It's unacceptable.

Senator DAINES. It is. Thank you.

Secretary PERRY. Yes, sir.

The CHAIRMAN. Thank you.

Senator Cortez Masto.

Senator CORTEZ MASTO. Thank you, Madam Chair.

Secretary Perry, welcome back to the Committee.

Secretary PERRY. Yes, ma'am.

Senator CORTEZ MASTO. When you were nominated for Secretary of Energy, we had a frank and serious conversation about my grave concerns about siting nuclear waste at Yucca Mountain. Since that time you visited the site, and thank you for the courtesy, you called me ahead of time to let me know you were going there. But since that trip you went from touting the importance of state sovereignty to a full-throated support for depositing the nation's waste in Nevada against the will of my state, undermining a state's right to defend its communities against dangerous nuclear waste. What has prompted such a change in your viewpoint?

Secretary PERRY. Senator, I, with all due respect, disagree with your analysis of my position. Nothing has really changed. I think it is wise for us to have a very open conversation with this country about the moral obligation that we have as a people. There are statutory requirements for us to move this waste. There are multiple options about where that waste could go.

As I clarified yesterday, there is no plan in place to put that in a particular place at this particular point in time, but I think we need to be looking at all of our options and having an open and a productive conversation about how—I don't think it's wise for us to continue to leave high-level waste, you know, spent rods in pools,

not unlike what they had at Fukushima, and particularly that over in California is in the Ring of Fire. I mean, geologically you could have an event that is not unlike what they had in Fukushima, and——

Senator CORTEZ MASTO. Secretary Perry, I appreciate it, and I received your comments, but let's talk about Yucca Mountain. I do not disagree we need a long-term plan, but the concern that I have, and many in our state have, is specifically when it comes to Yucca Mountain, because I will tell you, your predecessor, Secretary Moniz, and the DOE, they were steadfast in the position that the Yucca Mountain program is unworkable. In fact, the Department concurred with the recommendation from the Blue Ribbon Commission on America's Nuclear Future that a phased adaptive, consent-based siting process is the best approach to gain the public trust and confidence needed to site nuclear waste facilities.

Let me just say this. You have previously stated that you want to have a good working relationship with as many Governors as you can. I can tell you, as you well know, that Governor Sandoval is incredibly concerned about not only your talk and discussion on Yucca Mountain but doubling down on talk about interim storage at the Nevada National Security Site.

In fact, let me just say this. The Western Governors' Association, which includes your predecessor in Texas, recently passed a policy resolution which states that a nuclear waste facility should not be located within the boundaries of any western state or U.S. flag island without the written consent of that Governor or territory. That is all that Nevada is asking for, is consent-based siting, which your predecessor, Secretary Moniz, and the Blue Ribbon Panel have agreed that is what should occur. That is what we are asking you to do.

So why is that such a difficult concept? Why is that something that you think should not occur and, in fact, this Yucca Mountain process should go forward, and interim storage, which is a whole new conversation that we had not heard before, at the Nevada National Security Site? I am confused.

Secretary PERRY. Let me help with the last issue that you brought up, Senator, as I can. I was making reference to an article that was by a Nevada state senator, that he pitched that out as an idea. I think about a May 14, 2017, article that I picked up. That was what I was making——

Senator CORTEZ MASTO. Well, I appreciate that, and I will tell you that that is not something that we are going to support in——

Secretary PERRY. Okay. But, Senator, I'm not—I think it was taken out of context.

Senator CORTEZ MASTO. But let me just say this, what we are looking for is at least some sort of commitment that you are looking for at least the science to prove that it is safe. I mean, even your Deputy Secretary, Dan Brouillette, recently commented when he was in here in his nomination hearing that if the science is not there, that we would not support the project.

So if you cannot get behind consent-based siting, which is what all states should be—we should be looking at for all states and individuals there, then at least look at the science and commit that if the science is not there and it is not workable, then we should

not store nuclear waste or spent nuclear waste at Yucca Mountain. Can you commit to that?

Secretary PERRY. Sure.

Senator CORTEZ MASTO. Thank you.

Secretary PERRY. I can. And I think it's important for us to do two things: pay attention to the science and also to the rule of law.

Senator CORTEZ MASTO. Thank you. I appreciate that.

The CHAIRMAN. Thank you, Senator Cortez Masto.

Secretary Perry, just so you do know, I have been asked to submit as part of the Committee record here today a letter that Senator Cantwell and I received, as the Chairman and the Ranking Member, from a colleague of Senator Cortez Masto, Senator Heller, also from Nevada, with a request specific to the Department about repository costs in previous studies and a request for new cost studies on geologic disposal in repositories. So this will be included as part of the record. I believe that you may have already received it or are in the process of receiving it, but he has asked for that request—

Secretary PERRY. Yes. I will certainly take it under consideration, Senator.

The CHAIRMAN. —and I have complied with that.

[The information referred to follows:]

DEAN HELLER
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United States Senate

WASHINGTON, DC 20510

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June 21, 2017

The Honorable Lisa Murkowski
Chairman
Senate Committee on Energy and
Natural Resources
304 Dirksen Senate Office Building
Washington, DC 20510

The Honorable Maria Cantwell
Ranking Member
Senate Committee on Energy and
Natural Resources
304 Dirksen Senate Office Building
Washington, DC 20510

Dear Chairman Murkowski and Ranking Member Cantwell:

I write today to express my vehement opposition to the Administration's request for \$120 million in the Department of Energy's (DOE's) fiscal year 2018 budget to be in part utilized to restart licensing activities at the Yucca Mountain nuclear waste repository. I strongly believe that our nation cannot fully move forward with viable sustainable solutions for spent nuclear fuel and defense high-level waste without moving past Yucca Mountain. The Administration's request simply perpetuates a decades-long fight that has been strongly opposed by Nevadans from the state, done little to solve our nation's waste problem, and wasted billions of U.S. taxpayer dollars.

Chairman Murkowski and Ranking Member Cantwell, I commend your leadership in working to address our nation's long-term nuclear waste problem through introducing bipartisan, comprehensive legislation. I believe you have taken an important step forward in finding a solution, and I stand ready to partner with you on furthering your efforts with respect to consent-based siting. Together, I believe that we can find a path forward on what I would argue is one of our nation's most critically important issues not only to diversifying our energy portfolio but to that of Nevada and respecting the rights of all states to have the ability to object to storing high-level nuclear waste.

As I have stated to Chairman Alexander and Ranking Member Feinstein with the Energy and Water Senate Appropriations Subcommittee, the Administration purports that this budget request will "address nuclear waste, enhance national security, and reduce future taxpayer burden," yet in practice, it will do the exact opposite. Governor Sandoval has made clear the state of Nevada will contest over 200 elements of any license application, which will take years to resolve and cost the federal government billions of dollars. This is in addition to the DOE's estimates that an additional \$82 billion would be needed to license, litigate, build, operate, decommission, and eventually close Yucca Mountain. With respect to what has already been spent on the repository, this adds up to more than \$96 billion for the total system life cycle cost of the project.

It is clear that U.S. taxpayer dollars would be better spent identifying viable alternatives for the long-term storage of nuclear waste in areas that are willing to house it. In fact, in 2012, DOE

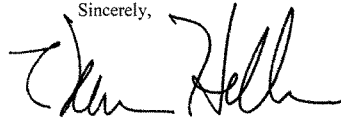
cost estimates show that all other costs being equal, walking away from Yucca Mountain and starting with a new repository site in a deep salt bed or a deep shale formation could save between \$12 billion and \$27 billion over the life of the repository. Before Congress spends any more U.S. taxpayer money on Yucca Mountain, I strongly urge you to ask Secretary Perry as he testifies before your subcommittee to explain what the Department has learned about repository costs in its previous studies. Furthermore, I believe we need new cost studies on geologic disposal in repositories, studies that include the lessons learned from recent progress with repositories in Europe.

Moreover, I am deeply troubled by recent comments made by Secretary Perry stating that the Nevada National Security Test Site could be an option for temporary storage of high-level nuclear waste. Not only do I believe that this comment is irresponsible, I also remain concerned about the legality of such actions by the Department. As I have repeatedly expressed to the Secretary, Nevada will not be forced against its will to shoulder the burden of housing our nation's nuclear waste.

The only viable solution to our nation's long-term nuclear waste problem is one that is rooted in consent. I stand behind the DOE's 2005 initiatives regarding consent-based siting as a result of the Blue Ribbon Commission on America's Nuclear Future. This open process ensures all Americans have a meaningful voice if their community is being considered for a future nuclear waste repository. I strongly believe that Secretary Perry should focus his efforts on this worthwhile initiative instead of making Nevada our nation's nuclear waste dump.

I stand with the state of Nevada in staunch opposition to any attempt to restart the repository licensing process, and I strongly urge you not to fund the Administration's request. Secretary Perry has referred to a "moral and national security obligation," and I believe that fighting for Nevada against Yucca Mountain is mine. Moreover, I encourage you to devote resources towards DOE's consent-based siting initiative for the storage and disposal of spent nuclear fuel and high-level radioactive waste. Thank you for your attention to this important request.

Sincerely,

A handwritten signature in black ink, appearing to read "Dean Heller", with a stylized flourish at the end.

Senator Dean Heller

The CHAIRMAN. Senator King.

Senator KING. Thank you, Madam Chair.

Mr. Secretary, I do not envy you today because you have been sent up here to defend the indefensible. This budget is perhaps the worst budget for any agency that I have seen in 12 years in public life in terms of corresponding to national priorities. It is amazing. You made a statement in your opening statement when you first appeared before this Committee in your confirmation hearing. You said, "When it comes to climate change, I'm committed to making decisions based on sound science and also take into account the economic impact."

This is not a sound science budget, Mr. Secretary, this is a non-science budget. You are cutting the very areas where the science, which we need to make good policy decisions, is going to be examined. Earlier today you said the U.S.—this is a direct quote—"The U.S. is the leader in clean energy technology, and we are committed to this mission."

The budget does not say that: ARPA-E, 93 percent essentially eliminated; you are even cutting the Energy Information Agency 3.5 percent which just provides information about our country's energy situation; Energy Efficiency, 69.6 percent cut; Office of Science, 17 percent—those are the national labs.

By the way, there are 56,000 people that work for the national labs. The budget, I am quite confident, is largely personnel. So a 17 percent cut in a 56,000-person agency is about 9,500 people. Now probably there are other areas that can be cut, but to come here and try to tell us that you are about sound science when you are cutting the very departments, the very portions, of your essential agency that are going to give us the science it does not pass the straight face test, Mr. Secretary.

I like you, you and I were Governors together, but I think you have been sent on a suicide mission here. I want you to go back and tell the people that are pushing you to do this, "I can't do it. It's not responsible." If you can find a question in there, you are welcome to it.

[Laughter.]

Secretary PERRY. I was looking for it, sir.

Senator KING. Well, I want to know, how do you justify these giant cuts? And don't tell me about reorganization. You cannot cut something by 69 percent and say you are going to find efficiencies.

Secretary PERRY. Governor, here is what I would tell you, is that if we're going to continue to do everything like we've always done it, then we're going to probably continue to get the same result. I hope what I can tell you is that I understand this budgeting process, I respect it, and I bring a rather substantial management history of running big things and doing them in a fairly substantial way. Sometimes we had the money that most agency heads thought that we needed, sometimes we didn't. But I hope that we will—we can agree that this is a good starting point—

Senator KING. No, it is not a good starting point. It is a terrible starting point.

Secretary PERRY. Well, it's—let me just say it's a starting point.

Senator KING. If you want to make it, let's say, 4 or 5 percent, but 69.6 percent is not a good starting point. I could meet you in the middle, and it is still not adequate.

Secretary PERRY. Well, then we'll work together to try to get it to be adequate, Senator, is about the only answer I know to give you.

Senator KING. Well, let me go to the other one that is—it is awful—Electricity Delivery and Energy Reliability, 47.8 percent cut. Are you aware that our grid is incredibly vulnerable right now to cyberattacks?

Secretary PERRY. I probably am more so than most people.

Senator KING. Well, how in the world can you allow people to say you are going to cut the Department that works on energy reliability and delivery, that is the grid, by almost 50 percent?

Secretary PERRY. Senator, again, I go back to if we get some flexibility in our budgeting, I feel pretty confident we'll be able to protect the grid, because that's not the only place that we're doing any grid work, by a substantial margin. There are substantial places in our national labs, whether it's INL and other places, where we're doing work to protect the grid and to analyze the grid.

Senator KING. Well, that is a national security concern, and I want to follow up with you on that, and if there are other places and if you can move money around, but cutting money for the reliability of the grid right now is a national security threat. I serve on other committees around here that deal with this issue. It is a serious national security threat.

I guess as you have pointed out and you have said several times, there is a process and you understand Congress—the President proposes, Congress disposes. Here is the question though, if and when, and I believe it is only a question of when, Congress restores a lot of these funds, will you administer them as intended by Congress? And will you staff adequately to meet those needs? Will you administer and implement the budget that Congress passes?

Secretary PERRY. To the best of my ability, I'm going to follow the rule of law, sir.

Senator KING. Thank you.

Thank you, Madam Chair.

The CHAIRMAN. Thank you, Senator King.

We will have an opportunity for another round of questions. I know that Senator Hoeven is hoping to make it back.

I wanted to ask you, Secretary Perry, about the Office of Indian Energy. This provides assistance with energy development, capacity building, cost reductions for tribes and Alaska Natives. This is a tough area to cut in my view. We have a situation in Alaska—we have half the tribes in the country and a lot of opportunities in the energy space when it comes to our native people.

We have doubled the staffing in the Office of Indian Energy in Alaska. We now have two DOE folks, two permanent employees, in the state. We had been working with Secretary Moniz because we had one fellow, one person, who had basically been running things for a period of years. He promised that we might be able to see as many as three—we are up to two.

But the reality is that we have had lack of adequate and consistent DOE staffing within our state. I am not going to suggest to

you that you need to be on a hiring spree here, but I do want to make sure, again, that our needs are met. The Office of Indian Energy, in my view, is one of those areas where you have high need, an important priority. We need to make sure that not only resources are there, but those to help effectuate the initiatives are in place.

So the question to you at this time is whether you think that there are some opportunities within the Office of Indian Energy to do more with not sharing of the funds but distributing these funds through different grant programs. What are we going to do to make sure the role of the Office of Indian Energy is not diminished? I would ask you to speak to the issue of the staffing that we have tried to make a priority in the state and where you see that might go. I am actually glad Senator Franken has rejoined the Committee now, because this is something that he and I have talked about often, that within the Office of Indian Energy there is good opportunity there. And Senator Hoeven, coming out of North Dakota, I think appreciates that well. So you have three of us that are interested in this budget category.

Secretary PERRY. Senator, if I might, and I'll try to be as brief as I can on this. As a matter of fact, this is just a new—it was released today.

The CHAIRMAN. I like that you are using new technology instead of paper.

Secretary PERRY. Yes, ma'am. The Office of Indian Energy Policy and Programs announced today that it selected 13 tribal energy projects to receive funding at \$7.8 million. I'm not going to delve into it anymore, but we're making some progress on that. We will work very closely with you, and Senators Hoeven and Franken both, as you all have tribal interests in your states and in this program. So—

The CHAIRMAN. Well, I appreciate that and it is always nice to hear news of grants, but again, I would like to know that we have—

Secretary PERRY. Staffing.

The CHAIRMAN. —some great sustainability here, and that sustainability comes with staffing. As you know, we have a really big state.

Secretary PERRY. Yes, ma'am.

The CHAIRMAN. We do not need to go into the Alaska-Texas comparison, but I will remind you that we are 2-1/2 times the size of Texas, and we have one guy—now we have two guys.

Secretary PERRY. I was given that t-shirt that showed Texas inside of Alaska with the adage, "Size matters."

[Laughter.]

The CHAIRMAN. I am glad that we have connected here. So this is good, this is good.

[Laughter.]

I am going to defer to Senator Franken and then Senator Hoeven here so that they have a chance to ask a second round of questions.

Senator FRANKEN. Senator Hoeven is Chairman of Indian Affairs, and he has signed on, along with others, on the loan guarantee program for Indian Energy. I am glad to hear there is

\$7.8 million and there is more money in the loan guarantee program also for Indian projects. I think that is a good thing.

I want to ask you about climate change. Secretary Perry, at your confirmation hearing you acknowledged that the climate is changing, but on Monday you were asked on CNBC, “Do you believe CO2 is the primary control knob for the temperature of the Earth and for climate?” and you answered, “No.” So if the climate is changing and if you disagree that CO2 is the primary driver, what do you think is driving the change?

Secretary PERRY. Yes, sir. And I’ll finish the rest of that interview for the public that may have not gotten as much coverage as me saying that I did not think that CO2 was the primary knob that changes it. I don’t. I think there are some other naturally occurring events, the warming and the cooling of our ocean waters and some other activities that occur. I also said in the next breath that man’s impact does in fact have an impact on the climate. The question is, what is going to be the economic impact for this country?

I referenced yesterday—in a hearing in front of the Senate Appropriations—that even an individual as celebrated from the standpoint of his capability as the Under Secretary of Energy under the previous Administration, Stephen Kunz, he said that the science isn’t settled yet.

I’ll ask the Committee and I’ll ask you, don’t you think it’s okay to have this conversation about the science of climate change? And why don’t we have a red team approach and sit down—you know, get the politicians out of the room and let the scientists—and listen to what they have to say about it? I’m pretty comfortable that, what’s wrong with being a skeptic about something that we’re talking about that’s going to have a massive impact on the American economy?

Senator FRANKEN. Well, you said this thing about—you told Senator Kunz that we need a red team-blue team exercise to establish climate change. It is my understanding that in a red team-blue team exercise, the blue team makes an argument, then the red team tries to knock it down, and the blue team then refines their argument, and they go back and forth until consensus is reached.

But that is exactly how science works, and including climate science. Researchers collect data and make arguments, peer reviewers poke holes in the argument, the researchers respond, and it goes back and forth until consensus is reached. Every peer-reviewed climate study goes through that red team-blue team treatment, and then thousands of studies are gathered into reports, and those reports themselves go through rigorous red team-blue team, and that is the scientific process.

You are not the first to do red team-blue team. The Koch brothers hired a red team of skeptics in 2012 in an effort to cast out on main stream science. It was called the BEST Project, and much to the chagrin of their funders, the skeptical scientists found that mainstream climate science is correct. To quote the scientific director of BEST, Dr. Richard Muller, “Call me a converted skeptic.” This was in 2013 or ’14. “Last year, following an intensive research effort involving a dozen scientists, I concluded that global warming was real and that the prior estimates of the rate of warming were

correct. I am now going a step further, humans are entirely the cause.”

Now, if you say that this is caused by the warming of the oceans, the reason the oceans are warming is because they absorb, water absorbs, the heat. That is why the sea level is rising, because when the water heats, it expands and also because of the melting of the ice caps. There is no peer-reviewed study that does not say this is happening.

The biggest proponent of this is our military and they, in their quadrennial review, say this is the biggest threat to our world. The time for red team—I’m sorry—that is what we do every day, that is what scientists do every day and 100 percent of peer-reviewed scientists have a consensus, and that is that this is happening.

Secretary PERRY. Senator, you said something that caught my attention in your remarks, that the person who had become a skeptic, converted skeptic?

Senator FRANKEN. Mm-hmm.

Secretary PERRY. And you said that he made the statement that global warming was 100 percent due to human activity.

Senator FRANKEN. Mm-hmm.

Secretary PERRY. I don’t believe that—100 percent? Every bit of that is global warming? I don’t buy it.

Senator FRANKEN. Well——

The CHAIRMAN. Thank you, Senator Franken.

Senator FRANKEN. I would just like to respond to that.

The CHAIRMAN. Well——

Senator FRANKEN. That was someone hired by the Koch brothers. [Laughter.]

Secretary PERRY. Listen, everybody has hired somebody that’s got something wrong from time to time, but to stand up and say that 100 percent of global warming is because of human activity I think on its face is just indefensible.

The CHAIRMAN. We are probably not going to resolve that here today, so let’s go to Senator Hoeven.

Secretary PERRY. Hence, we should have a red-blue team approach to this again.

The CHAIRMAN. Thank you.

Senator FRANKEN. Okay. Never mind.

[Laughter.]

Senator HOEVEN. Mr. Secretary, it is good to see you again.

Secretary PERRY. Yes, sir.

Senator HOEVEN. One of the things that we talked about at our Energy and Water Appropriations hearing was how we could do carbon capture and sequestration. Actually Senator Franken, what we did talk about, and you were on board with, were the carbon capture and sequestration projects that we have underway and helping do them.

Secretary PERRY. Yes, sir.

Senator HOEVEN. So, I mean, that is using new technology to produce more energy——

Secretary PERRY. Improve it.

Senator HOEVEN. ——and improve environmental stewardship. But there was one question that I did want to follow up with you on that I did not get to ask yesterday, and that is our Energy and

Environmental Research Center at the University of North Dakota, which I referred to yesterday and which we are going to get you out to visit and look forward to doing that and seeing what they are doing. They have contracts and cooperative agreements with the Department of Energy, with your Office of Fossil Energy. The Energy and Environmental Research Center at the University of North Dakota has cooperative agreements with your Office of Fossil Energy at DOE. Under those cooperative agreements, they are actually doing this development of carbon—both the capture and the storage—and it is a big regional project, it covers a huge area out there where they are actually putting CO₂ downhole. In some cases, it is tertiary recovery, in other cases it is just storage.

Secretary PERRY. Yes, sir.

Senator HOEVEN. Interestingly enough, we are not only doing that for the fossil industry, we actually have ethanol plants out there. One of our ethanol plants now, because we put the legal and regulatory structure in place to actually store CO₂ from Class VI wells, so just store it, not for secondary recovery, but we have that legal and regulatory framework which we basically developed from the Interstate Oil and Gas Compact Commission (IOGCC). I think you were Chairman of the IOGCC, and I was Chairman several times. We developed that model legislation which we actually passed in North Dakota, so that legal regulatory framework is in place, and EPA just gave us primacy on the ability to regulate it.

So now not only are we working with the fossil industry to store CO₂ and get secondary recovery, we actually have an ethanol plant now that is capturing the CO₂ out of their process and then they are going to actually store it too. That will not be for tertiary recovery, that will be just sequestration. Okay? So we are doing it on the renewable side too.

These are the kind of cooperative agreements we have with DOE. My request to you is, would you ask your Office of Fossil Energy to expedite the grant funding? Because our guys have grant funding under those cooperative agreements and they are being held up on their projects right now because that grant funding is shared between the State of North Dakota, private enterprise, and your office but we are waiting on your piece of it.

Secretary PERRY. Yes, sir. And, Senator, is it your understanding of this that the delay has been because of a review process that was going on at DOE?

Senator HOEVEN. I do not know the answer to that.

Secretary PERRY. I'll find out.

Senator HOEVEN. But these are agreements that are in place. The agreement is there, it is just that they are waiting on that funding for these ongoing projects. I am not sure why it is—

Secretary PERRY. I'll find out.

Senator HOEVEN. Thank you, sir.

Secretary PERRY. We'll be back in contact.

Senator HOEVEN. I appreciate it. And when I see Senator Franken, I will tell him we are working hard on these carbon capture projects.

Secretary PERRY. Yes, sir.

Senator HOEVEN. Thanks again.

The CHAIRMAN. Thank you, Senator Hoeven.

Secretary Perry, you have been very good. I had not thought we would keep you until a quarter of one o'clock, but again, I apologize for the late start and appreciate your indulgence going over here and your responses to many. As it gets warmer here in Washington, DC, though, you need to know that this Alaska girl longs for the Arctic, and I start thinking about Arctic all the time. What are we doing here in the Congress, what are we doing in the Administration to really take that leadership role that I think the United States should as an Arctic nation? We discussed at the confirmation hearing and prior to that, that this is a focus of mine, and I do not really see much in the budget here that will help us build out that Arctic energy vision.

So I would like to know if there is something special in here that you want to point my attention to. I am happy to look at it but know that it is something that I would like to sit down with you and your team. I know that your team is a little bit skinny right now and we are going to help you with that, but we really want to try to make sure there is an understanding that within the Department of Energy we think that you can play a very, very key role in so many of these initiatives as we work on our Arctic global leadership. So I look forward to working on that with you.

Secretary PERRY. Senator, the one thing that I would just reiterate with you, I think we've mentioned it here, I spoke to you and the Committee, in the room behind the Committee, prior to coming in, is my great belief and faith and hope that small modular reactors, the work that is being done in the private sector, the work that we will be doing to advance that, the next generation, if you will, is I think one of the ways that we can address the Arctic.

The real challenges that you have of not having a widespread grid, this vast area of land where the population is thin in places and being able to deliver a source of energy to them that is practical, that is economical and that is stable would be a goal that I look forward to working with you.

The CHAIRMAN. Well, I so agree. I think there are multiple applications where you might not think nuclear would be a fit for Alaska. Everybody thinks of us as this great fossil-producing state, and we certainly have that in abundance, as we do our renewables, whether it is wind, solar, geothermal, and hydro, clearly. Senator Cantwell noted in her opening statement that we had an opportunity to go to Cordova to conduct a field hearing of the Energy Committee focused on microgrids. We are pioneering microgrids in Alaska that the rest of the world is paying attention to.

So we have a lot to offer. Again, these are areas where you might not think about in the context of the Arctic discussion, but there is clearly a role. If you are looking for incubators of innovation, we can absolutely provide that to you. In fact, I have a renewable energy fair that I would like to invite you to in mid-August in the interior of Alaska. It does not get any more beautiful than that.

If you want to just get a slight preview of some of the innovation that goes on, I have a grow tower in my front reception room in my office here in the Hart Building where we are growing lettuce. I am just here to tell you that people do not think we can grow anything in the cold, in the dark, and we are proving that with a

little bit of ingenuity, you can grow it in your reception room. So I am looking forward to working with you on those issues.

Secretary PERRY. I look forward to coming up and spending some time in the great State of Alaska.

The CHAIRMAN. We look forward to welcoming you.

Thank you for being here and thank you for your time.

Secretary PERRY. Thank you, Senator.

The CHAIRMAN. We stand adjourned.

[Whereupon, at 12:48 p.m., the hearing was adjourned.]

APPENDIX MATERIAL SUBMITTED



Department of Energy

Washington, DC 20585

July 21, 2017

The Honorable Lisa Murkowski
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510

Dear Madam Chairman:

On June 22, 2017, Secretary Rick Perry testified regarding, the Department of Energy's budget request for Fiscal Year 2018. To complete the hearing record, please find enclosed answers to the questions submitted by Ranking Member Maria Cantwell, Senators Ron Wyden, Debbie Stabenow, Al Franken, Joe Manchin III, Martin Heinrich, Mazie Hirono, Bill Cassidy, and you regarding this hearing.

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

Sincerely,

A handwritten signature in black ink, reading "Jennifer A. Loraine".

Jennifer A. Loraine
Deputy Assistant Secretary for Senate Affairs
Congressional and Intergovernmental Affairs

Enclosures

cc: The Honorable Maria Cantwell
Ranking Member



QUESTIONS FROM CHAIRMAN LISA MURKOWSKI

- Q1. For the past several years, the Department has been preparing for a major effort to test the economic feasibility and practical benefits of Enhanced Geothermal Systems to make geothermal power more widely available. The project, which is called Project FORGE, is currently at a critical juncture. What activities will DOE be conducting to further geothermal research and development and the FORGE program?
- A1. The Geothermal Technologies Office is prioritizing early-stage hydrothermal and Enhanced Geothermal Systems (EGS) research and development (R&D) to enable the development of geothermal energy technologies and allow hydrothermal resources and enhanced geothermal systems energy to be a fully competitive, widely available, and geographically diverse component of the national energy mix. In Fiscal Year (FY) 2018, the Geothermal Technologies Office will pursue major activities in the EGS Collab, hydrothermal R&D, and initiate new early-stage R&D in waterless stimulation.

The EGS Collab brings together a team of subsurface experts from across the National Laboratory complex, partnering with academia and industry to develop in situ intermediate scale fracturing experiments where the fundamental relationships between seismicity, stress state, and permeability (cracks in the rock) can be resolved, and thermal hydro mechanical chemical (THMC) models can be validated and verified. The basic science challenge addressed by the EGS Collab is to better understand fracture dynamics in crystalline rock and fluid flow at an intermediate scale. The fundamental concepts associated with advancing our understanding of permeability creation, enhancement, and sustainability will be directly applied at the Frontier Observatory for Research in Geothermal Energy (FORGE) EGS field laboratory.

Although Department of Energy (DOE) is not requesting funding for FORGE in FY 2018, implementation of the program will continue using prior year funding. Execution of FORGE is currently in Phase 2B, in which the teams are securing all required environmental permits, National Environmental Policy Act (NEPA) clearances, and site characterization. A down-select to the final team and approval to move into Phase 2C is expected in FY 2018. Phase 2C will entail further site characterization, full size injection well planning, technical road mapping and development of an initial competitive R&D

Funding Opportunity Announcement, as well as the establishment of the FORGE Science, Technology, and Analysis Team.

- Q2a. Please describe your view of the Department's and National Lab's relationship with the private sector when it comes to cybersecurity.
- A2a. Partnership with the energy sector is central to DOE's cybersecurity strategy, as about 90 percent of the Nation's energy infrastructure is owned and operated by the private sector. For nearly two decades, DOE has worked closely in a voluntary capacity with energy sector stakeholders at all levels—technical, operational, and executive—along with regional operators and state and local governments to identify and mitigate physical and cyber risks to energy systems. The energy industry and DOE have worked toward a common cybersecurity vision and roadmap first developed in 2006, and updated in 2011, with the publication of the *Roadmap to Achieve Energy Delivery Systems Cybersecurity*. The shared vision seeks to design, install, operate, and maintain resilient energy delivery control systems that can survive a cyber incident while sustaining critical functions.

DOE's strong partnership with the energy industry has created a foundation of earned trust that promotes the mutual exchange of information and resources to secure critical energy infrastructures. DOE has leveraged partnerships to share cyber threat, vulnerability, incident, and mitigation information; develop and share field-proven best practices and risk management tools for cybersecurity; and deliver innovative technologies to secure critical control systems. These relationships leverage the distinct technical expertise within industry and government to develop solutions to the highly specialized security challenges of energy delivery systems.

DOE's national laboratories serve as a critical strategic and technology partner, providing vital facilities, resources, and capabilities to support national security needs and conducting work that is not otherwise available from the private sector. DOE and the energy sector work with the national laboratories on R&D of advanced technologies, analysis of cyber security risks and threats, modeling and simulation of cyber impacts, and information sharing on evolving threats.

Fulfilling DOE's authorities and responsibilities depends on this long-standing trust and coordination. The Fixing America's Surface Transportation Act of 2015 designated DOE as the sector-specific agency (SSA) for cybersecurity for the energy sector. As the SSA, DOE serves as the day-to-day Federal interface for energy infrastructure security and resilience, including dynamic prioritization and coordination of sector-specific activities; carrying out incident coordination responsibilities consistent with statutory authority, policies, directives, or regulations; and providing technical assistance to identify vulnerabilities and help prevent or mitigate the effects of incidents.

Q2b. Where should the Department prioritize its funding for these efforts?

A2b. The Department has developed a multiyear plan with a two-fold cybersecurity strategy: address growing threats and promote continuous improvement to strengthen today's energy delivery systems, and develop game-changing solutions that will create inherently secure, resilient, and self-healing energy systems for tomorrow. The plan enjoys strong support from energy companies because it supports industry priorities in the Cybersecurity Roadmap. DOE's strategy is built around three strategic priorities:

- Strengthen energy sector cybersecurity preparedness through information sharing and situational awareness, including bi-directional, real-time, machine-to-machine information sharing tools; provide risk management tools and technical assistance; and reduce cybersecurity supply chain risks.
- Coordinate cyber incident response and recovery by developing a coordinated national cyber incident response capability for the energy sector; improving cyber incident response training and incident reporting; and conducting cyber incident response exercises. This supports the SSA role to develop and adopt procedures to enhance public-private communication and coordination to improve emergency response and recovery.
- Accelerate game-changing R&D of resilient energy delivery systems to prevent, detect, and mitigate a cyber incident in today's systems; and support next-generation systems that can survive a cyber incident. R&D priorities include:

- Anticipating future grid scenarios and design cybersecurity into emerging devices from the start.
- Enabling future power systems to automatically prevent, detect, mitigate, recover from, and survive a cyber incident.
- Building strategic core capabilities in the National Laboratories and building university collaborations dedicated to advancing cybersecurity for energy delivery systems.

This strategy, developed and implemented in partnership with the energy sector, seeks to reduce cyber-attack vectors and identify attacks quickly; enable operators to sustain grid operations during an attack and prevent equipment damage; and enable rapid recovery from a cyber-attack against critical energy infrastructure.

- Q3. Advanced nuclear reactors, including small modular reactors and micro-reactors, hold great promise for clean, reliable, and secure power. DOE programs have been essential in the early and later stages of R&D and commercialization. How do you intend to use the resources of the Department to continue efforts on advanced reactors, including SMRs?
- A3. The Department agrees that advanced reactors, including small modular reactors, hold great promise as a clean, reliable, and secure power source for our nation. The Department also recognizes that advanced reactors face challenges to ultimately achieve commercialization. Accordingly, the Department plans to partner with nuclear technology developers, including existing fleet, small modular reactor and other advanced reactor designs, in cost-shared research and development. This will be accomplished by a solicitation focused on, but not limited to: improvements in manufacturing; fabrication and construction techniques; sensors; instrumentation and control systems; plant auxiliary and support systems; operational inspection and monitoring capabilities; and modeling and simulation of various elements of plant life cycle. In addition to cost-shared research and development, the FY 2018 President's Budget prioritizes investments in nuclear energy research infrastructure to enable private sector innovation.
- Q4. While your budget supports the need for research into methane hydrates, noting it could be the next key to supplying the world with natural gas after shale development, the natural gas technologies budget is cut 87 percent to just \$5.5 million. Given the

successes that Japan and China have recently had in methane hydrate production, will the administration commit to keeping America a world leader on hydrates?

- A4. The FY 2018 budget request of \$3.5 million for Gas Hydrates supports early-stage and lab-based gas hydrates research. The Department received \$19.8 million for gas hydrate research in its FY 2017 appropriation. This funding allowed DOE to fund the initial phases of the joint U.S.-Japan Alaska North Slope project, and will allow for DOE's continued participation in that project through FY 2018. Additionally, the initial phase of the Gulf of Mexico field research project to conduct resource characterization at a single site has been completed and the results will be analyzed to confirm the nature and regional context of those gas hydrate deposits. The research proposed in FY 2018 does not represent a field-scale testing protocol as the FY 2018 budget relies on industry to fund this type of later-stage R&D. The Gas Hydrates request is consistent with the Administration's America First Energy Policy, which provides a mechanism for U.S. global energy dominance, while being prudent with taxpayer dollars and reasserting the proper federal role as a supporter of early-stage R&D.
- Q5. Microgrids are extremely important for our small off-grid communities in Alaska, because they provide the opportunity to introduce cleaner energy technologies while reducing costs for residents, industry, and military installations. In fact, in Alaska we operate over 200 microgrids. How will you leverage the work being done in Alaska on microgrids with the work being done at the Department?
- A5. DOE recognizes the importance of microgrids in off-grid communities such as those in Alaska and military installations, and has made significant progress in partnership with local communities, states, and industry. For example, DOE supported the Alaska Microgrid Partnership under the Grid Modernization Lab Consortium in 2016. The project focused on developing the framework and programmatic approach to assisting stakeholders reduce diesel fuel consumption in Alaska's remote microgrids by at least 50 percent, without any corresponding increase to system lifecycle costs but with significant improvement to system reliability, security, and resilience. Moreover, DOE supported developing and testing of transactive control activities on three campuses (the Pacific Northwest National Laboratory, University of Washington, and Washington State

University (WSU) in the Pacific Northwest. The WSU campus will leverage its microgrid, major campus loads, and thermal storage to deliver transactive response. DOE will continue to work with Alaska on understanding resilience improvements and decision tools.

QUESTIONS FROM RANKING MEMBER MARIA CANTWELL

- Q1. In your budget hearing testimonies, you answered questions by saying the budget proposal is just one step in the process for deciding funding levels. For the record: Do you support the President's budget request for the Department of Energy?
- A1. Yes.
- Q2. During your confirmation hearing you committed to protecting Hanford workers and to provide adequate funding to clean up the site. The proposed budget would not allow for progress to be made on the Central Plateau or the Hanford Tank Farms. It also cuts community support, used for oversight and outreach purposes and perhaps most importantly funding the Richland School district, by 46%. Why does the President's budget fail to provide the funding necessary to get the job done?
- A2. The Fiscal Year (FY) 2018 budget positions the Department to continue making significant progress at the Hanford Site, which includes continued progress in safely removing the K Basin sludge from near the Columbia River to the central plateau, continuing pump and treat activities to remediate contaminated groundwater, and the maintenance, repair, and replacement of failing infrastructure, facilities, and systems. This includes a focus on addressing risks posed by those that are specifically clean-up related and those that support our cleanup activities.

The FY 2018 budget request is slightly greater than \$2.3 billion. This funding is greater than one-third of the entire budget for Department of Energy's (DOE) Office of Environmental Management (EM).

Taking many variables into account, DOE has generally prioritized its cleanup activities as follows:

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

DOE will continue to discharge its responsibilities by conducting cleanup within a “Safety First” culture that integrates environmental, safety, and health requirements and controls into all work activities. This ensures protection for the workers, public, and the environment.

Q3. Can you guarantee that this August, you will meet with the proper DOE officials to determine what funds are needed to stabilize facilities at Hanford?

A3. Yes.

Q4. The budget for Hanford falls short by \$124 million— and that’s before the tunnel collapse. Every time an unforeseen event takes place at Hanford, money is shifted away from other projects to meet those needs. How do you expect the site offices to meet mandated commitments when they are constantly underfunded and having to shift money to remediate unforeseen situations?

A4. The FY 2018 budget request is slightly greater than \$2.3 billion. This funding is greater than one-third of the entire budget for DOE’s Office of EM.

The FY 2018 budget positions the Department to continue making progress at the Hanford Site, which includes continued progress in safely removing the K Basin sludge from near the Columbia River to the central plateau, continuing pump and treat activities to remediate contaminated groundwater, and the maintenance, repair, and replacement of failing infrastructure. This includes a focus on addressing risks posed by those that are specifically clean-up related and those that support our cleanup activities.

The grouting of Plutonium-Uranium Extraction Plant (PUREX) Tunnel 1 later this fall is estimated to cost less than \$10 million. Considering the Richland FY 2017 enacted level of \$916 million, this urgent requirement causes only a minor shift in schedule of lower relative risk cleanup work.

Q5. The Hanford facility in the state of Washington pioneered the plutonium extraction process and produced plutonium in support of our national defense for more than 40 years. Do you agree that it is an urgent moral and legal obligation to properly fund and proceed with the cleanup effort at the Hanford site, including construction of the Waste Treatment Plant?

- A5. The Department takes its regulatory commitments seriously and is actively working to clean up the Hanford Site while continuing key risk reduction and remediation activities that may not have specific regulatory commitments. The Department continues to make progress on the Waste Treatment and Immobilization Plant (WTP), having installed the last major component in the Low Activity Waste facility this year, which is a key facility in the Department's effort to begin treating low activity waste by December 31, 2023.
- Q6. How can I and the workers at the Hanford site trust that you will provide them with the resources they need when this budget fails to meet your commitments?
- A6. The Department takes its regulatory commitments seriously and is actively working to clean up the Hanford Site while continuing key risk reduction and remediation activities that may not have specific regulatory commitments.

The FY 2018 budget positions the Department to continue making progress at the Hanford Site, which includes continued progress in safely removing the K Basin sludge from near the Columbia River to the central plateau, continuing pump and treat activities to remediate contaminated groundwater, and the maintenance, repair, and replacement of failing infrastructure, facilities, and systems. This includes a focus on addressing risks posed by those that are specifically clean-up related and those that support our cleanup activities.

The FY 2018 budget request is slightly greater than \$2.3 billion. This funding is greater than one-third of the entire EM budget.

- Q7. Will you ensure that you will impress upon the Administration that any changes in the Department's approach to the Hanford cleanup must include input from the state of Washington and the Washington delegation before moving forward, in order to avoid costly litigation that will only hamper progress?
- A7. During my tenure as Secretary, I want to improve the collaboration with the Washington congressional delegation, the State of Washington, and Tribal leaders, to emphasize the importance of achieving cleanup results versus the apparent focus on increasing processes. I believe we can do a better job and I have challenged my staff to identify and evaluate specific focus areas for our consideration.

I will work closely with leaders from the State of Washington, the congressional delegation, and other important stakeholders as part of the decision-making process for the cleanup mission at Hanford.

- Q8. Do I have your word you will work with the Washington delegation and state of Washington on the Hanford cleanup?
- A8. The Hanford Site cleanup is a high priority for me. As a former Governor, I have a strong appreciation and understanding of the role of elected officials. I am committed to working with the state of Washington, the Washington congressional delegation and our other important stakeholders to continue to make steady cleanup progress and develop new and innovative solutions to our cleanup challenges at the Hanford Site.

As I indicated in my hearing, I want to look at opportunities to complete the Department's EM mission more efficiently and expeditiously, including the cleanup of the Hanford Site where considerable effort remains.

To that end, the Office of EM is working to identify and examine opportunities to improve the effectiveness of its cleanup efforts. This includes examining ways to advance the tank waste cleanup mission at Hanford as we continue to maintain the focus on completing construction of the WTP Low Activity Waste Facility and making glass by December 31, 2023. I would also expect us to look at opportunities to advance the overall cleanup of the site as we complete cleanup efforts in the River Corridor area and shift our focus to the Central Plateau.

Moving forward with these efforts will take leadership on all of our parts and a commitment to partnership, to think creatively and to work together to remove barriers, while still being safe and protecting human health and the environment.

- Q9. In just the past month a tunnel collapsed adjacent to the Plutonium-uranium extraction facility, which contains fatally harmful radioactive constituents and, more recently, radioactive contamination was found on a workers clothing. These events highlight how dangerous Hanford is and the extreme focus we must maintain on the safety mission. Do you acknowledge the extreme risk to workers at the Hanford site?

- A9. The partial tunnel collapse at the Hanford Site was a sobering reminder that the men and women who work for DOE contractors at Hanford do incredible work and can be exposed to hazardous conditions. The health and safety of the workers, members of the public, and protection of the environment is our first priority.

I will work with you, labor organizations, and other key stakeholders to better understand worker concerns and to continue strengthening the Department's safety and training processes.

- Q10. Do you commit to improving worker safety and improving the worker compensation program and the Department's contribution the Energy Employees Occupational Illness Compensation Program at Hanford?
- A10. The Department's Richland Office has initiated a number of actions to strengthen the state and federal compensation programs at Hanford. The actions include working with the State to obtain additional expertise related to chemical exposures to aid the state in its administration of the compensation program and improving workers' awareness of the Washington State Labor and Industries Office of the Ombudsman for Injured Workers of Self-Insured Businesses.

These enhancements resulted from Richland's close collaboration with contractors, labor unions, state, and other federal agencies. The actions are now underway and I look forward to working with you and my counterparts at other relevant agencies on further improving these programs, while ensuring communication with the workers at Hanford. These initiatives are part of a more comprehensive set of efforts to ensure workers have a safe work environment. These include title 10, Code of Federal Regulations, part 851, *Worker Safety and Health Program* (10 CFR 851), which incorporates the Occupational Safety and Health Administration's (OSHA) safety and health regulations (contained in 29 CFR), 10 CFR 850, *Chronic Beryllium Disease Prevention Program* which requires an extensive program to protect workers from exposure to beryllium and provide worker rights and benefits, and 10 CFR 835, and *Occupational Radiation Protection* which requires a comprehensive Radiation Protection Program to prevent occupational exposures to ionizing radiation.

In addition to these Rules, the Department has established a number of directives and technical standards to address worker safety and health and ensure the unique safety and health hazards associated with DOE work are addressed. The Directives include:

- Integrated Safety Management – requires a consistent integrated approach to managing safety and health issues;
- Nano Material and Biological Safety and Security – addresses these two safety concerns as they apply to facilities within the Department;
- Federal Technical Capabilities – requires qualified safety and health managers and staff; and
- Federal Oversight – establishes mechanisms for the oversight of safety and health programs.

Safety and health best practices for hazards in the areas of worker safety and health, radiation protection, and chemical management, not covered by national consensus standards, are addressed in departmental technical standards.

The Department is committed to continuing to strengthen its administration of the Energy Employees Occupational Illness Compensation Program Act (EEOICPA) activities at Hanford and sites across the complex. DOE's role under EEOICPA is to provide records and information to the National Institute for Occupational Safety and Health (NIOSH) and the Department of Labor (DOL) to assist with reconstructing dose and adjudicating worker claims.

In addition, DOE has been working closely with DOL on a project to enhance the DOL Site Exposure Matrices (SEM) for the Hanford site, which is a relational database that identifies toxic substances present at DOE sites and links that information with site locations, labor categories, illnesses, and other pieces of information relevant to claims adjudication. The SEM is an important tool for the claims adjudication process, and the effort to update and enhance this tool is a key priority for DOE. DOE has developed a Secure Electronic Records Transfer (SERT) system that is used to send and receive EEOICPA records requests quickly and effectively.

DOE has recently funded two major scanning projects at Hanford beginning July 5, 2017, aimed at streamlining the response to EEOICPA claims. The first project is to digitize all legacy dosimetry records now existing in microfilm and microfiche. The collection is estimated to contain over 12 million separate images. The project is expected to be completed in September 2018. The second project is to complete the digitization of all legacy personnel records on site, approximately 200,000 more records in addition to the 95,000 already completed. We expect this task will be complete in May 2018.

- Q11. Do you acknowledge that the Department has a lot of work to do to improve how it helps sick workers at Hanford? Will you commit to work with me to fix the Department's deficiencies and work with the unions and advocacy groups to get to the bottom of the problems plaguing the workers compensation program at Hanford?
- A11. The men and women who work at the Hanford Site do incredible work and can be exposed to hazardous conditions. The health and safety of the workers, members of the public, and protection of the environment is our first priority. I will work with you, labor organizations, and other key stakeholders to better understand worker concerns and to continue strengthening the Department's safety and training processes.

With regard to the administration of the workers' compensation programs, the Department's Richland Office has initiated a number of actions to strengthen implementation of the State's workers' compensation program at Hanford. The actions include: working with the State to obtain additional medical expertise related to chemical exposures and to improve Hanford workers' awareness of the Washington State Labor and Industries Office of the Ombudsman for Injured Workers of Self-Insured Businesses.

These enhancements resulted from Richland's close collaboration with contractors, labor unions, state, and federal agencies. The actions are now underway and I look forward working with you and my counterparts on further improving this program, while ensuring communication with the workers at Hanford.

- Q12. What *specific* steps have you taken and are planning to take on worker safety at Hanford?

- A12. We are committed to ensuring a safe environment for workers that is protective of their health and allows them to feel comfortable to raise safety or other concerns without fear of retaliation. We apply a defense-in-depth approach to safety that builds in layers of protection to eliminate, limit or mitigate hazards to workers, the public or the environment accomplished through the use of physical and other engineered features; safety structures, systems and components; and safety management systems and other controls necessary to provide protection.

The Hanford contractors have implemented a robust integrated safety management system (ISMS) that incorporates safety into all aspects of work from planning to execution. It includes procedures and adherence to procedures that meet or exceed DOE and OSHA requirements, job hazard analyses conducted prior to work, pre-job meetings and walkdowns, workplace monitoring, worker training, and continuous improvement processes to identify and correct deficiencies and further enhance safety.

With respect to the concerns that have been raised related to tank vapors at the Hanford Site, we have taken a number of actions to address the recommendations we have received from NIOSH; the Center for Toxicology and Environmental Health, the DOE Inspector General, and the DOE Office of Environment, Safety, and Health. These actions include hiring more than 100 additional industrial hygiene professionals, investing in new detection, analysis and monitoring technologies in the tank farms, and improving both personal and area monitoring. We are currently demonstrating an integrated suite of chemical monitoring technologies in one of the double shell tank farms that allows the real-time detection of chemical vapors that will help us tailor enhanced monitoring in other areas of the site. The FY 2018 budget request continues this important investment in enhanced capabilities.

I look forward to making my first visit to Hanford later this summer, and talking with the men and women who are doing these difficult, and sometimes hazardous, jobs every day to better understand their concerns. I will use the information and the feedback I receive from the workers to work closely with labor organizations, the State of Washington, the

congressional delegation, and others to continue strengthening the Department's safety and training processes.

Q13. Will you commit to working with us to ensure the workers at Hanford are receiving the proper training and equipment and that they are not exposed to chemical vapors?

A13. Yes.

Q14. On May 9, Tunnel 1, adjacent to the Plutonium-Uranium Extraction Plant (PUREX) at Hanford partially collapsed. I visited the site within days. On the day of the tunnel collapse, you were visiting Idaho National Lab – one state over. Why didn't you visit the site following the tunnel collapse?

A14. On the date of the Hanford PUREX Tunnel #1 partial collapse, I was touring the Idaho National Lab. I was immediately notified of the situation, and was in close contact with Hanford staff as well as Emergency Operations staff in our Headquarters building. As a former Governor of Texas, I have managed through many crises, including hurricanes and other natural disasters. Rather than becoming a distraction with a last-minute visit, I chose to allow the very capable and knowledgeable local staff to respond immediately and get the situation under control.

Q15. During your confirmation process, you committed to visiting Hanford. Will you visit the site with me in August? When you visit, will you meet with the workers? Will you also commit to visiting PNNL?

A15. I look forward to visiting Hanford later this summer, and hearing first-hand from the workers their concerns. I also plan to visit the Pacific Northwest National Laboratory.

Q16. Hanford has been an interim storage site for 70-plus years, but it was not meant to be the de facto final resting place for this high-level nuclear waste. Can the people of Washington State count on you to provide a disposal option for the Defense Waste that has resided at Hanford for 70 years? Will you ensure that any decisions that are made about how waste is processed will be done with input from the state of Washington Department of Ecology and the entire Washington delegation?

A16. Addressing nuclear waste storage and disposal, enhancing national security and significantly reducing future taxpayer burdens are priorities for this Administration. The FY 2018 budget request proposes funding for nuclear waste disposal while providing sound, science-based solutions.

I will work with the State of Washington, the Washington congressional delegation, and others to ensure we are making sustainable, risk-informed, and fiscally wise decisions regarding the dispositioning of nuclear waste in this country.

- Q17. During your confirmation process, you wrote in response to a Question for the Record, "Our national laboratories are the crown jewels of the nation and I plan to support and advocate for their work." However, the President's budget proposal would slash funding for the labs, eliminating 7,000 jobs across 12 of the national labs, which is about 25 percent of the workforce. Do you agree with your earlier statement that the Labs should be sufficiently funded, or do you agree with this budget, which seems to not value the Labs' work and researchers?
- A17. Through our 17 national laboratories, the Department engages in cutting-edge research that expands the frontiers of scientific knowledge and generates new technologies that address our greatest energy challenges. This budget will ensure that the Department's national laboratories continue to be the backbone of American science leadership by supporting cutting-edge basic research, and by building and operating the world's most advanced scientific user facilities—which will be used by over 27,000 researchers in FY 2018.
- Q18. Why did you allow these drastic budget cuts despite saying that you would support and advocate for the work of the National Labs?
- A18. My goal is to ensure that the DOE, through its national laboratories, continues to support the world's best enterprise of scientists and engineers who create innovations to drive American prosperity, security and competitiveness for the next generation. The FY 2018 Budget Request refocuses the Department's energy and science programs on early-stage research and development (R&D) at our national laboratories to advance American primacy in scientific and energy research in an efficient and cost effective manner. The Request will refocus the intellectual prowess of our scientists and engineers on the development of technologies that the ingenuity and capital of America's entrepreneurs and businesses can convert into commercial applications and products that improve the lives and security of all Americans.
- Q19. How are we going to retain U.S. leadership in science and technology development if the Department is proposing a budget that will result in a massive brain drain?

A19. Our Nation will achieve our economic, energy, and environmental goals simultaneously by ensuring the United States continues to be a leader in energy technology, development and delivery, and by unleashing America's ingenuity to unlock our natural resources. The Request refocuses the Department's energy and science programs on early-stage R&D at our national laboratories to advance American primacy in scientific and energy research in an efficient and cost effective manner including:

- The FY 2018 Request funds \$6.4 billion in early-stage R&D while reducing later-stage research, development, demonstration, and deployment programs by \$3.1 billion from the FY 2017 enacted levels.
- The Request includes a \$4.5 billion investment in the Office of Science (OS), to continue and strengthen American leadership in scientific inquiry with DOE as the Nation's largest Federal supporter of basic research in the physical sciences.
- The Request also provides \$1.9 billion in energy R&D programs, with a renewed focus on cutting-edge innovation and transitioning those breakthroughs to the private marketplace.

Q20a. I've toured PNNL and have seen their research which has made them one of the lead labs working on grid modernization technologies. DOE's R&D programs seek to improve the reliability, security and resilience of the grid. Some of this important work is being done via the Grid Modernization Lab Consortium, a collection of 14 national labs and co-led by PNNL. What is your plan to continue advancements in grid R&D?

A20a. The Department's FY 2018 budget request focuses funding to national laboratories' early stage scientific research efforts related to grid modernization. DOE expects to meet commitments concerning the existing Grid Modernization Lab Consortium (GMLC) efforts. DOE anticipates private industry will leverage DOE research for innovative applied solutions, demonstrations, and pilot projects tailored to market needs and opportunities.

Q20b. How will you keep the Consortium moving forward?

A20b. In FY 2017, DOE continues to utilize the GMLC to carry out grid modernization, including a lab call for integrated field tests and support for institutional studies. DOE also expects to meet commitments in FY 2017 and, if necessary, in FY 2018, with respect to the existing GMLC efforts.

Q21. Under the proposed budget, more than 1,000 researchers at PNNL may be laid off, despite your assurances to Rep. Newhouse that you will manage the lab “in a way that continues to keep the employment levels at the level to deliver the innovation and technology this country is going to need.” Would those be the employees working on cyber security, nuclear non-proliferation, Hanford clean-up, grid reliability or buildings efficiency?

A21. The FY 2018 Budget Request for DOE’s energy and science programs will place a key focus on early stage R&D at the national laboratories. Under the request, all DOE national laboratories remain open and operational.

Q22. During your confirmation hearing, you said, “I have no questions at all about whether or not the Trump Administration is going to be very supportive of keeping America strong and free, and the technologies that come out of DOE in many cases are going to play a very, very important role. I will be an advocate for that.” I couldn’t agree more on the important role the Department plays. For example, between 1976 and 2012, \$12 billion in EERE investments yielded economic benefits of \$230 billion, with an annual return on investment of 20 percent. Study after study shows that federal investments have a positive impact stimulating private sector R&D, and yet your budget slashes funding. How can you justify a budget that severely cuts investment in R&D across the board at the Department?

A22. The President’s FY 2018 Budget refocuses the Department’s energy and science programs on early-stage R&D at our national laboratories to advance American primacy in scientific and energy research in an efficient and cost-effective manner. The Budget provides \$6.4 billion, \$4.5 billion in the OS and \$1.9 billion in energy R&D programs, with a renewed focus on cutting-edge innovation and transitioning those breakthroughs to the private marketplace.

Through our National Laboratories, we will continue to support the world’s best enterprise of scientists and engineers who create innovations to drive American

prosperity, security and competitiveness for the next generation. The FY 2018 Budget positions us to take up that challenge while continuing to ensure our national security.

- Q23. The budget proposal slashes innovation spending across DOE programs. This seems to be based on a belief that the private sector will pick up the slack. Yet only two percent of venture capital goes to energy startups, and the private sector has no incentive to invest in the time- and capital-intensive demonstration projects that are needed to test risky and unproven energy technologies. The energy industry itself is risk-averse and, in some cases, even disincentivized to invest in R&D. Meanwhile, What *specific* studies are you relying on to assert that the private sector will fill in the gap?
- A23. The Budget Request provides \$6.4 billion for research and development programs, with a renewed focus on cutting-edge innovation and fostering the transition of those breakthroughs to the private sector for commercialization.

The private sector plays a critical role in bringing innovations into the energy marketplace. The FY 2018 Budget refocuses the Department's energy and science programs on early-stage research and development at our national laboratories to advance American primacy in scientific and energy research in an efficient and cost-effective manner. It focuses our investments on the basic, early-stage R&D conducted by the scientists and engineers at our 17 national laboratories who are constantly on the path to developing the next great innovations that can transform society, and bring forth a new era of prosperity for the American people.

In addition to providing \$6.4 billion for early-stage research towards cutting-edge innovations, including \$4.5 billion in the Office of Science and \$1.9 billion in energy R&D programs, the Budget consolidates programs focused on bringing technologies to the market in the Office of Technology Transitions (OTT). Through concerted effort and coordination with our labs, this will reduce costs to the taxpayer while at the same time providing a robust technology transfer program to transfer breakthroughs from the national laboratories to the private sector.

- Q24. Countries like China, Korea, and Germany are consistently increasing their public investments in energy R&D. How is the U.S. going to retain its leadership role in innovation with dramatic cuts to federal R&D spending?

- A24. The FY 2018 Budget Request focuses resources on early-stage R&D, where the Federal role is strongest, for energy technologies best positioned to enable American energy independence and domestic job-growth in the near to mid-term. This shift allows the private sector to fund later-stage research, development, and commercialization of energy technologies.

By focusing on early stage R&D, the budget proposes critical investments necessary to sustain America's leadership in transformative science and emerging energy technologies—for example, in transportation, coal, renewable power, energy efficiency, and cyber-security for the grid.

This work will support the world's best enterprise of scientists and engineers who create innovations to drive American prosperity, security and competitiveness for the next generation.

- Q25. In your testimony before this Committee, you said, "I support the academic and the Government mission of basic research, even when you may not see the results of that for a generation." And you added that "I am a big believer that we have a role to play both in basic research obviously, but also in that applied research, to bring new technologies, new commercialization, new economic development opportunities to this country." Could you please clarify your position on the role DOE plays in supporting basic research vs. early stage research vs. applied research?

- A25. While the Budget reduces later-stage research, development, demonstration, and deployment programs by \$3.1 billion from the FY 2017 Enacted levels, it also includes \$6.4 billion for early-stage R&D with a renewed focus on cutting-edge innovation and transitioning those breakthroughs to the private marketplace. The Department's energy and science programs will focus on early-stage R&D our national laboratories to advance American primacy in scientific and energy research in an efficient and cost-effective manner.

In the area of basic science research, the DOE is the Nation's largest Federal supporter of basic research in the physical sciences, and the President's FY 2018 Budget provides \$4.5 billion for the OS to continue and strengthen American leadership in scientific inquiry. By focusing funding on early-stage research, this Budget will ensure that the

Department's National Laboratories continue to be the backbone of American science leadership by supporting cutting-edge basic research, and by building and operating the world's most advanced scientific user facilities—which will be used by over 27,000 researchers in FY 2018.

In the area of applied R&D, the Department also supports energy R&D programs—supported by \$1.9 billion in the President's FY 2018 Budget—with a renewed focus on cutting-edge innovation and transitioning those breakthroughs to the private marketplace.

Finally, we consolidate programs focused on bringing technologies to the market in the OTT. Through our focus on early-stage research and concerted efforts to coordinate with our labs on technology transfer, the Budget will reduce costs to the taxpayer and spur world-leading energy innovation—while at the same time providing a robust technology transfer program to transfer breakthroughs from the national laboratories to the private sector.

- Q26. How exactly does this budget support basic research, early stage research, and applied research, all while slashing spending across the board?
- A26. The Budget focuses the intellectual prowess of our scientists and engineers on the development of technologies that the ingenuity and capital of America's entrepreneurs and businesses can convert into commercial applications and products that improve the lives and security of all Americans.

The Budget provides \$6.4 billion, \$4.5 billion in the OS and \$1.9 billion in energy R&D programs, with a renewed focus on cutting-edge innovation and transitioning those breakthroughs to the private marketplace. While reducing later-stage research, development, demonstration, and deployment programs by \$3.1 billion from the FY 2017 enacted levels, these investments will ensure that the DOE, through its National Laboratories, will continue to support the world's best enterprise of scientists and engineers who create innovations to drive American prosperity, security and competitiveness for the next generation.

- Q27. During your confirmation process you said, “I believe that the Department of Energy should continue to invest in the basic research that will spur the innovation that will keep America’s economy, including its wind and solar industries, competitive.” Earlier this week, the American Energy Innovation Council – a coalition of corporate leaders including Bill Gates, Norm Augustine, and John Doerr – warned that “the U.S. innovation system may be in danger of losing ground to other nations, which are simply making greater commitments to innovation than the United States.” Meanwhile, the United States ranks only 12th in energy R&D intensity, which measures energy R&D spending as a percentage of GDP. How can the United States remain a global leader in innovation if we slash our investments in it?
- A27. Our job is to create innovations to drive American prosperity, security and competitiveness for the next generation, and the President’s FY 2018 Budget Request positions us to take up that challenge while continuing to ensure our national security.

By focusing funding on early-stage research, this Budget will ensure that the Department’s National Laboratories continue to be the backbone of American science leadership by supporting cutting-edge basic research, and by building and operating the world’s most advanced scientific user facilities—which will be used by over 27,000 researchers in FY 2018. The President’s FY 2018 Budget provides \$4.5 billion for the OS to continue and strengthen American leadership in scientific inquiry.

The Department also supports energy research and development programs—supported by \$1.9 billion in the President’s FY 2018 Budget—with a renewed focus on cutting-edge innovation and transitioning those breakthroughs to the private marketplace.

Through these investments and by refocusing the Department’s energy and science programs on early-stage R&D at our national laboratories, the President’s FY 2018 Budget will advance American primacy in scientific and energy research in an efficient and cost-effective manner.

- Q28. As you know, Mission Innovation is a multinational effort to accelerate public and private investment in clean energy innovation. Twenty countries, including the United States, committed to doubling their clean energy R&D investments over the next five years. This budget obviously undermines that commitment. Do you support Mission Innovation, and how can the United States live up to its international commitments under this budget proposal?

- A28. The United States is committed to supporting the development of affordable and reliable energy as a foundation for economic growth and energy security. Indeed, reliable, affordable energy goes hand in hand with a strong economy. Innovation in science and technology has been a cornerstone of America's economic progress. The private sector funds and performs the majority of U.S. R&D, but the Federal government has an important role in funding R&D in areas that industry does not have a strong incentive to invest.

Innovation continues to be a top priority for the United States through both strategic public funding for early-stage R&D and strong private sector investment to support the development and commercialization of the most promising ideas. Novel technologies open fresh avenues to expand domestic energy supplies and drive down energy costs. Broad access to affordable and reliable energy will further stimulate economic growth—bringing jobs and prosperity to millions of U.S. consumers and businesses and throughout the global economy. Many of the most innovative technologies shaping global energy markets today can trace their origins to public investments in basic science, exploratory research, and early-stage technology development. Innovations arising from these investments have created new technologies and lowered their cost, which in turn have had transformative effects on whole industries.

The DOE's National Laboratories have worked with American universities, research institutions and industry partners, and international collaborators around the world, to push the frontiers of basic science and research. They explore novel concepts to meet high-priority national needs. They discover new knowledge, share it with private partners, and create a wellspring of ideas that help spur technological breakthroughs. The U.S. government plans to continue to support investments in early-stage research to advance energy technology innovation. The outcomes are expected to feed the innovation pipeline, stimulate entrepreneurs, attract investors, and enable U.S. companies to secure leadership positions in global energy markets. The United States seeks to nurture an efficient research enterprise that will realize the overarching goals of Mission Innovation, namely, to make clean and advanced energy technology widely accessible and affordable worldwide.

- Q29. Five months ago, when testifying during your confirmation hearing before this Committee you said: "I believe some of [climate change] is naturally occurring. I believe some of it is caused by manmade activity. The question is, how do we address it in a thoughtful way?" – adding "I am committed to making decisions based on sound science." You also promised, "I'm going to protect all of the science whether it's related to the climate or to the other aspects of what we're going to be doing." But in an interview with CNBC, you stated that CO2 is not the "primary control knob" affecting climate change, citing ocean waters and other environmental factors. Could you please elaborate on the science that underpins that belief?
- A29. I believe the climate is changing and man is having an impact. There are several 'control knobs' which contribute to that change. My focus as Secretary of Energy is to utilize American innovation and technology to produce energy in an environmentally responsible manner that enhances our economic security.
- Q30. Control knob" is an interesting choice of words, because a 2010 report by leading NASA climate scientists – titled "Atmospheric CO2: Principal Control Knob Governing Earth's Temperature" – concluded "it is clear that CO2 is the key atmospheric gas that exerts principal control over the strength of the terrestrial greenhouse effect." That report found that "atmospheric CO2 control knob is now being turned faster than at any time in the geological record." I'd like to give you an opportunity, once and for all, to clarify whether or not you agree with 97 percent of climate scientists – scientists who conclude that the climate is changing and that manmade greenhouse gas emissions are the primary driver.
- A30. As I have previously stated, the climate is changing and man is having an impact. There are several 'control knobs' which contribute to that change. My focus as Secretary of Energy is to utilize American innovation and technology to produce energy in an environmentally responsible manner that enhances our economic security.
- Q31. Please elaborate on how we can address this challenge in a "thoughtful way" based on "sound science" if the budget proposal slashes Biological and Environmental Research within the Office of Science – the office that supports climate science – by 43 percent.
- A31. The FY 2018 Budget Request for Biological and Environmental Research implements the Administration's decision to shift focus to more fundamental research across DOE. Through careful prioritization and ensuring that funding goes to the most promising research, this budget will ensure that the Department's national laboratories continue to be the backbone of

American science leadership by supporting cutting-edge basic research and to advance American primacy in scientific and energy research in an efficient and cost effective manner.

In alignment with this, investments in certain areas are discontinued and the Climate and Environmental Sciences subprogram is retitled "Earth and Environmental Systems Sciences" to reflect its new focus. The FY 2018 Budget Request gives priority to supporting specific aspects of earth system models, maintaining current U.S. leadership in high-resolution earth system modeling and model development, and other science research underpinning ultimate use in energy and infrastructure planning and policy.

- Q32. Please comment on how you will "protect all of the science" when, in 2010, you referred to climate science as a "contrived phony mess" and blamed a "secular carbon cult" of scientists who manipulate data to show evidence of climate change.
- A32. The Department will continue to abide by the OS merit review system to ensure the quality and integrity of all funded research. The research will focus on fundamental earth system science.

I have been consistent in my support of our National Laboratories, the crown jewels of science in America. They tackle some of the toughest scientific challenges and develop mind-boggling technologies. They also keep us safe, through research that defends us from terrorism and keeps our nuclear stockpile secure, modern, and effective. I fully support the work of the National Laboratories system in all its endeavors that cover the spectrum of challenges facing America today.

- Q33. You have stated that we need a "Red Team" approach to examining climate science. But that is exactly the nature of the scientific and peer review processes. Are you aware that this already exists on a regular basis?
- A33. The OS merit review system ensures the quality and integrity of all funded research, and additional review could contribute towards a robust scientific dialogue. The specific process for a Red team exercise has not yet been developed.
- Q34. The Intergovernmental Panel on Climate Change (IPCC) was set up in 1988 by the World Meteorological Organization and U.N. to provide policymakers with regular assessments of the scientific basis of climate change. These assessments are written by hundreds of leading scientists and undergo multiple rounds of drafting and review to ensure they are

comprehensive and objective and produced in an open and transparent way. How would your Red Team exercise possibly expand on what has already been done by the entire scientific community?

- A34. Office of Science merit review system ensures the quality and integrity of all funded research, and additional review could contribute towards a robust scientific dialogue. The specific process for a Red team exercise has not yet been developed.
- Q35. The budget proposes to eliminate ARPA-E. In March, you tweeted, “Innovators like the ones supported by our @ARPAE program are key to advancing America's energy economy.” The National Academies released a report this month stating, “There are clear indicators that ARPA-E is making progress toward achieving its statutory mission and goals” and “the committee found no signs that ARPA-E is failing, or on a path to failing, to deliver on its mission and goals.” Do you agree with the Budget’s proposal to eliminate ARPA-E? If so, what changed your mind from publicly supporting ARPA-E to calling for its elimination?
- A35. I support the President’s Budget. The Budget will spur world-leading energy innovation, while also reducing costs to the taxpayer.
- Q36. The budget proposes to eliminate the Weatherization Assistance Program and State Energy Program, which provide critical technical assistance and state-controlled competitive grant funding to all 50 states. The Weatherization Program supports approximately 8,500 direct and indirect jobs – which can’t be outsourced – each year, growing the energy workforce. Please provide an explanation of the anticipated reductions in homes that will be weatherized as a result of terminating DOE’s Weatherization Assistance Program. What are the key technical assistance functions DOE currently performs that will not be replicated at an individual state level?
- A36. In FY 2018, the Weatherization Assistance Program (WAP) will weatherize approximately 23,725 homes as the program is closed out, using funds appropriated with FY 2017 funds. WAP will weatherize approximately 35,000 homes in FY17.

Maintenance of the Standard Work Specifications for Home Energy Upgrades, accreditation of training centers, and support for the National Energy Audit Tool are some specific examples of technical assistance functions that will not be provided through WAP. However, states, utilities, and other stakeholder groups may re-prioritize resources to support these programs as appropriate.

- Q37. The budget proposes to cut funding for the Office of Science by 17 percent. The office 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 national laboratories. Their facilities support more than 31,000 researchers from universities, national laboratories, industry, and international partners. Do you agree that Federal investments in basic research are critical for maintaining U.S. leadership in science and technology and creating jobs? If so, why does the Department's budget call for cutting Science funding by 17 percent?
- A37. The President's FY 2018 Budget Request refocuses the Department's energy and science programs on early-stage R&D at our national laboratories to advance American primacy in scientific and energy research in an efficient and cost effective manner. This includes a \$4.5 billion investment in the OS, to continue and strengthen American leadership in scientific inquiry with DOE as the Nation's largest Federal supporter of basic research in the physical sciences. The budget also maintains the most critical core capabilities and infrastructure at our national laboratories to support that groundbreaking early R&D. With continued construction of cutting-edge projects like the Linac Coherent Light Source-II, the Facility for Rare Isotopes Beam, and the Long Baseline Neutrino Facility/Deep Underground Neutrino Experiment, while also supporting our world-leading science and technology workforce at the national labs, we will ensure we continue to drive innovation for the Nation.
- Q38. The Biological and Environmental Research (BER) Program in the Office of Science took nearly a quarter of the office's cuts. As you may know, BER supports basic research biological systems and earth systems science. This proposed budget for BER appears to target earth systems science, possibly because this administration has said it intends to dismantle any program that appears to be affiliated with climate science. Do you agree that basic science research programs that help contribute to innovation and drive economic growth are important? How do you plan to ensure that BER meets its missions at the proposed funding level?
- A38. The FY 2018 President's Request supports priorities within BER in the areas of Genomic Sciences, Earth and Environmental Systems, and scientific user facilities. The basic science generated from these activities provides the research that drives innovation and growth for applications with broad economic benefits to society.
- Q39. A 2016 DOE study found that a portfolio of R&D investments at the Office of Energy Efficiency and Renewable Energy totaling \$12 billion from 1976 to 2012 yielded net

economic benefits to the United States of \$230 billion (nearly 20 times multiplier) with an annual return on investment of 20 percent. Given this return on investment and the trillions of dollars that will be invested globally in renewable energy and energy efficiency, why are you undermining U.S. energy leadership by proposing to cut EERE by 70 percent?

- A39. The FY 2018 Budget focuses Energy Efficiency and Renewable Energy (EERE) resources on early-stage R&D, where the Federal role is strongest, and reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies. The Budget emphasizes energy technologies best positioned to support American energy independence and domestic job-growth in the near to mid-term. The Budget maintains America's leadership in transformative science and emerging energy technologies in sustainable transportation, renewable power, and energy efficiency.

EERE early-stage research focuses on technology challenges that have the potential for high return on investment, but which present a significant degree of scientific or technical uncertainty across a relatively lengthy time span, making it unlikely that industry will invest significant R&D on their own. Thus, this budget maintains the most critical core capabilities and infrastructure at DOE National Laboratories related to sustainable transportation, renewable power and energy efficiency technologies. Technology solutions derived from EERE early-stage R&D give U.S. industries, businesses, and entrepreneurs the competitive edge needed to excel in the rapidly changing global energy economy. Industry deployment of these technologies creates jobs, reduces U.S. reliance on imported oil, increases energy affordability, improves energy security, ensures environmental responsibility and offers Americans a broader range of energy choices.

- Q40. The budget proposal cuts the Building Technologies Office – a program that costs less than \$2 per household and helps consumers save almost \$500 per year – by two-thirds. Do you agree that it's critical to use the Department of Energy's capabilities to help building owners make retrofit and construction choices that employ smart technologies to make dramatic reductions in building energy consumption?
- A40. The Building Technology Office's (BTO) proposed Building Energy Research & Development (BERD) subprogram sponsors early-stage R&D in energy-efficient building technologies, enabling a range of U.S. industries in fields like building

construction and renovation as well as appliance and material manufacturing to develop and deploy novel building technologies. BERD's technology areas are Buildings-to-Grid; Heating, Ventilation and Air-Conditioning & Refrigeration (HVAC&R); Windows & Envelope; Solid State Lighting; and Building Energy Modeling (BEM). This work leverages the National Laboratories' researchers and high performance computing capabilities as well as unique National Laboratory facilities needed for BTO to enable industry to achieve the goal of reducing the average energy use per square foot of all U.S. buildings by 50% from 2010 levels, thus saving consumers money while enhancing productivity and comfort.

- Q41. In your opinion, isn't helping energy bill payers cut energy waste in order to unleash American productivity an important function of the premiere energy R&D agency?
- A41. In FY18, EERE's energy efficiency portfolio will build on the considerable progress made over the last 40 years and pursue early-stage R&D targeted at high impact technology areas such as advanced lighting, space heating and cooling, building envelopes, and manufacturing materials and processes. The overall goal of the energy efficiency portfolio is to strengthen the body of knowledge that enables businesses, industry and the Federal government to improve affordability, energy security-resiliency, and energy productivity of our buildings and manufacturing sectors. The knowledge outputs of this research can support a foundation for economic growth and job creation as businesses, consumers, and energy managers develop and deploy new energy-efficiency and manufacturing technologies and best practices.
- Q42. I'd like to know what's taking so long for the DOE to finalize common-sense energy efficiency rules for portable air conditioners, backup battery systems for electronics, air compressors, walk-in coolers and freezers, and commercial heating boilers. Together these standards would save consumers \$11 billion on their energy bills over 30 years. These standards were developed through DOE's rigorous rulemaking process and completed in December 2016. Can you please explain what the holdup is and when we can expect to see these rules finalized?
- A42. The Department of Energy is the Defendant in a lawsuit concerning the subject matter of this question. The Department cannot comment on an issue subject to ongoing litigation.

Q43. The President's budget proposes to reduce DOE's appliance standards work by half. DOE's work in this area has cut U.S. electricity usage by 13 percent compared to what it would be without energy efficiency standards, so I think crippling the program is the wrong way to go. How will DOE continue help Americans billions in energy costs if this program is radically scaled back?

A43. DOE is committed to meeting its legislatively mandated deadlines for covered appliances and equipment. The Energy Policy and Conservation Act (as amended) mandates the Department's test procedure and standards rulemaking activities. The rulemaking schedule, and thus the level of program activity, is determined by existing statute.

In FY 2018, the Appliance and Equipment Standards subprogram will fund all necessary and feasible steps to finalize legally required efficiency standards and test procedures, and meet all applicable judicial and statutory deadlines. DOE will, as appropriate, undertake activities regarding the certification and enforcement of existing energy conservation standards.

Q44. Previous Administrations, Republican and Democrat, have advanced energy saving goals for our federal government. What will you do to further reduce the energy waste in our federal buildings?

A44. The Federal Energy Management Program (FEMP) FY 2018 Budget Request of \$10 million supports federal agencies in meeting statutory energy and water management related goals and requirements. In FY 2018, FEMP will focus on reducing the operating costs of the government by assisting Federal agencies in identifying, designing, and completing energy-savings projects, building upon previous accomplishments. FEMP works with our stakeholders to enable federal agencies to meet energy related goals, identify affordable solutions, facilitate public-private partnership and provide energy leadership to the country by identifying government best practices. FEMP provides technical project development assistance for energy savings performance contracts (ESPC), utility energy savings contracts, and power purchase agreements in pursuit of energy and water efficiency improvements and demand reduction services.

FEMP will provide technical assistance that leverages performance contracting and power purchase agreements, helping agencies meet their statutory requirements, and

enhancing workforce development. In conjunction with technical assistance, FEMP will provide portfolio planning guidance to promote strategic integration of advanced technologies into power supply and master facility planning, helping DOE as a whole strengthen national energy security by increasing energy supply, diversity, resiliency, and reliability. FEMP will also foster Federal building and fleet optimization by providing guidance and tools focused on metering, auditing, operations and maintenance, and water use. As part of this support request by Federal agencies, the Federal Energy Management subprogram, working directly through experts at the DOE National Laboratories, will:

- Offer portfolio planning guidance to promote strategic integration of advanced energy technologies (such as renewable energy, micro-grids and advanced battery storage) into site/facility power supply and master site planning;
- Develop best practices for implementing resilient energy management strategies in Federal facilities;
- Develop best practice approaches to address the challenges and risks organizations face from cyber threats to the energy management platform;
- Standardize steps agencies can take to secure their energy-related hardware and data while integrating effective energy management; and
- Improve facility resiliency through enhanced energy management technologies and tools focused on optimization and cost reduction.

FEMP will continue to work with agencies to fulfill energy management performance statutory requirements through proactive engagements and enhanced workforce development services and opportunities.

- Q45. Public Private Partnerships are a key way to advance energy savings. Please let us know what PPP tools you will be encouraging at the Department of Energy and how?
- A45. The Department utilizes a variety of public-private partnership models in the FY18 Budget Request to address critical early-stage R&D challenges. Additionally, DOE

anticipates private industry will use the results of DOE-funded research to conduct later stages of applied research as well as provide investments to fund industry demonstrations and pilot projects. The publically available *Report on Technology Transfer and Related Technology Partnering Activities at the National Laboratories and Other Facilities for Fiscal Year 2014* provides many examples of past public private partnership models DOE has utilized. The Fiscal Year 2015 report is forthcoming.

- Q46. Forty years ago, we created the Strategic Petroleum Reserve (SPR) to prevent economic and security impacts of crude oil supply disruptions. It is our most important federal energy security asset. Yet the President's Budget proposes to sell approximately half the SPR crude oil by 2027. Do you agree that we should auction off our energy security by selling the Strategic Petroleum Reserve?
- A46. The United States now produces oil and gas at historically high rates, which is our first and best way to build our energy security. The SPR was created in the 1970s, when the United States imported 5-6 million barrels of oil per day from OPEC countries. Today, the United States imports roughly half that from OPEC countries despite a significantly larger economy. Independent projections from the U.S. Energy Information Administration (EIA) indicate that 10 years from now, U.S. net petroleum imports will be even lower, putting even less of a strain on the U.S. economy in the event of a petroleum supply disruption. While the SPR continues to remain a vital national energy security asset, given increased reliance on and availability of domestic sources of production, the Administration believes the U.S. can meet its energy security requirements with a smaller SPR.
- Q47. If we sell the additional amounts from the SPR, how will the United States meet its international obligations?
- A47. The United States has two primary oil stockholding requirements to meet obligations under the International Energy Program: (1) To hold stocks equivalent to 90 days of net petroleum imports, and (2) To contribute a proportionate share of the total required stock release (currently approximately 43%) in the event of a collective action response by the International Energy Agency (IEA) to a global oil supply disruption.

For requirement (1) – At the conclusion of required sales in 2027, the SPR would be able to meet its requirement to provide 90 days of net petroleum import protection, based on a projected SPR crude oil inventory level of 250-260 million barrels and U.S. EIA projections of U.S. net petroleum imports of 1.72 million barrels per day (EIA 2017 Annual Energy Outlook Reference Case). An SPR of this size would accordingly supply roughly 150 days of net petroleum import protection.

For requirement (2) – The half liquidation sale would result in a projected SPR crude oil Inventory of 250-260 million barrels and would also close two of the four SPR storage sites, reducing the SPR's design drawdown rate from its current level of 4.415 million barrels per day to a maximum of 2.8 million barrels per day. The United States would be able to meet its proportionate share for any IEA collective action response, provided that the United States proportionate share requirement of the daily flow rate and total volume of oil released does not exceed the above parameters after the half liquidation sale is completed. Further, if, as the EIA projects, the US's demand for petroleum products continues to hold steady or decrease slightly while other IEA Member Countries demand increases and/or new Members Countries join the IEA – the US contribution to a collective action could decrease.

- Q48. Do you believe oil markets are subject to price volatility that affects U.S. consumers?
- A48. As globally traded commodities, crude oil and petroleum products are subject to price volatility on a daily basis for a variety of reasons. In the world's spot markets, prices for petroleum can be reflective not only of current views of supply and demand fundamentals but also of longer term political stability in producing countries and economic growth in consuming countries. In addition, spot markets are located in different parts of the globe and trade different qualities of petroleum such that price volatility can also be caused by more localized factors such as ship loading restrictions or pipeline and storage constraints.

Petroleum product prices at wholesale terminals typically change only once during the day so that distributors can properly plan truck shipments and pricing for their fuels on delivery to end use sellers. Retail prices at the consumer level are also affected by oil price volatility, as gasoline price changes are significantly driven by crude oil price

changes. However, due to large, visible price signage and the ability of retail consumers to readily switch stations, retail gasoline prices move more slowly than crude oil prices, as gasoline retailers are reluctant to change prices often given that they are unsure of their competitors' potential responses.

- Q49. Do you believe the core policy reasons for the establishment of the Strategic Petroleum Reserve still exist today?
- A49. The SPR was established to protect the United States from the impacts of severe petroleum supply interruptions. At the time of the SPR's establishment, Organization of the Petroleum Exporting Countries (OPEC) dominated global oil production, the Arab oil embargo had just ended, and the primary energy threat to the United States was a physical curtailment of oil imports. The reduction in crude oil imports in recent years, stemming from increased domestic production and stagnant consumption, has reduced U.S. exposure to physical oil supply shortages. However, crude oil is a globally traded commodity and supply disruptions anywhere in the world result in price increases that can harm the U.S. economy. The SPR remains an important national energy security asset, protecting the national economy from potential GDP losses caused by shocks to the world oil market.
- Q50. As you well know, our energy sector is changing and we need to ensure we have a skilled energy workforce that can keep up. The most recent Department of Energy employment report found that 73 percent of energy companies found it difficult to hire skilled employees. At your confirmation hearing, you stated that "we need to equip our workforce with what they need to succeed." Then why did the Administration not request funding for workforce training at the Department? And how will you ensure workforce training is a DOE priority?
- A50. The DOE's core mission is to support early-stage R&D leading to cutting-edge innovation. The FY 2018 Budget focuses its investments on the basic, early-stage R&D conducted by the scientists and engineers at our 17 national laboratories who are constantly on the path to developing the next great innovations that can transform society, and bring forth a new era of prosperity for the American people.

Workforce training is not within the Departments' core missions and is better left to mission agencies and the private sector. However, we recognize the importance of the

next generation of America's science and technology workforce, and our budget request supports targeted programs like the Solar Decathlon which will continue to attract students to science and energy technology fields. In addition, the FY 2018 budget continues to support students and post-doctoral researchers at our national laboratories.

Q51. Although we have mandatory cybersecurity standards for electric utilities, natural gas pipelines are subject to merely voluntary guidelines issued by the Transportation Security Administration (TSA). DOE's most recent Quadrennial Energy Review (QER) suggested that DOE should assess whether any additional or mandatory cybersecurity guidelines are necessary for natural gas pipelines given the increased dependence between the electric and natural gas sectors. Given your statements in response to a Question for the Record – that "cybersecurity is a critical issue and a significant part of DOE's mission. I will prioritize it with the incoming Administration and Congress" – do you agree with the QER recommendation?

A51. Cybersecurity is indeed a critical issue and a significant part of DOE's mission. As consumption of natural gas for electric power production has increased, the cybersecurity of the natural gas infrastructure has grown in importance.

For the past 15 years, the Department has engaged in an active, voluntary public-private partnership with the natural gas industry through the Oil and Natural Gas Subsector Coordinating Council. This forum helps develop priorities and share best practices for cybersecurity for natural gas infrastructure. The Department continues to support cybersecurity solutions for natural gas infrastructure as part of its ongoing cybersecurity program.

Q52. One week before your budget testimony, the Washington Post reported that "[h]ackers allied with the Russian government have devised a cyber-weapon that has the potential to be the most disruptive yet against electric systems that Americans depend on for daily life." During your confirmation hearing, you reassured the committee that cybersecurity was one of your top two priorities, but your budget slashes cyber funding by 32 percent. How can cybersecurity be a top priority if you have cut its funding by 32 percent?

A52. Securing our Nation's power grid remains an urgent concern. The \$20 million, or 32%, decrease to Cybersecurity for Energy Delivery Systems (CEDS) primarily results from the completion of funding for several activities; base CEDS funding is maintained.

- A \$5 million reduction is for the Virtual Energy Sector Advanced Digital Forensics Analysis Platform, which was initially funded in FY 2016, and will complete implementation and begin transitioning to the private sector in FY 2017.
- The industry-scale electric grid test bed was a congressionally directed project initiated in FY 2014 as a 3-year project. The FY 2017 appropriation provided an additional \$9 million, which will fund preparation for construction of a dedicated transmission line feed during FY 2018, and also fund construction of the feed, which may not begin until FY 2019.
- The FY 2016 and FY 2017 appropriations included congressional direction of \$5 million for each year to develop cyber and cyber-physical solutions for advanced control concepts for distribution and municipal utility companies.

Q53. How can you and DOE keep our country safe from Russian cyberattacks if you do not have the funds to do so?

A53. DOE takes the cybersecurity threats to the grid seriously, and has put together a multiyear plan based on a successful public-private partnership that leverages technical and financial resources from industry and government. This strategy enjoys strong support from energy companies due to our dedication to collaboration with the industry, our understanding of electric sector system needs, and our ability to help the sector develop and deploy the innovative tools, technologies, and other expertise of the DOE national laboratories.

DOE's cybersecurity budget focuses on three tenets to support the security of the Nation's energy sector:

- Strengthen electric sector cybersecurity preparedness—DOE will continue its close coordination with the private sector through the energy sector coordinating councils, trade associations, manufacturers, utilities, and individual companies to facilitate information sharing programs, deploy systems for real-time situational awareness, support self-assessments of cyber-risk and cybersecurity maturity, and implement best practices such as response readiness.
- Coordinate cyber incident response and recovery—DOE will continue its incident response program, which aligns with the industry-led cyber mutual assistance

programs and includes information sharing and rapid adoption of lessons-learned to help detect and mitigate cyber incidents at the earliest stages, thus decreasing their potential impact.

- Support game-changing R&D of resilient energy delivery systems—DOE will continue its innovative R&D program to prevent, detect, and mitigate a cyber incident in today's systems, and develop next-generation resilient energy delivery systems that can survive a cyber incident.

The Department helps ensure program success by sustaining strategic core capabilities throughout its national laboratories. These capabilities are called upon as needed, and conducted in close partnership with the private sector, to develop innovative technologies that reduce the risk of a cyber-incident disrupting energy delivery.

- Q54. In regards to your ongoing grid study, it is troubling that the Administration appears to be suggesting that adding more renewable energy threatens grid reliability, especially when our National Labs have repeatedly found this is not true. Are you aware that NREL has found that the eastern grid and the western grid could each reliably accommodate 30 percent renewable energy rates without grid changes, and that a separate NREL study concluded that renewable energy will be able to reliably generate 80% of U.S. power needs by 2050 if we invest in increased grid flexibility?
- A54. The National Renewable Energy Laboratory studies, which were in part funded by DOE's Office of Electricity Delivery and Energy Reliability, are important building block studies showing the potential to handle large amounts of variable renewable energy within the grid structure. The studies, however, did not conclusively model the impact of high penetrations of variable renewable energy. For example, the study indicating the potential for 80 percent renewable generation showed modeling feasibility only if there were also grid changes equivalent to building over 40 new 1,000 megawatt transmission lines across the Nation and grid operations managed by a single balancing authority over the 48 contiguous states.

By 2020, sections of the transmission system are scheduled to operate with over 60 percent wind energy in Kansas, Oklahoma, and Texas. Grid operators in those and other states are searching for real world solutions to reliably manage the grid; it is not yet proven that they will be able to do so on a consistent, reliable basis under a highly

variable, highly distributed generation mix. Part of the work being done in the GMLC is to further model and understand how to bridge the gap between our ability to model and the ability to operate the grid.

- Q55. Do you agree with the fact that low natural gas prices, not renewable energy, are making coal and nuclear power uncompetitive?
- A55. EIA has tracked trends in electricity generation from coal and nuclear power plants over the last several years. The declining share of coal generation results from a number of separate factors. Low natural gas prices have been a leading factor during recent shifts in the generation mix, and in reducing the competitiveness of coal and nuclear power. Increasing generation from renewables, stagnant demand for electricity, excess electric generating capacity, and new electric power-sector emission regulations have also played a role. EIA has not specifically analyzed the relative importance of each of these factors.
- Q56. As a former governor of Texas, you know the enormous potential of wind power and the benefits it provides. Do you believe that wind harmed the grid in Texas, and that it poses a threat to the grid in general? Please provide a “yes” or “no” answer.
- A56. The Department, in response to my direction, has undertaken an internal review to examine the state of electricity markets and grid reliability and produce a study aimed at ensuring that our electric grid remains reliable, resilient, and affordable. The study is an impartial review of the state of electricity markets and related policies, and there are no preconceived notions as to the findings and recommendations that will result from this review.

I appreciate the value of all energy sources. My track record speaks for itself. As Governor of Texas, I helped oversee an enormous increase in wind energy such that Texas is now the largest wind energy producing state in America. Texas has to date had a successful integration of wind energy. This has been due to extensive planning; implementation of supporting legislation and alternative grid system support, like demand response and distributed generation; constant vigilance as the grid operations went into practice; and continued planning and modeling as some areas try to manage large amounts of variable renewable energy.

- Q57. Can you commit that the Department will not attempt to preempt state renewable energy programs, such as renewable portfolio standards, in an attempt to bolster less competitive sources of energy, such as coal?
- A57. There is no national renewable portfolio standard authority that could serve as a basis under which the Department could preempt state renewable portfolio standards.
- Q58. The President and DOE cannot ignore statutory requirements or funding direction provided by appropriations legislation for Fiscal Years 2016 and 2017. I am glad there seems to be progress on these issues, particularly at ARPA-E and the small business grants. Will you commit that DOE will follow the law to fund projects as directed by Congressional intent and appropriations for the current and previous fiscal years, despite what is included in the Administration's budget proposal?
- A58. Yes, the Department of Energy will follow the law.
- Q59. Are you aware that the budget proposal triggers the national labs, universities, and businesses to begin planning for this worst-case scenario, including creating workforce reduction plans?
- A59. DOE takes very seriously its responsibilities under Section 3161 of the National Defense Authorization Act of Fiscal Year 1993, codified at 50 U.S.C. 2704, to develop plans when it becomes necessary to restructure the workforce at its defense nuclear facilities. DOE has plans in place at all of DOE's defense nuclear facilities, including many of the national labs, universities, and businesses you reference. DOE contractors are responsible in the first instance for managing their workload and workforce in an effective and fiscally responsible manner, consistent with their contracts with the Department. To that end, DOE contractors continuously re-evaluate their priorities, and certainly in the case of budget proposals. DOE actively works with its contractors, especially in these circumstances, to ensure that the contractor employees, and key stakeholders, are kept abreast of any developments.
- Q60. In my home state of Washington, the proposed budget request would result in a cut of approximately \$190 million and a loss of over 1,000 jobs to the Pacific Northwest National Laboratory, a powerhouse of innovation. With these cuts, how will you ensure that the Department and its National Labs continue to make significant contributions to our global leadership in science and energy?
- A60. All DOE national laboratories remain open under the FY 2018 Budget Request and with available funding, the budget prioritizes funding to mitigate impacts at the national labs.

Through careful prioritization and ensuring that funding goes to the most promising research, the Department of Energy will continue to be a world-leading science and technology enterprise that generates the innovations that fulfill our missions ensuring the Nation's security and prosperity.

- Q61. The Department of Energy's Title 17 Loan Program, which was signed into law by President George Bush in 2005, is one tool that can help fill the infrastructure investment gap. The Department of Energy's loan programs have a significant amount of money remaining in loan authority that can be utilized for investments in a broad range of new energy infrastructure. Why would the Administration, which has pledged to invest in rebuilding our infrastructure, eliminate a program that has a track record of success and existing funding that can be used for energy infrastructure?
- A61. To support the Administration's commitment to reasserting the proper role of what has become a sprawling Federal Government and reducing deficit spending, the President's FY 2018 budget reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies and focuses resources toward early-stage R&D.
- Q62. In response to a Question for the Record, you wrote, "I commit to reviewing the loan guarantee program and evaluate its successes and failure. I am committed to both investing in energy innovation and using taxpayer dollars responsibly." Does this mean you conducted a full review of the loan guarantee program and concluded that it should be eliminated?
- A62. In the development and preparation of the FY 2018 Budget, all of the Department's programs and priorities were reviewed. In order to support the Administration's commitment to reasserting the proper role of what has become a sprawling Federal Government and reducing deficit spending, the President's FY 2018 budget reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies and focuses resources toward early-stage R&D.
- Q63a. President Trump has continually pushed auto executives to build more manufacturing plants in the United States. The Department of Energy's Advanced Technology Vehicle Loan Program is one tool that could provide the financing to make that happen. Since 2009, 18 facilities in 8 states were retooled or built with ATVM loans that directly employ almost 38,000 people. But the Administration's budget would eliminate the

ATVM program. In response to a Question for the Record, you wrote, "I will review the ATVM program to make sure it achieves its goals. I will be committed to transparency and accountability with respect to government investments." Have you completed this review prior to supporting the President's budget?

- A63a. In the development and preparation of the FY 2018 Budget, all of the Department's programs and priorities were reviewed. In order to support the Administration's commitment to reasserting the proper role of what has become a sprawling Federal Government and reducing deficit spending, the President's FY 2018 budget reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies and focuses resources toward early-stage R&D.

The President's FY 2018 budget proposal calls for the cancellation of all remaining loan volume and appropriated credit subsidy for the Advanced Technology Vehicles Manufacturing (ATVM) loan program.

- Q63b. How does eliminating the ATVM program help support American manufacturers and autoworkers?
- A63b. To support the Administration's commitment to reasserting the proper role of what has become a sprawling Federal Government and reducing deficit spending, the President's FY 2018 budget reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies and focuses resources toward early-stage R&D.
- Q64. I was particularly disturbed to see the proposed cuts to the Office of Electricity Delivery and Energy Reliability's R&D programs. At a time when we require more advanced and integrated R&D to improve the security, resiliency and reliability of the grid, why in the world would the administration propose these deep cuts?
- A64. The FY 2018 budget request focuses funding on early stage research efforts to improve the security, resiliency and reliability of the grid, allowing for private industry to leverage this research for innovative applied solutions, demonstrations, and pilot projects tailored to market needs and opportunities. R&D programs focused on activities where the

private sector has substantial incentive to invest are better conceived and managed through market-based disciplines.

- Q65. In response to a Question for the Record, you wrote, "I assure you that I am committed to energy reliability and to fulfilling this important mission of the Department." Nevertheless, the President's proposed budget for fiscal year 2018 cuts the non-cyber programs at the Office of Electricity Delivery and Energy Reliability by 46 percent, including an 80 percent cut to the Resilient Distribution Systems program. These cuts would eliminate critical advanced modeling, research into new synchrophasor applications, evaluation of transactive controls, microgrid demonstrations, and grid-scale storage demonstration projects. If the Department ceases to fund the important work described above, what other entities have demonstrated a willingness and financial ability to pick up the slack?
- A65. The FY 2018 budget request focuses funding on early stage research efforts, allowing for private industry to leverage this research for innovative applied solutions, demonstrations, and pilot projects tailored to market needs and opportunities. Some states are also supporting technology demonstrations to support their grid modernization goals. In general, activities where there are sufficient and substantial incentives for market-based investment are better facilitated by the private sector.
- Q66. The President's budget proposes to auction-off to the highest bidder the Bonneville Power Administration's transmission facilities and the transmission assets owned by the other Federal power marketing administrations (PMAs). This proposal would increase rates for BPA customers between 26 and 44 percent, allowing private companies to substantially raise transmission rates and thus increasing power prices for consumers in more than 30 states. Is the Department seriously going to pursue this proposal to auction off the PMA transmission lines?
- A66. While the Budget proposes to divest the PMAs of their transmission assets, privatization of the PMAs has been proposed by Administrations in the past, and I recognize your concerns regarding the proposal.

As Secretary of Energy, I want to assure you that I value the goals of affordable, reliable power and transmission services to ratepayers and consumers. I understand how important those goals are, particularly to rural communities, and the significance of transmission systems to your region's economy. I commit to work with you as the discussion of this proposal continues.

- Q67. Please provide a detailed explanation of how the Department can justify pursuing this proposal to auction off the PMA transmission lines, including those owned by the Bonneville Power Administration.
- A67. Divestiture of Federal assets can encourage private capital investment in the Nation's infrastructure and relieve long-term pressure on the deficit related to future capital investments. The vast majority of the Nation's electric infrastructure is owned and operated by for-profit private utilities. Ownership of transmission assets is best carried out by the private sector where there are appropriate market and regulatory incentives. Eliminating or reducing the PMA's role in electricity transmission and increasing the private sector's role will encourage a more efficient allocation of economic resources and mitigate risk to taxpayers.

As Secretary of Energy, I want to assure you that I value the goals of affordable, reliable power and transmission services to ratepayers and consumers. I understand how important those goals are, particularly to rural communities, and the significance of transmission systems to your region's economy.

- Q68. By eliminating ARPA-E, the proposed budget would also have an adverse impact on DOE's Small Business Innovation Research (SBIR) and Small Business Technology Transfer (STTR) programs, reducing funding for these successful public-private partnerships by 25%, or nearly \$57 million, when compared to FY 2016 numbers. What is the impact of the budget cuts on the SBIR and STTR programs compared to FY 2017 numbers by dollars and percent?
- A68. The table below summarizes the FY 2017 Enacted level and FY 2018 President's Budget Request for the DOE SBIR and STTR programs.

	FY 2017 Enacted (\$M)	FY 2018 President's Request (\$M)	Change (\$M)	Change (%)
SBIR	222	152	-70	-32%
STTR	31	21	-10	-32%

- Q69. You have the discretion not to cut SBIR/STTR programs. Have you considered transferring the SBIR/STTR funding that would have been administered through ARPA-

E to the Office of Science to administer, and therefore not reduce, public-private partnerships with small firms? Will you review this option and provide details on your decision, including why you made the decision?

- A69. DOE has historically determined the budgets for the SBIR/STTR programs administered by the OS and Advanced Research Projects Agency-Energy (ARPA-E) by applying the congressionally-mandated percentages for SBIR and STTR to its extramural R&D budgets. DOE values the contribution made by small businesses through the SBIR and STTR programs, but also values the extramural R&D performed by the DOE national laboratories, universities and other organizations. Increasing SBIR/STTR allocations beyond the minimum required, decreases the amount of research funding that goes to these other groups. In some years, based on the quality of applications received, DOE has elected to contribute more than the minimum required by statute to the SBIR and STTR programs. DOE has not considered a policy change to permanently fund the SBIR and STTR programs above their minimum levels and does not anticipate doing so in the near future.

ARPA-E will continue to administer its own SBIR/STTR program. ARPA-E fully funds its SBIR/STTR projects at the time of award and therefore those projects funded from a given fiscal year appropriation will be supported as long as they continue to demonstrate technical success.

- Q70. Can you commit to ensuring that all future SBIR and STTR funds will be made in a timely fashion?
- A70. DOE works to ensure that SBIR and STTR obligations are made in a timely fashion each fiscal year. Obligation of SBIR and STTR funds are impacted by the appropriation process. In some years, late enactment of appropriations have resulted in SBIR and STTR obligations being delayed until the next fiscal year.
- Q71. Some small businesses fear DOE will move away from the Congressional mandate to review proposals based on technical merit and move towards proposals that are based more on an ideology, reducing exploration of technologies regarding clean technology or mitigating climate change. Will you commit to preserve merit-based reviews of SBIR and STTR applications, and ensure transparency in any process changes?

- A71. As stated in DOE's Guide to Financial Assistance: "It is DOE policy that all discretionary financial assistance, competitive or noncompetitive, be awarded through a merit-based selection process. Merit review means a thorough, consistent, and objective examination of applications based on pre-established criteria by persons independent of those submitting the applications and knowledgeable in the field of endeavor for which support is requested." SBIR and STTR applications have been and will continue to be subject to merit-based reviews. The merit-based review criteria are published in each SBIR/STTR Funding Opportunity Announcement.

QUESTIONS FROM SENATOR RON WYDEN

- Q 1. The president's budget calls for auctioning off the transmission assets of the Department of Energy's Power Marketing Administrations, including the Bonneville Power Administration in the Northwest.

Selling off BPA would amount to highway robbery for families in the Northwest, whose dollars are already stretched too thin without the administration trying to raise their monthly utility bills. Public power customers in the Pacific Northwest have paid for the system, which runs successfully without interference from the federal government. Their investment should not be put up for sale.

Can you explain how the administration's proposal to sell off the transmission assets of power marketing administrations like BPA is in the best interests of families in the Northwest?

- A1. The Administration's proposal seeks the best operation of these transmission assets with appropriate market and regulatory incentives in the private sector. As Secretary of Energy, I understand how important the goals of affordable, reliable power and transmission services are to Pacific Northwest families.

- Q2. The National Energy Technology Laboratory campus in Albany, Oregon has been an integral part of the Energy Department's national energy research since it was created in 1943. Scientists in Albany have contributed valuable research on the Department's classified national security programs and a broad range of research for the public.

On what basis, in the few short months that you have been in charge of the department, did you decide to close it? I want to see the actual, written analysis that you used to make this decision. Please provide that to the Committee and to me within a week.

- A2. As part of the Department's effort to operate more efficiently, the FY 2018 Budget Request proposes a phased approach to consolidation of NETL's Albany research operations into NETL's Eastern sites. The Department has funded a Mission Alignment study to begin in FY 2017 to evaluate this approach. The study will: (1) Evaluate alternatives for locating NETL's Alloy Metallurgy Capabilities; (2) Study of Environmental Impacts Responsibility & Remediation at the Albany site; and (3) Analysis of Alternatives for Configuration of NETL's Eastern Sites.

In looking at consolidation of the Eastern sites, the Department will consider factors such as the cost of operations at each site, percentage of the workforce that is located at each

site, mobility of functions, and proximity to regional resources and partnerships. It is likely that this activity will take several quarters to complete, at which time a final report will aid informing next steps regarding the long-term configuration of NETL's footprint. This is a process that will include input from our workforce and other stakeholders. Any decisions made are to ensure the long-term strength and sustainability of the Department's science and technology enterprise.

- Q3. It's been over a month since a tunnel holding railroad cars full of radioactive waste collapsed at the Hanford site. That collapse is yet another reminder that decades of environmental missteps and shortcuts are coming home to roost.

Residents and workers in the Pacific Northwest are tired of being put at risk. During your confirmation hearing, you committed to working with members of the Senate to clean up the site and move forward on a Hanford cleanup plan. So it defies explanation that your department's budget cuts funds from the very account at Hanford that funds the cleanup of this tunnel, other contaminated sites at Hanford.

Last month, Sen. Cantwell and I joined with a bipartisan group of senators and representatives from Oregon and Washington. We asked the Government Accountability Office to literally get to the bottom of radioactive sites at Hanford and give us a report card on what DOE needs to do to clean up this mess. Cleaning up Hanford is not a partisan issue. It's DOE's issue. And now as Energy Secretary, it's your issue.

What are you going to do to restore funding for clean-up at Hanford, and what are you going to do to restore the confidence of citizens and workers in the Northwest in the DOE's ability to make Hanford safe?

- A3. The Department takes its regulatory commitments seriously and is actively working to meet its cleanup commitments. The safety of our workers, the public and the environment are overriding values in performing our cleanup mission.

The FY 2018 budget positions the Department to continue making progress at the Hanford Site, which includes continued progress in safely removing the K Basin sludge from near the Columbia River to the central plateau, continuing pump and treat activities to remediate contaminated groundwater, and the maintenance, repair, and replacement of failing infrastructure, facilities, and systems. This includes a focus on addressing risks posed by those that are specifically clean-up related and those that support our cleanup activities.

The FY 2018 budget request was slightly greater than \$2.3 billion. This funding is greater than one-third of the entire budget for Department of Energy's Office of Environmental Management.

As a former governor, I have a strong appreciation and understanding of the role of elected officials. I am committed to working with you, the state of Washington, the Washington delegation and our other important stakeholders to continue to make steady cleanup progress and develop new and innovative solutions to our cleanup challenges at the Hanford site.

- Q4. During your confirmation hearing, you indicated that you would support investments in "the basic research that will spur innovation that will keep America's economy, including its wind and solar industries, competitive."

When this administration withdrew from the Paris agreement, you promised the United States would remain "the world leader in the development of next generation technology." You said that "instead of preaching about clean energy, this Administration will act on it."

Apparently, acting on it means slashing support for research and innovation. You have proposed cutting clean energy research by 70 percent. You've proposed gutting funding for the National Labs, including a 35 percent cut to the Pacific Northwest National Lab. You've proposed eliminating DOE's advanced research division. Meanwhile, China and Germany are investing billions in clean energy research.

Clean energy presents an opportunity for good paying, red-white-and-blue jobs, here in the United States.

How does this administration intend to be a world leader in clean energy research and innovation while gutting funding for research and innovation?

- A4. Through careful prioritization and ensuring that funding goes to the most promising research, the DOE will continue to be a world-leading science and technology enterprise that generates the innovations that fulfill our missions ensuring the Nation's security and prosperity.

The FY 2018 Budget Request focuses resources on early-stage research and development (R&D), where the Federal role is strongest, for energy technologies best positioned to enable American energy independence and domestic job-growth in the near to mid-term. This shift allows the private sector to fund later-stage research, development, and commercialization of energy technologies. By focusing on early stage R&D, the budget proposes critical investments necessary to sustain America's leadership in transformative science and emerging energy technologies.

- Q5. If you haven't discovered already, the DOE is a very secretive place. Often, the only way Americans and their elected officials learn about problems at DOE is from whistleblowers. Nowhere is that more true than at Hanford. Last year the Government Accountability Office sent a report to me and Sen. McCaskill and Sen. Markey documenting DOE's repeated failure to protect whistleblowers from retaliation. In March, we wrote you two urgent letters aimed at addressing problems raised by GAO.

The first asked you to immediately reinstate regulations making sure DOE could take action against its contractors for retaliating against whistleblowers. It's unfortunate that suspending those rules was one of the very first things the new administration did.

We are still waiting for a response to that letter. The second letter asked you to protect a whistleblower at Savannah River who was fired for cooperating with the Government Accountability Office on its investigation into whistleblower abuses at the Energy Department.

Again, we are still waiting for a response.

First, when can I expect your response to these letters, and second, what are you going to do as secretary to end DOE's culture of retaliation against whistleblowers?

- A5. As Secretary of the DOE, I am committed to promoting a strong safety culture across the Department that ensures that federal and contractor employees are able to speak out, raise issues, and share concerns about safety without fear of retaliation. Retaliating against an employee who reports violations of law, mismanagement, waste, abuse, or dangerous/unsafe workplace conditions is prohibited by statute, regulation, and contractual provisions. The Department currently has robust procedures in place for investigating—and remedying if appropriate—any and all claims of retaliation.

To further the commitment to whistleblower protection, the Department recently issued a final rule, which became effective in March 2017, clarifying that the Department may issue civil penalties against certain contractors and subcontractors for instances of whistleblower retaliation that concern nuclear safety.

In recent years, a small number of whistleblower claims against the Department or its contractors have been substantiated—both relative to the size of the DOE workforce and in absolute terms. Nevertheless, I, and DOE as a whole, take these claims very seriously. A notable example is the case of Sandra Black, a contractor employee at the Savannah River Site. The Department recently issued a final decision in her case and determined that there was a sufficient basis to conclude that she was subject to reprisal.

- Q6. The United States has signed the Comprehensive Test Ban Treaty (CTBT), which establishes a global moratorium on nuclear testing. Although the US has not ratified the treaty, Presidents from both parties have followed George H. W. Bush's moratorium on new testing. Do you support continuing this bipartisan moratorium on nuclear testing?
- A6. The United States is continuing to implement our long-standing moratorium on nuclear testing. Through National Nuclear Security Administration's (NNSA) Stockpile Stewardship Program, we're able to confidently certify that the nuclear stockpile is safe, secure, and effective without nuclear explosive testing. On CTBT itself, the Administration is conducting a thorough review of U.S. arms control and nonproliferation policy, including the CTBT, and this review is not yet complete.
- Q7. The President's budget requests \$1.79 billion for Department of Energy Nuclear Nonproliferation priorities. That's about \$90 million less than Congress provided last year and almost \$150 million less than the year before that. Do you agree that preventing the spread of nuclear weapons and nuclear materials should be one of the top U.S. priorities? If yes, then can you explain to this Committee why you asked Congress to cut funding this year rather than to increase funding?
- A7. Yes, the Administration agrees that preventing the spread of nuclear weapons and nuclear materials should be one of the top U.S. priorities. The \$87 million (4.6 percent) reduction in the DNN budget in FY 2018 relative to the FY 2017 enacted is misleading because the reduction is driven by a decline in University of California (UC) Legacy pension costs and a

shift in DOE's strategy in its plutonium disposition program. Specifically, the \$87 million reduction is a result of three things:

- \$56 million less requested for MOX construction;
- \$42 million less requested for UC Legacy Pension; and,
- \$11 million in increases to other DNN activities.

This Administration is committed to pursuing an aggressive nonproliferation agenda, even in this tight budget environment. NNSA is requesting more money in FY 2018 for its core nonproliferation, counterterrorism, and counterproliferation work than requested in FY 2017. NNSA is effectively asking for the same amount as enacted in FY 2017, excluding UC Legacy pension payments and the MOX construction program:

- Compared to the FY 2017 request, the core non-proliferation program (NA-20) is 4.0 percent higher; DNN is 3.6 percent higher including both the core nonproliferation program and National Counterterrorism and Incident Response (NCTIR).
- Compared to the FY 2017 enacted, the core non-proliferation program (NA-20) is 0.4 percent (\$4.9 million) lower; DNN is 0.04 percent (\$0.6 million) higher including both the core nonproliferation program and NCTIR.

QUESTIONS FROM SENATOR DEBBIE STABENOW

- Q1. In your written testimony, you mention that you wish the Senate confirmed you earlier so you could have been “a full participant in crafting this (budget) proposal.” I am assuming this means you would have sought changes to the budget request.

How would the budget look differently had you been confirmed by the Senate earlier? Would it not be proposing a \$920 million cut to the Office of Science or a \$1.5 billion cut to the Energy Efficiency and Renewable Energy office? Would it not be proposing to zero out the SuperTruck program and many other programs administered by the Vehicle Technologies Office?

- A1. The FY 2018 Budget refocuses the Department’s energy and science programs on early-stage research and development (R&D) at our national laboratories to advance American primacy in scientific and energy research in an efficient and cost effective manner. This includes a \$4.5 billion investment in the Office of Science, to continue and strengthen American leadership in scientific inquiry with Department of Energy (DOE) as the Nation’s largest Federal supporter of basic research in the physical sciences.

The FY 2018 Budget focuses Energy Efficiency and Renewable Energy (EERE) resources on early-stage R&D, where the Federal role is strongest, and reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies. The Budget emphasizes energy technologies best positioned to support American energy independence and domestic job-growth in the near to mid-term. The Budget maintains America’s leadership in transformative science and emerging energy technologies in sustainable transportation, renewable power, and energy efficiency.

EERE early-stage research focuses on technology challenges that have the potential for high return on investment, but which present a significant degree of scientific or technical uncertainty across a relatively lengthy time span, making it unlikely that industry will invest significant R&D on their own. Thus, this budget maintains the most critical core capabilities and infrastructure at DOE National Laboratories related to sustainable transportation, renewable power and energy efficiency technologies. Technology solutions derived from EERE early-stage R&D give U.S. industries, businesses, and

entrepreneurs the competitive edge needed to excel in the rapidly changing global energy economy. Industry deployment of these technologies creates jobs, reduces U.S. reliance on imported oil, increases energy affordability, improves energy security, ensures environmental responsibility and offers Americans a broader range of energy choices. As we move forward over the coming weeks and months, I look forward to working with you and your colleagues to finalize the funding for the DOE.

- Q2. Thank you for your commitment to visit the Facility for Rare Isotope Beams project at Michigan State University. When completed, it will be the world's most powerful radioactive beam facility and advance new defense, environmental science, and medical technologies. The project will generate \$1.7 billion in wages and \$4.4 billion for Michigan's economy.

I was surprised that you would mention in your written testimony that the budget includes \$80 million for the FRIB when that amount is \$17.2 million less than what is required to keep the project on track and when your department acknowledges these cuts would drive up the project's cost by \$20 million.

I appreciated your comments to me last week that you are committed to ensuring FRIB remains on budget and on schedule for completion. How will you work with me and the Congress to ensure this objective is achieved when the budget does not include the resources necessary to make this happen?

- A2. Construction of the Facility for Rare Isotope Beams (FRIB), which will provide world-leading capabilities for nuclear structure and nuclear astrophysics, is a high priority for the Department and strongly supported within the FY 2018 President's Request. The project has made impressive progress since it started in FY 2014 and it is over 70% complete. The project will be re-baselined to reflect an increased Total Project Cost and schedule delay as a result of a decrease in its funding in FY 2018 relative to the current funding baseline profile. Even in the context of competing priorities, the Department is committed to supporting the project through to its successful completion, enabling U.S. world-class nuclear structure and astrophysics research.
- Q3. I was very disappointed to see that the Department's budget proposes to zero out the SuperTruck program, along with most other programs in the Department of Energy's Vehicle Technologies Office.

SuperTruck is a 50/50 cost-shared, public-private partnership that promotes the research, development, and demonstration of technologies that improve the efficiency of tractor trailer trucks by more than 100% by 2020.

Trucks, which include Class 8 vehicles, haul as much as 80% of the goods transported in the country. Although they only make up 4% of vehicles on the road, they use about 20% of the fuel. Adoption of technologies because of SuperTruck will save millions of gallons of fuel per day and significantly reduce carbon emissions.

I understand budgeting requires hard choices. However this \$20 million program that creates strategic public-private partnerships seems to exemplify the type of projects your Department should be engaged in, and moreover, reflect the programs you spoke favorably about to this Committee and with me personally. Why then is the budget eliminating funding for SuperTruck?

- A3. SuperTruck II builds on the success of the SuperTruck I program and seeks to achieve greater than 100 percent improvement in freight efficiency (ton miles per gallon) as well as 55 percent engine brake thermal efficiency, with a focus on technologies with realistic potential for cost effectiveness.

The FY 2017 Consolidated Appropriations Act provided a second year of SuperTruck II funding at \$20M and specified adding a fifth award. The Department plans to comply with this direction over the next few months, consistent with the competitive bid process. Since FY 2017 would be the final year of funding for this work, all awards will be modified to accommodate the \$40M in enacted funding (\$20M in FY 2016 and \$20M in FY 2017) while increasing the program to five awards. The Department will continue to work with the five awardees and reflect DOE's overall commitment to focusing on early stage R&D.

- Q4. During our conversation in January we discussed the Iran Deal and nuclear nonproliferation. At that time, you mentioned needing to learn more about the agreement and that one of your first actions as Secretary would be to meet with former Secretary Moniz to get more information. Have you met with Secretary Moniz and with experts at the International Atomic Energy Agency? If yes, are you confident that the Department of Energy has the tools necessary to enforce the agreement?
- A4. Yes, I have met with former Secretary Moniz. DOE does not "enforce" the Joint Comprehensive Plan of Action (JCPOA) with Iran, but we play a leading role in developing and supporting the tools necessary for the United States to assess Iranian

compliance. For example, through technical support and training, DOE supports the International Atomic Energy Agency's (IAEA's) ability to monitor and verify Iran's nuclear activities. Since 1980 every IAEA inspector receives nuclear material measurement training at Los Alamos National Laboratory (LANL).

I met with IAEA Director General Yukiya Amano in March and look forward to meeting with additional IAEA experts in the future. Close collaboration with the IAEA is central to maintaining U.S. confidence in the IAEA's monitoring and verification activities and, by extension, Iran's continued compliance with the deal.

Many of the tools and capabilities available to the IAEA for JCPOA monitoring were also developed through DOE safeguards cooperation. For example, the On-line Enrichment Monitor, jointly developed by Oak Ridge National Laboratory (ORNL), LANL and the IAEA, allows the IAEA to determine if Iran enriches uranium above permitted levels. I am confident that the Department of Energy has the tools necessary to assess Iranian compliance with the JCPOA.

- Q5. In your nomination hearing and in our conversations, you shared your commitment to sound science and the Department of Energy's essential role in supporting critical research and development. As you stated in January before this committee, research and development carried out at DOE has the potential to change the world and make a real positive difference in quality of life and the economy in our country – a sentiment I agree with.

However, multiple programs such as the Advanced Manufacturing Program and ARPA-E are severely cut or eliminated in this budget proposal. This budget does not seem to reflect the essential role you have described that DOE plays in technological advancements that improve people's lives and drives our economy.

According to a report from Ranking Member Cantwell, the cuts in your budget would result in 420 scientists in Michigan losing their jobs and future annual economic growth in my state being reduced by nearly \$165 million annually. What impacts on technological advancements for our Country would you anticipate in the coming years as a result of the proposed cuts?

- A5. Through careful prioritization and ensuring that funding goes to the most promising research, the DOE will continue to be a world-leading science and technology enterprise

that generates the innovations that fulfill our missions ensuring the Nation's security and prosperity.

The FY 2018 Budget Request focuses resources on early-stage R&D, where the Federal role is strongest, for energy technologies best positioned to enable American energy independence and domestic job-growth in the near to mid-term. This shift allows the private sector to fund later-stage research, development, and commercialization of energy technologies. By focusing on early stage R&D, the budget proposes critical investments necessary to sustain America's leadership in transformative science and emerging energy technologies.

- Q6. Secretary Perry, in your interview with CNBC on Monday morning, you were asked whether you thought carbon dioxide was the 'primary control knob' for the temperature of the Earth and the climate. You responded: "No, most likely the primary control knob is the ocean waters and environment that we live in."

You went on to say that being a skeptic about the causes of climate change was "quite all right" and that if someone does not believe the science on climate change is settled, that person is wrongly treated as a "Neanderthal."

I don't have a problem when an individual has questions about anything. What I do find concerning is when someone holds a position that seems to disregard near scientific consensus – be it from NASA, NOAA, or the Intergovernmental Panel on Climate Change.

Given this scientific consensus, what information appears to have led you to think human activities are not the leading cause of climate change?

- A6. I believe the climate is changing and man is having an impact. There are several 'control knobs' which contribute to that change. My focus as Secretary of Energy is to utilize American innovation and technology to produce energy in an environmentally responsible manner that enhances our economic security.

QUESTIONS FROM SENATOR AL FRANKEN

- Q1. Mr. Secretary, I believe there is an important federal role in helping Tribal Nations develop electricity projects. Congress created the Tribal Energy Loan Guarantee Program in the Energy Policy Act of 2005 to help tribes overcome challenges in securing financing for electricity projects by allowing the DOE to guarantee loans. But until this year, the program had never received funding. Thanks to the help of many of my colleagues on this committee from both sides of this aisle—including Chairman Murkowski and Senators Hoeven and Barrasso—the Fiscal Year 2017 omnibus provided \$9 million. Now the Department needs to set up the program and start issuing loan guarantees. This program can help develop energy resources and bring high-quality jobs to Indian Country, where they are badly needed. Will you commit to me that you will set up the program and expend the funding that Congress provided the Department?
- A1. The FY 17 omnibus was enacted shortly before the FY 2018 Budget was released. The Budget proposes to terminate the Loan Programs, and the Department is currently in the process of evaluating how the credit subsidy provided in the omnibus fits within the loan program proposal in the budget.
- Q2a. Secretary Perry, in April you ordered a 60-day review of U.S. electricity policy to determine whether coal and nuclear plants are being “unfairly” pushed off the grid. You suggested that renewable resources—like wind and solar—were threatening grid reliability and that because of that, we need to prop up coal and nuclear plants. What do you expect this study to find?
- A2a. The Department, at my direction, has undertaken an internal review to examine the state of electricity markets and grid reliability and produce a study aimed at ensuring that our electric grid remains reliable, resilient, and affordable. The study is an impartial review of the state of electricity markets and related policies, and there are no preconceived notions as to the findings and recommendations that will result from this review.

I appreciate the value of all energy sources. My track record speaks for itself. As Governor of Texas, I helped oversee an enormous increase in wind energy such that Texas is now the largest wind energy producing state in America. The study raises important and timely questions about the electric grid. For example, it asks why so many

baseload plants—like coal and nuclear—have closed, whether wholesale energy and capacity markets are adequately compensating important resilience and reliability attributes, how electric markets have evolved, and whether regulatory burdens, subsidies, and mandates have forced premature retirements. I have directed the Department to conduct rigorous analysis to answer these questions and to recommend sound policies to protect the Nation's electric grid.

Q2b. How will you use the findings?

A2b. The study is an important step toward determining how to ensure a well-functioning electric grid for the long term. We expect that the study will show that many actors outside the Federal government have an important role in grid resilience and reliability. We plan to articulate a wide range of possible actions, ranging from immediate actions falling within the scope and authority of the Department to broader solutions the Department cannot undertake alone. The study is intended to inform and motivate further discussion and action within and across the electric stakeholder community. We look forward to a fruitful dialogue once the study is completed.

Q2c. Are you familiar with an extensive two year study, completed by the Department of Energy last year, which found that the U.S. energy grid could accommodate up to 80 percent wind and solar power with no loss of reliability? If so, why do you need an additional study?

A2c. This important building block study, which was in part funded at National Renewable Energy Laboratory by Department of Energy's (DOE) Office of Electricity Delivery and Energy Reliability, showed the potential to handle large amounts of variable renewable energy within the grid structure. It did not, however, conclusively model the impact of high penetrations of variable renewable energy. For example, the study showed modeling feasibility only if there were also grid changes equivalent to building over 40 new 1,000 megawatt transmission lines across the Nation and grid operations managed by a single balancing authority over the 48 contiguous states.

- Q2d. In justifying the study, you claim that centralized power from coal and nuclear must be preserved as a matter of national security, yet DOD is moving toward a more diverse set of power sources precisely to increase reliability and security, in the U.S. and abroad. Why are these two agencies moving in what appears to be opposite directions?
- A2d. American families and businesses deserve a power system that is affordable, supports national security through fuel diversity and fuel assurance, and is technologically advanced, resilient, reliable, and second to none. Because these goals may conflict and require delicate balancing by policymakers—for instance, high levels of reliability can become expensive, which works against affordability—and given growing levels of uncertainty and volatility from technology, finance, world threats, environment, etc., it is prudent to compile diverse portfolios that can provide a variety of important attributes. The study essentially asks how we should go about building and maintaining such portfolios, and seeks to understand the consequences for the Nation’s electric resource portfolio options should significant amounts of coal and nuclear resources become unavailable to serve in current and future portfolios.
- Q3. Secretary, during the hearing you said, “Is ARPA-E the holy grail of how government needs to be structured? I will suggest to you, maybe not.” What did you mean by this statement? Other than proposing to end the program, are you planning on proposing reforms to ARPA-E, and if so, when will you share them with Congress?
- A3. The Administration remains committed to responsible spending that supports early-stage energy research and is prioritizing high-impact early-stage research that the private sector is unlikely to undertake. There is concern about the potential for Advanced Research Projects Agency-Energy’s (ARPA-E) efforts to overlap with Research & Development (R&D) being carried out, or which should be carried out, by the private sector. The proposed elimination of ARPA-E reflects both a streamlining of Federal activities and a refocusing on the proper Federal role in energy R&D.
- Q4. According to DOE’s FY 2018 budget submission, the MOX project has “experienced a 350 percent cost growth and a 32 year schedule slip since 2007.” The MOX approach to plutonium disposition is now projected to cost approximately \$50 billion, while the dilute and dispose alternative is less than half that—at about \$17 billion. I commend you for proposing termination of the MOX project and instead pursuing the dilute and dispose alternative to plutonium disposition. I would also like to know, does DOE’s current cost estimates for MOX include the decontamination and decommissioning of the facility at

end of the project? If current cost estimates do not include this, what is a rough order of magnitude estimate of the cost of decontaminating and disposing of the MOX facility once the project is finished?

- A4. DOE's current cost estimates for the MOX project does not include decontamination and decommissioning of the facility. We do not have a rough order of magnitude estimate for these costs since this will be dependent on the negotiated final end state of the facility.
- Q5. Recent news reports have revealed a series of safety violations at Los Alamos National Laboratory, in particular a lack of safety culture and repeated violations of safety rules involving plutonium. According to the *Washington Post* story, almost all of the people hired to enforce the safety procedures have quit in frustration. Apparently, these problems have been going on for 4 years, if not longer. What is DOE doing to immediately improve the handling of plutonium at Los Alamos and to insure that any safety procedures are enforced?
- A5. The *Washington Post* article discussed a series of safety infractions at Los Alamos National Laboratory (LANL) dating back to 2011. The article characterizes these events as on-going occurrences. However, most of the events described in the *Post* article happened prior to 2014. Regardless of the timeframe, corrective actions and improvements have been underway during the past, approximately, four years. Though we have made substantive progress, we understand that we need to continue to make improvements since the Lab has not yet attained the level of excellence DOE expects.

As a result of the issues identified in 2011, initial improvements in staff training were completed in 2012. Those improvements, however, did not resolve all the underpinning issues that ultimately led to significant criticality safety staff attrition by 2013. The Laboratory Director paused plutonium operations in 2013 principally due to problems in work execution, which was compounded by insufficient criticality safety professional staffing. The Laboratory began a corrective action plan to improve the Laboratory's safety culture and staffing. Actions under that plan continue today.

Initial efforts focused on improving plutonium handling processes. Improvements included revising procedures used to handle plutonium, enhanced training in plutonium

handling, and strengthening and increasing senior management reviews up to and including reviews with the Laboratory Director on actions and progress.

The Laboratory Director resumed lower risk operations in 2014. DOE federal staff reviewed the resumption process and the operations as they were restarted. Higher risk operations were resumed using a very structured process requiring federal verification that procedural and operational improvements were institutionalized within the Laboratory. Federal and contractor staff collaborated to ensure stockpile surveillance and production mission milestones were adequately managed. NNSA deployed resources from headquarters to assist the on-site field office in addressing these issues.

The result of this multi-year effort is a demonstrated improvement in plutonium handling processes and procedures. Six extensive federal assessments have verified that operational improvements and the underpinning training and culture are in place to support safe handling of plutonium in support of the mission.

The Laboratory has also strengthened the criticality safety division. The management that contributed to the staff attrition was replaced, and aggressive hiring to rebuild the criticality safety division continues. The division has been elevated within the organizational reporting structure to improve visibility and quickly obtain senior management help when needed. Currently, the criticality safety division staffing numbers are reaching the levels needed to fully support all Laboratory operations where significant quantities of nuclear materials are handled, although several staff remain in training. These efforts will continue until the LANL criticality safety division is a sustainable, world-class safety department.

Q6a. NNSA is reportedly considering alternatives for facilities to produce pits for nuclear weapons and earlier this month implied that pit production might be moved out of Los Alamos. One alternative being considered is the Savannah River Site. Is NNSA considering moving pit production to the Savannah River Site?

A6a. NNSA is conducting an Analysis of Alternatives (AoA) to evaluate all plausible options that could provide enduring plutonium infrastructure capable of supporting pit production

capacity of 80 pits per year. Multiple sites within the Nuclear Security Enterprise, including Los Alamos National Laboratory and the Savannah River Site, are being considered within the analysis. The AoA itself is not a decision, but a tool used to gather and analyze pertinent data as needed to inform the decision-making process. The AoA is expected to be complete in the summer of 2017.

Q6b. Is NNSA considering repurposing the MOX building for pit production?

A6b. Repurposing the MOX building for pit production is one of the alternatives being considered in the Analysis of Alternatives. The AoA itself is not a decision, but a tool used to gather and analyze pertinent data as needed to inform the decision making process. The AoA is expected to be complete in the summer of 2017.

Q6c. Is the Administration still committed to disposing of the excess weapons plutonium intended for MOX fuel or does it now intend to use this plutonium in the production of new nuclear weapons pits?

A6c. The Administration remains committed to disposing of our excess weapons-grade plutonium.

Q7a. In contrast to previous years, the FY 2018 budget request does not contain any information about the estimated appropriations necessary for the five year period of the Future Years Nuclear Security Program. This five year projection is helpful for understanding future implications for today's spending decisions and helps Congress better understand how to prioritize scarce resources. This is especially important with respect to the Weapons Activities account because, as you are aware, there is substantial disagreement and uncertainty over the cost of nuclear modernization.

Why did the FY 2018 budget submission include information about costs for FY 2018 only?

A7a. Estimates for the FY 2019 – FY 2023 base budget topline for the NNSA reflect FY 2018 levels inflated by 2.1 percent annually. This outyear topline does not reflect a policy judgement. The Presidential Memorandum on Rebuilding the Armed Forces, released on 01/27/17, directed a series of defense reviews including the initiation of a new Nuclear Posture Review, to ensure that the U.S. nuclear deterrent is modern, robust, flexible, resilient, ready, and appropriately tailored to deter 21st century threats and reassure our allies. Once the National Security Strategy and Nuclear Posture Review are completed,

the Administration will make a policy judgement on amounts for the NNSA's FY 2019 – FY2023 topline in the FY 2019 Budget.

- Q7b. When can Congress expect to receive information about the remaining years of the Future Years Nuclear Security Program?
- A7b. The Administration will make a policy judgement on amounts for the NNSA's FY 2019 – FY 2023 topline in the FY 2019 Budget, in accordance with the National Security Strategy and Nuclear Posture Review that are currently under development.
- Q8. I am concerned that the budget request for the Department of Energy proposes severe reductions to the Office of Energy Efficiency and Renewable Energy, cutting funding by 65 percent for wind power, 66 percent for solar power, and 76 percent for water power technologies. These reductions, if implemented, would reduce progress made over the last several decades in reducing America's dependence on foreign oil and increasing our clean energy. Additionally, I am concerned that these cuts would negatively impact DOE's efforts to bring high-risk/ high-reward research in renewable power – like that conducted at the St. Anthony Falls Laboratory in Minnesota – across the innovation "valley of death." Can you explain to me how this budget supports, in your view, American innovation, clean energy, and a sustainable energy future?
- A8. Through careful prioritization and ensuring that funding goes to the most promising research, the DOE will continue to be a world-leading science and technology enterprise that generates the innovations that fulfill our missions ensuring the Nation's security and prosperity.

The FY 2018 Budget Request focuses resources on early-stage R&D, where the Federal role is strongest, for energy technologies best positioned to enable American energy independence and domestic job-growth in the near to mid-term. This shift allows the private sector to fund later-stage research, development, and commercialization of energy technologies. By focusing on early stage R&D, the budget proposes critical investments necessary to sustain America's leadership in transformative science and emerging energy technologies.

- Q9. The DOE employs advanced computing and simulation to accomplish its core mission of advancing scientific frontiers and safeguarding Americans. While the budget request increases funding for Advanced Scientific Computing Research, sufficient funding is not provided for important areas of fundamental research, such as applied and computational

mathematics and Artificial Intelligence. Meanwhile, other countries, including China, are increasing investments in these areas. What is DOE's strategy for this research? Does the Department have plans to engage the current community of university researchers in applied mathematics and similar fields?

- A9. The decrease in the math and computer science research budgets from FY 2016 reflects a transfer of exascale related funding to the Office of Science Exascale Computing Project. The base research budgets continue to support fundamental research in areas such as data intensive science, Artificial Intelligence, and computing beyond Moore's Law. For example, ASCR currently supports a handful of small-scale research projects for exploring potential growth areas at the intersection of applied mathematics and Artificial Intelligence (AI). These will be used to spark larger-scale University and DOE national laboratory research investments and computational efforts involving AI. This effort engages universities as performers of research either directly funded by ASCR or in partnership with our national laboratories.
- Q10. As you know may know, Minnesota experienced a serious propane shortage a few years ago due to pipeline outages, a large corn crop that needs propane for grain drying, and an extremely cold winter. This shortage caused the price of propane to skyrocket, making it very expensive for over 200,000 Minnesotans to heat their homes during an extremely cold winter. Although changes have been made, I'm concerned that propane stocks are falling again this year. What is being done to prevent another shortage?
- A10. As the U.S. Government's provider of energy statistics and analysis, the Energy Information Administration (EIA) provides data and projections that can be used to inform the public. In response to the propane shortage experienced during the 2013/14 winter and current developments, EIA has taken the following actions:
- Starting with the 2014/15 heating season, EIA issues the Propane Situation Update briefing deck every Wednesday afternoon, from the first Wednesday in October to the last Wednesday in March. Michigan and Kansas are reported individually and the remaining Midwestern states are reported in groups,
https://www.eia.gov/special/heatingfuels/resources/Propane_Briefing.pdf
 - In October 2014 EIA expanded, in cooperation with participating states, the number of states covered in its State Heating Oil and Propane Program (SHOPP). The SHOPP

program surveys and reports average propane and heating oil prices at the state level,
<https://www.eia.gov/petroleum/heatingoilpropane/>

- In January 2017 EIA began reporting rail movements of propane, in addition to pipeline and waterborne movements, at the regional level,
https://www.eia.gov/dnav/pet/pet_move_railNA_a_EPLLP_RAIL_mbbbl_m.htm
- EIA is tracking propane inventories in the Midwest and sub-regions within it on a weekly basis.
- EIA has already engaged in discussions with industry and staff from Senate offices regarding current propane markets.
- EIA will brief staff from the offices of Senators Franken (MN) and Baldwin (WI) on issues affecting supply of propane in the Midwest at the end of July, when they will have additional data on propane inventory builds. Delegations from other states and associations have also been invited.

QUESTIONS FROM SENATOR JOE MANCHIN III

- Q1. Secretary Perry, as you know, the United States is entirely far too dependent on other nations for our supply of rare earth elements. These elements, also called “REEs” or “critical minerals”, are used in countless consumer products such as cell phones, televisions, and medical equipment. And these elements are increasingly the subject of national security concerns because our supply is imported from China. In fact, the Congressional Research Service reports that “refined rare earth metals are almost exclusively available from China. The United States has the expertise but lacks the manufacturing assets and facilities to refine oxides into metals...” That wasn’t always the case. So, it’s time we took a hard look at how to redevelop a domestic industry for these. West Virginia University is doing a lot of great work on extracting these materials from coal mine byproducts. Once commercialized, these processes could be a critical means of standing up a domestic market for rare earth elements. In the FY 2017 spending bill, we included a \$15 million plus-up for R&D into the extraction and recovery of rare earth elements and minerals from U.S. coal and coal byproducts.

Can you please comment on the national security concerns associated with these elements?

How would you address these concerns in the context of this budget which would put constraints on this type of research?

- A1. The U.S. is now largely import dependent for rare earth elements (REEs), which are needed in manufacturing in the communications, defense, information technology, medical, and renewable energy sectors. Billions of dollars are now spent on imports of these technologies, which include components made from REEs, that could instead be manufactured in the United States if the needed minerals can be supplied domestically. The potential economic benefits are substantial. Some of the raw materials for fiber optics systems, lasers, carbon fibers, and products needed for U.S. infrastructure improvements can be produced domestically. Department of Energy’s Office of Fossil Energy is working within the current budget to establish the technical and economic feasibility of producing these key materials domestically from coal and coal products. Our current focus is production of REEs in coal country to reduce our import dependence, to help insulate these U.S. regions from swings in markets for conventional coal products, and to attract advanced manufacturing facilities to one source of the materials - U.S. coal country. This research on extracting rare earth elements from domestic resources like coal is a complement to the research at the National Labs like Idaho, Ames, Oak Ridge and Livermore that focus on new approaches to subsequent

chemical separation and processing of rare earth materials into technologies like magnets, phosphors (for TVs, lighting and cell phones) and other items important to our strong domestic energy and manufacturing sectors.

- Q2. West Virginia is known for coal. But what we're less known for is the work we've done to burn that coal more cleanly. The DOE's fossil energy research is headquartered at the National Energy Laboratory in West Virginia, where NETL has worked with the private sector on the technologies we use to remove particulates and other harmful substances from coal. The National Energy Technology Lab in Morgantown, West Virginia is an extraordinary complex that is near and dear to my heart and employs 612 people. Your budget proposes consolidation of the 3 lab facilities that make up NETL in a phased approach. First, Albany would be consolidated in to the Eastern sites and, as your written testimony notes, the Department will "evaluate alternatives for the consolidation of NETL's eastern sites" in Pittsburgh and Morgantown. I believe that research and development is critical to the Department of Energy mission and the national lab system is vital to ensuring that we are on the cutting edge of energy technology development. The Morgantown facility is seen as a mainstay of fossil fuel technology development. Their projects on carbon capture, efficient utilization of coal, and how to integrate fossil fuel systems with renewable energy are vital to our energy future.

What is the goal behind this consolidation of the NETL facilities in Morgantown, Pittsburgh, and Albany, Oregon as proposed?

Can you provide additional details?

- A2. The Department's goal is to ensure we deliver cutting edge research that meets the needs of the energy industry and the American public by ensuring we have aligned and streamlined our scientific talent, physical assets and capabilities to serve this mission in the most cost-effective manner. To achieve this goal, we are launching a comprehensive study to analyze the costs and benefits of the National Energy Technology Laboratory three-site configuration as well as options to maximize its capabilities. The results of this comprehensive study will inform the best approach to achieving this goal.
- Q3a. West Virginia is hurting. The decline of the coal industry has been devastating. We are losing businesses and population. So, in addition to doing everything we can to stop the bleeding and help our people in the near-term, we are also looking for ways to revitalize our home state economy. I recently introduced the Capitalizing American Storage Potential Act which will help create an Appalachian Storage Hub. It would maximize the opportunities associated with our vast reserves of natural gas liquids (NGLs). According to the Mid-Atlantic Technology Research & Innovation Center, about 20% of the value in the Marcellus Shale alone is ethane, propane, and butane – also known as natural gas

liquids, attracting investments and creating jobs. So, the Hub will attract manufacturers that need reliable affordable access to these products. With safety and the environment top of mind, I'd like to see the Storage Hub move forward and that's why I introduced a bill making the storage hub eligible for Title XVII – to provide access to low cost financial capital to help overcome private sector concerns about risk.

Putting aside that the President's budget proposes the elimination of the loan program, what is your perception of this program which has a 97.78% repayment rate?

- A3a. To support the Administration's commitment to reasserting the proper role of what has become a sprawling Federal Government and reducing deficit spending, the President's FY 2018 budget proposal reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies and focuses resources toward early-stage research and development. Consequently, the budget reflects terminating loan originations after September 30, 2017.
- Q3b. Can you commit to work with me on how the Department of Energy can help the Appalachian Storage Hub?
- A3b. I look forward to continuing our dialogue on the Appalachian Storage Hub. Our roundtable discussion on the project was very productive, and I look forward to engaging you and your staff further.

QUESTIONS FROM SENATOR MARTIN HEINRICH

- Q1. I am pleased to see the Office of Technology Transitions is again funded in your budget. Last year, DOE successfully piloted a new approach to promote technology transfer from the DOE labs using a voucher program that pairs businesses with lab scientists and engineers to help speed up commercialization of technologies. I've been an advocate for voucher programs that help move technologies from the labs. What are your specific plans to promote tech transfer from the labs using the funding set aside in the Technology Commercialization Fund, and will you support a second round of vouchers to bolster the commercial application of lab-developed technologies?
- A1. DOE is aware that it is a statutory requirement to provide funding to support the Technology Commercialization Fund (TCF) and will adhere to that policy. We are in the final stages of selecting the 2017 TCF awardees, having recently completed the merit review process for the proposals submitted in response to our FY 2017 request during the first quarter of the fiscal year. I am pleased to report that there was increased interest and we received an increase of almost 25 percent in the number of proposals submitted for funding by the TCF in 2017 versus 2016.

As required under the statute, all TCF awards require matching private funds. In order to promote tech transfer from the labs, those labs that are contractor operated may use non-appropriated funding to submit proposals in two topic areas: Topic Area 1: Projects for which additional technology maturation is needed to attract a private partner; and Topic Area 2: Cooperative development projects between a lab and industry partner(s), designed to bolster the commercial application of a lab-developed technology. All labs are eligible to submit and receive awards in Topic 2. All projects selected for the TCF must receive at least an equal amount of non-federal funds to match the federal investment.

There have been two separate voucher type programs that have been pursued by DOE on a pilot basis over the past two years. One is a Small Business Voucher program in which funding and lab mentoring is provided to small businesses that are developing promising technologies that may or may not have originated at a National Lab. That pilot was begun in the Energy Efficiency and Renewable Energy program and has expanded to the Nuclear Energy program. The other pilot is the Energy I-Corps (previously known as Lab-Corps),

which partners national lab scientists and engineers working on energy technologies that have shown potential for commercial application with industry mentors. This activity provides a two-month intensive hands-on training for our lab scientists and engineers to learn how the private sector approaches decision making on technologies and products so the technologies (and companies licensing them) can successfully compete in the marketplace. This is accomplished using the energy technologies that have already been developed at the lab. The opportunity for training and mentorship by private sector experts enhances the ability of the national labs to successfully identify technologies with high potential for commercialization. Both the Small Business Voucher and the Energy I-Corps programs are under evaluation to determine their effectiveness and whether they merit continuation.

- Q2. You committed to the president your 60-day internal study of grid reliability and energy markets would “provide concrete policy recommendations and solutions.” You indicated today your study is now due in early July. Given this is an internal report that could have wide-ranging implications on future markets, will you consider providing an opportunity for public review and comment on a draft of the report before the recommendations are finalized?
- A2. We intend to publish the report, and we recognize the great interest that this internal review has garnered. In the spirit of transparency, we will welcome stakeholder input on the finished product. We are establishing a mechanism now to catalog those comments. All interested stakeholders will have ample opportunity to comment on the actual contents of the study.

While the Department receives a great deal of input from its stakeholders, we see this study as an important step in determining how to ensure a well-functioning electric grid in the long term. The Department has no preconceived notions as to the findings and recommendations that will result from this review. We look forward to a fruitful dialogue once the review is completed.

- Q3a. In responding to my question today, you indicated your forthcoming internal grid study would address issues of reliability in states such as Texas. As you well know, wind generation in West Texas has grown dramatically over the last few years and now accounts for about 23 percent of power generation for the Electric Reliability Council of Texas (ERCOT). Further, ERCOT believes close to 100% of new electricity generation that will be added in Texas over the next 10 years will likely be either solar and wind power. Do you agree with ERCOT's technical assessment that it can accommodate such high penetration levels of renewable energy?
- A3a. It is technically feasible to do many things on the grid that may not be economic or prudent to do on a large scale or an extended basis, so changes such as you describe require careful study and planning. When large amounts of variable renewable generation capacity (such as wind and solar) are added to the grid, they typically have to be backed up by some combination of highly flexible alternatives, such as gas-fired generation, energy storage devices, or demand response capacity, all of which need to be economically viable so that they will continue to be available when needed. Increasingly, given the design of today's wholesale electricity markets (including ERCOT), the addition of large amounts of zero-marginal cost wind and solar (and sometimes even negatively-priced wind because of the Federal production tax credit) into the markets can conflict with the economic viability of the generation resources necessary when the electricity from wind or sun are not available. Further, the addition of large amounts of renewables often requires the development of substantial additional transmission capacity, which typically takes significant time and capital investment, the cost of which generally falls to ratepayers. If ERCOT and the Texas electric power industry are able to bring on significant amounts of additional renewables while also doing the other things necessary to keep their system reliable and economic, that would be a welcome outcome.
- Q3b. If not, what federal policy remedies will you recommend to correct Texas's decision to increase its share of competitive renewable generation?
- A3b. It is unlikely that we will make specific recommendations to Texas (or any other state) about how it should balance its generation portfolio.
- Q4. In a letter dated July 25, 2014, the Nuclear Weapons Council gave Congress its commitment to build modular structures to maintain plutonium production and associated

support capabilities at Los Alamos National Laboratory consistent with section 3114 of the National Defense Authorization Act for 2013, as amended by section 3117 of NDAA for 2014. The NWC also stated the modular building strategy at LANL met the requirements for maintaining the nuclear weapons stockpile over a 30-year period. The plutonium strategy endorsed by the Nuclear Weapons Council and required by the NDAA will require substantial new investments at LANL over the next five years. I understand CD-0 was approved in August 2015 to construct two new modular structures for plutonium research at LANL not later than 2027. What is the status and timeline to complete the required Analysis of Alternatives? When do you now expect CD-1 and CD-2 to be approved?

- A4. Critical Decision (CD)-0 approval recognized NNSA's need to provide high-hazard, high-security laboratory space for conducting plutonium operations required for the enduring stockpile stewardship and management activities over the long term. Consistent with DOE Order 413.3B, and GAO best practices, an Analysis of Alternatives (AoA) is being conducted after CD-0 approval. The AoA evaluates options to address that need, and is expected to be complete in the summer of 2017.

Once the AoA is complete, and a preferred alternative is selected, National Nuclear Security Administration (NNSA) will initiate conceptual design and other activities to prepare for Critical Decision (CD)-1 submittal, which is anticipated in FY 2018. NNSA anticipates achieving CD-2 in FY 2020.

- Q5. I understand as governor you were interested in hosting temporary storage of high-level commercial nuclear waste and spent nuclear fuel in Texas. In 2012, the Blue Ribbon Commission's report on nuclear waste made very clear that the only possible path forward is through a consent-based approach to siting both temporary storage and permanent disposal facilities for high-level waste. Will you continue DOE's policy of consent-based siting? What in your mind constitutes "local consent" for siting nuclear waste facilities?
- A5. As Secretary, I continue to see the benefits that consolidated interim storage could provide in removing waste from some 120 sites around the country to one or a few consolidated storage facilities as we work towards a permanent disposal solution. With regards to an interim storage facility, it would need to be sited in accordance with local, state, and federal laws and regulations. Currently, the procedures for pursuing geologic disposal are prescribed by the Nuclear Waste Policy Act.

- Q6. Interstate energy transmission projects take significant investments and have long lead times. For project developers, it is critical to have some certainty in the timing and scope of federal permitting reviews. Under the energy Policy Act of 2005, the Department of energy was given multiple authorities to facilitate the timely construction of interstate electric transmission facilities. What steps is the Department taking under its existing authorities to facilitate the required reviews of multi-state high-voltage transmission lines?
- A6. On September 23, 2016, Department of Energy (DOE) issued a Final Rule for Coordination of Federal Authorizations of Electric Transmission Facilities establishing an Integrated Interagency Pre-Application (IIP) process. The IIP process was developed under the specific authorities found in section 216(h)(3) of the Federal Power Act, which requires the Secretary, to the maximum extent practicable under Federal law, to coordinate the Federal authorization and review process with any Indian tribes, multi-state entities, and state agencies that have their own separate permitting and environmental reviews. Section 216(h)(4)(C) also requires the Secretary to establish an expeditious pre-application mechanism to allow project proponents to confer with Federal agencies involved and for each such agency to communicate to the proponent any information needs relevant to a prospective application and key issues of concern to the agencies and public. The Final Rule went into effect on November 23, 2016.

The IIP is voluntary and timing for the process is driven by the transmission community. The IIP allows perspective transmission project proponents to engage in DOE-facilitated early project information sharing to inform any subsequent environmental review by Federal agencies under National Environmental Policy Act. An important strength of the process is that other agencies (Federal, regional, state, local, and tribal) with authorizations or permit decisions for a proposed transmission project are invited to participate so the information is shared at one time. This provides a transmission developer an opportunity to substantively discuss a proposed project with all agencies, to ensure that potential issues are identified by permitting agencies and tribes before a project proponent files an application, and to enjoy time savings through better early project planning. The deliverable of the IIP process is a Final IIP Resources Report—essentially an applicant-prepared Environmental Assessment—that is submitted to the lead agency conducting subsequent environmental review following application for

Federal authorizations. This document and its contents, which are vetted by the participating agency and tribal staffs, is incorporated into agencies' administrative record for permitting decisions, thereby using this early information to inform Federal agency decisions.

DOE's implementation of Section 216(h) authorities is on-going and DOE is currently developing policy and guidance with the Administration's focus on increased electric infrastructure development to effectively and efficiently meet the reliability and resiliency needs of the Nation's electric grid.

- Q7. The FY18 budget request for Science and NNSA provides increases in funding to accelerate the development of exascale computing. Exascale technology is important to the United States' national interests: With exascale technology, we can fight diseases, better maintain our nuclear stockpile and analyze the potential of foreign threats against the United States, and catalyze industry to produce products faster, cheaper, and more safely. Previous agency plans have called for exascale development in the 2023 timeframe, but the President's budget has included funding to accelerate its development to 2021. What specific factors led to your decision to accelerate the project delivery of at least one exascale-capable system in 2021?
- A7. The 2021 date is result of a request for information issued in early 2017 and subsequent discussions with U. S. computing vendors. Based on this work, it was evident that results of previous high performance computing activities yielded sufficiently innovative technologies that, with the appropriate investments, make exascale achievable in 2021. Achievement of exascale requires new hardware and software designs and technologies – not just more of the same technologies strung together – to overcome challenges in parallelism, energy efficiency, and reliability. We and our private-sector partners will be pushing our state-of-the-art fabrication techniques to the limit to achieve exascale. Significant one-time investments in engineering (“non-recurring engineering”) and design by the vendors in conjunction with DOE's team must be started as soon as possible in order to deliver an exascale system in 2021. Considerable concurrent investments are needed to develop software and applications to effectively use an exascale system on scientific problems and nuclear weapons applications. The 2021 delivery of hardware is aligned with the timeframe for completion of the necessary software and application development.

Deploying at least one exascale system in 2021 will keep the U. S. competitive in the international exascale race. As the Council on Competitiveness stated, “A country that wishes to out-compete in any market must also be able to out-compute its rivals.” Exascale computing is critical to the national security, scientific, and energy missions of the Energy Department. Exascale also is critical to ensure U.S. primacy in computing to advance economic competitiveness in technological and manufacturing processes. Achievement of exascale will deliver breakthrough computer performance to both the Federal and private sectors. The accelerated investments in design and engineering over the next 3-4 years will keep the U.S. at the forefront of computational platforms. This will allow us to continue to lead in: scientific and engineering progress; advances in manufacturing techniques and rapid prototyping; nuclear security missions including stockpile stewardship without testing; and, the ability to explore, understand and harness natural and engineered systems that are too large, too complex, too dangerous, too small, or too fleeting to explore experimentally.

- Q8. Your 2018 budget request provides for a substantial decrease in funding for the Department’s Office of Electricity (OE). OE is one of the most critical parts of DoE because of its role in funding a wide range of grid modernization research and deployment programs, as well as leading-edge grid security and reliability programs. Grid modernization is especially important to help propel the US economy forward. Is there a way that these programs can be shielded from such severe funding damage so that these valuable efforts can continue?
- A8. DOE agrees that grid modernization is critical to our economy and security, however the current fiscal environment requires thoughtful prioritization of Federal investments. The FY 2018 budget request focuses Federal funding on early stage research efforts, allowing for private industry to leverage this research for innovative applied solutions, demonstrations, and pilot projects tailored to market needs and opportunities. Where market incentives exist to undertake research and development activities like those previously supported by OE, such activities may be better initiated and managed by the private sector.

QUESTIONS FROM SENATOR MAZIE HIRONO

- Q1. During your confirmation hearing in January, I asked you how the Department of Energy under your leadership would be able to effectively pursue an all-of-the-above energy strategy – as you testified the Department would do – if the Trump Administration held true to its threat to completely eliminate a core program like the Office of Energy Efficiency and Renewable Energy (EERE) which focuses on transitioning to a cleaner, renewable energy economy. You said, “Well, Senator, maybe they’ll have the same experience I had and forget that they said that.” While this was a humorous response, we now know that the Trump Administration did not forget. The President’s budget proposes to cut the EERE program by 70 percent. The program was funded at \$2.1 billion in FY 2017 and is proposed to be funded at \$636 million in FY 2018. How can the Department lead an all-of-the-above energy strategy if so much of the Department’s all-of-the-above capabilities are being eliminated or marginalized through drastic funding cuts? I recognize that work on this budget proposal was underway before you were confirmed, but do you support actually making these cuts?
- A1. I support the President’s Fiscal Year (FY) 2018 Budget which refocuses the Department’s energy and science programs on early-stage research and development at our national laboratories to advance American primacy in scientific and energy research in an efficient and cost-effective manner.

The FY 2018 Budget focuses its investments on the basic, early-stage research and development (R&D) conducted by the scientists and engineers at our 17 national laboratories who are constantly on the path to developing the next great innovations that can transform society, and bring forth a new era of prosperity for the American people. These investments span technologies across the entire energy sector, including coal, natural gas, unconventional fossil energy, nuclear energy, renewable energy, energy efficiency, advanced transportation, the electric power grid, and basic science research. Across all of these areas, the Budget provides \$6.4 billion, \$4.5 billion in the Office of Science and \$1.9 billion in energy research and development programs, with a renewed focus on cutting-edge innovation and transitioning those breakthroughs to the private marketplace. These comprehensive and focused investments will allow the Department, through its National Laboratories, to continue supporting the world’s best enterprise of scientists and engineers who create innovations to drive American prosperity, security and competitiveness for the next generation.

- Q2. Hawaii has relied on imported fossil fuels for over 90 percent of our energy production. Thanks in large part to a memorandum of understanding signed first under President George W. Bush, the DOE has been a key supporter of Hawaii's efforts to shift towards sustainable locally produced renewable energy. Technical assistance and grants from DOE's State Energy Program have played a crucial role in accelerating the shift away from imported oil. In calling for the elimination of the State Energy Program, you assert in your testimony that "later-stage R&D, demonstration, and deployment responsibilities" should be shifted to the private sector and the States. Please explain to me your rationale for cutting off Hawaii's access to what you describe in your testimony as the "world's best enterprise of scientists and engineers who create innovations to drive American prosperity, security and competitiveness for the next generation."
- A2. The Administration is committed to energy policies that lower cost for hardworking American's and maximize the use of American resources, freeing us from dependence on foreign oil. The President's FY 2018 Budget Request for the Department of Energy (DOE) demonstrates the Administration's commitment to reasserting the proper role for what has become a sprawling Federal Government and reducing deficit spending. It reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies and focuses resources toward early-stage research and development. The DOE anticipates that the states, to the extent practicable, will re-prioritize state budgets and resources to support these programs as appropriate within their states.
- Q3. On June 20, the Natural Energy Laboratory of Hawaii Hawaiian Electric Light Company and others announced their plans to install an advanced flow battery using the element vanadium order to test its ability to provide long-duration grid-scale energy storage in a warm weather environment. DOE's Office of Electricity and the Sandia National Laboratory offered expertise, coordination, and financial support in helping this project happen. Energy storage technologies like this can help the whole country make use of greater amounts of energy from renewable sources like solar and wind and help Hawaii reach its goal of 100% renewable sources electricity by 2045. Given the promise of energy storage technologies and the reluctance of electric utilities to be the first to try out a new and capital-intensive technology on its own, do you agree with me that it is incredibly short-sighted to for this budget to propose cutting the Office of Electricity's energy storage program by 60 percent?
- A3. Energy storage is a promising technology for grid modernization. It provides the flexibility for variability in electricity supply and demand, enhances asset utilization, and contributes to electric system reliability and resilience. The FY 2018 budget request focuses Federal funding on early stage research efforts, allowing for private industry to

leverage this research for innovative applied solutions, demonstrations, and pilot projects tailored to market needs and opportunities. States may choose to support these efforts based on local priorities. DOE will continue to work with the private sector and the states to ascertain technological needs.

- Q4. The budget targets electric transmission and reliability, smart grid research and development, and energy storage for deep cuts, ranging from 64 to 80%. Hawaii has been on the leading edge of grid modernization, benefitting our residents, businesses, and military installations with a more reliable electricity supply. Why is the Administration trying to cut support for work that makes our grid more efficient, affordable, reliable, and less vulnerable at a time when cyber threats and threats from extreme weather and climate change are increasing?
- A4. DOE agrees that efforts to make our grid more efficient, affordable, reliable, and less vulnerable are important. However, the current fiscal environment requires thoughtful prioritization of Federal investments. The FY 2018 budget request focuses Federal funding on early stage research efforts, allowing for private industry to leverage this research for innovative applied solutions, demonstrations and pilot projects. States may choose to support these efforts based on local priorities. DOE will continue to work with the private sector and the states to ascertain technological needs. Moreover, where market incentives exist to undertake R&D activities like those previously supported by OE, such activities may be better initiated and managed by the private sector.

QUESTIONS FROM SENATOR BILL CASSIDY

- Q1. As you know, many of my constituents and I, have an interest in the Lake Charles Methanol project. The project received a conditional commitment from DOE for a loan guarantee last December. While the Department recommended in its budget for FY 2018 that the Loan Program be terminated, the budget recommendation did not rescind budget authority for projects that received a conditional commitment prior to October 1, 2017. My reading of DOE's proposal is that the Department will honor the conditional commitment for the Lake Charles project when the project is presented for financial close.

Given this budget was already written by the time you were confirmed, are there specific reforms you would like to implement to the DOE Loan Program that would give you greater confidence that taxpayers are being protected, while at the same time making financing available for first of a kind innovative energy projects?

- A1. The Loan Programs Office underwrites and structures its loans and loan guarantees to protect the interests of taxpayers and maximize prospects for full repayment. The Government Accountability Office (GAO) has stated in one of their past reports that some private lenders have noted that the Department's due diligence is as rigorous – or more so – than that performed in the private sector.

However, to support the Administration's commitment to reasserting the proper role of what has become a sprawling Federal Government and reducing deficit spending, the President's Fiscal Year (FY) 2018 budget reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies and focuses resources toward early-stage research and development. Consequently, the budget reflects terminating loan originations after September 30, 2017.

- Q2. The President's budget calls for a significant reshaping of the Strategic Petroleum Reserve. The budget requests additional sales of approximately 270 million barrels of crude by 2027, on top of the sales included in legislation last Congress. The budget also calls for the closure of 2 of the 4 SPR sites. While I do not support such a drastic reduction in the SPR, Congress will ultimately decide if additional sales are appropriate. What I am most interested in hearing are your plans on utilizing the Energy Security and Infrastructure Fund to modernize the SPR facilities. What is your assessment of the readiness and condition of the SPR facilities?
- A2. While the Strategic Petroleum Reserve (SPR) remains operationally capable and ready to drawdown its crude oil inventory if directed to do so, a significant amount of

infrastructure is approaching or has exceeded its 25 year design life and is in need of replacement. To address this issue, the SPR has initiated the Life Extension Phase II project as part of its SPR Modernization program. This project is on schedule, with an anticipated completion date between FY 2022 and FY 2024. Section 404 of the Bipartisan Budget Act of 2015 (Public Law 114-74) authorizes the Secretary of Energy to sell up to \$2 billion of SPR crude oil over four fiscal years commencing in FY 2017 through FY 2020. Receipts from these sales are deposited to the Energy Security and Infrastructure Modernization Fund to fund SPR Modernization program activities. In FY 2017, the SPR sold 6.28 million barrels of crude oil resulting in receipts of \$323.2 million, to be applied towards the Life Extension Phase II project.

- Q3. The Strategic Petroleum Reserve is decades old, and there have been recent reports of tank roof collapses and water pipe damage. What specific steps do you plan to take to ensure that this vital national resource is maintained and is fully operational if needed?
- A3. While the SPR remains operationally capable and ready to drawdown its crude oil inventory if directed to do so, a significant amount of infrastructure is approaching or has exceeded its 25 year design life and is in need of replacement. To address this issue, the SPR has initiated the Life Extension Phase II project as part of its SPR Modernization program. The purpose of this project is to modernize aging SPR infrastructure, SPR storage sites and the St. James marine terminal through systems upgrades and equipment replacement to ensure the SPR's operational readiness to meet mission requirements. The project is on schedule, with an anticipated completion date between FY 2022 and FY 2024.
- Q4. Southwest Louisiana and Texas have been leading the way on development of LNG Export facilities. Louisiana is expecting its second facility to begin exporting globally next year. According to Shell, global LNG demand is expected to increase 4-5% annually until 2030. We need to be in a position to fill that demand with U.S natural gas as the demand grows.

Unfortunately, the past Administration prolonged the export approval process for several projects, including one project which waited 1,642 days for approval. In the current competitive market, foreign buyers are looking for certainty before agreeing to long-term offtake agreements.

Do you believe exporting natural gas is in the national interest of the United States, and if so, what specific actions can you take as Secretary to ensure these approvals do not languish at DOE, as they have in the past?

- A4. To date, Department of Energy (DOE) has issued 28 final Liquefied Natural Gas (LNG) export authorizations to any country in the world where trade is not prohibited by law, in a cumulative volume of exports totaling 21.33 billion cubic feet per day (Bcf/d) of natural gas. In these orders, DOE has discussed the many benefits of exporting U.S. LNG, including environmental benefits, improved energy security for our allies and trading partners, and economic growth as measured by U.S. gross domestic product. DOE has found that these benefits are consistent with the public interest. DOE has acted on all applications ready for final DOE action. Thus far in 2017, DOE has granted the applications to export LNG from the proposed Golden Pass, Delfin and Lake Charles LNG export projects. DOE intends to continue taking prompt action on all applications that are ready for final action at DOE.

DOE's review of applications to export LNG to non-free trade agreement countries requires a public interest review under the Natural Gas Act, as well as an environmental review under the National Environmental Policy Act (NEPA). For large-scale LNG projects, the NEPA reviews are led by the Federal Energy Regulatory Commission (FERC) or U.S. Department of Transportation Maritime Administration (MARAD), with DOE acting as a cooperating agency. Given the size and scope of LNG projects, NEPA reviews that include issuing a Record of Decision or a Finding of No Significant Impact can take more than two years. Once the lead agency (FERC or MARAD) completes the NEPA review and issues a Record of Decision or Finding of No Significant Impact for a particular LNG export project, DOE typically acts within days or weeks to complete its public interest review and issue a final order.

Ultimately, the market will determine how much U.S. LNG export capacity is built and utilized. The most recent long-term forecast by the U.S. Energy Information Administration, the *Annual Energy Outlook 2017*, sees U.S. LNG exports reaching a high of 12 Bcf/d of natural gas by 2040. According to data submitted to DOE, LNG export

projects accounting for nearly half of the total LNG volume approved to date for export to any country in the world (10 Bcf/d of the 21.33 Bcf/d total) are currently under construction. In addition to promptly reviewing LNG export applications as part of our regulatory responsibility, DOE is working with the Administration, industry, other Federal and state government agencies, and our international partners to help U.S. companies maximize opportunities in the global LNG market.

- Q5. In the President's FY18 Budget, the Administration proposes to spend \$279 million to terminate the Mixed Oxide Fuel Fabrication Facility (MOX). This is a position that was shared by your predecessor Secretary Moniz but Congress has continued to reject this approach. The issue that has come up time and time again is the "re-baselining" of the project, or in other words figuring out what the project would likely cost to finish. I am told that your Agency "re-baselined" the MOX project without consulting with the contractor, which appears to go against the clear intent of Congress.

If it is true that the "re-baselining" of the MOX facility was done improperly, without consulting those who would actually be working on the project, then why would the Department of Energy make a final determination to terminate the project with incomplete data?

- A5. In response to the FY 2016 National Defense Authorization Act requirement, the Department updated the performance baseline for the MFFF project. This detailed estimate, which was prepared in collaboration with the U.S. Army Corps of Engineers and included consultation with the Contractor, was transmitted to Congress on September 14, 2016. The GAO has determined that the estimate is reliable. The estimated cost to complete the facility is roughly \$12 billion. The project would bring total construction costs to \$17 billion, when including \$5 billion in sunk-costs to date.

