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THE PRESIDENT'S BUDGET REQUEST FOR THE U.S. DEPARTMENT OF ENERGY FOR FISCAL YEAR 2019

HEARING

BEFORE THE

COMMITTEE ON ENERGY AND NATURAL RESOURCES UNITED STATES SENATE

ONE HUNDRED FIFTEENTH CONGRESS

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THE PRESIDENT'S BUDGET REQUEST FOR THE U.S. DEPARTMENT OF ENERGY FOR FISCAL YEAR 2019

TUESDAY, MARCH 20, 2018

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

The Committee met, pursuant to notice, at 10:03 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.

We are here today to discuss the President's budget request for the Department of Energy for Fiscal Year 2019.

We welcome to the Committee, Secretary Rick Perry. It is good to have you back in front of us, and we look forward to your comments this morning.

Like last year, the request emphasizes funding for the National Nuclear Security Administration, which falls outside of our jurisdiction. In addition, the President's budget requests additional funding for the environmental management program to clean up our nation's nuclear sites.

I appreciate these proposals, but the request offsets them with cuts to a number of energy and science programs that enjoy strong bipartisan support. It also seeks to eliminate all funding for ARPA-E, which is a program that undertakes innovative, pioneering work.

While we should always be looking for places to cut the budget, we should also recognize that innovation is critical to our nation's energy future. It creates jobs, it boosts growth, it adds to our security and it increases our competitiveness. We need to focus on maintaining our global leadership in science, research and development. And central to that mission are the hardworking scientists and engineers at our national laboratories and our universities.

Now although I do not support all of the proposals in this request, I believe that we will find many areas of interest and agreement. I believe it is time to look at reforms that can reduce the stovepipes at the Department and make better use of taxpayer dollars. I am intrigued by the Department's decision to create a new cybersecurity office, and I look forward to seeing the remainder of

the Department's budget justifications, which will need to be released as soon as possible.

So again, Secretary Perry, I want to welcome you back before our Committee.

I will note as all members have previously been alerted, that the Secretary has a hard stop at 11:30 so you can head to the White House. I understand that you will be taking up some, hopefully, nuclear-related discussions.

We appreciate your time, so out of respect for our limited time with the Committee this morning, I will end my opening remarks here and simply note that I look forward to hosting you, Mr. Secretary, in Alaska in the near future.

Senator Cantwell, good morning.

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

Senator CANTWELL. Thank you, Madam Chair.

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.

An important priority for DOE is energy infrastructure security. Our energy infrastructure is under attack. It is under cyberattack, and we need to do much more to protect it as a national critical asset.

Russia has proven its ability to disrupt the grid and last week the Trump Administration announced new sanctions on Russia for attacks on the U.S. infrastructure. The Department of Homeland Security and the Federal Bureau of Investigation characterized the activities as, "a multi-staged intrusion campaign by Russian government cyber actors who gained remote access into the energy sector networks."

The FBI and Department of Homeland Security state that since at least March 2016, Russia has targeted government entities in multiple U.S. critical infrastructure sectors, including our energy and nuclear sectors.

A year ago, I called for a comprehensive assessment of cyberattacks to our grid by Russians, and I repeatedly asked the Trump Administration to tackle this urgent task and make sure that we have an assessment. If the FBI and Department of Homeland Security's recent admission is not a siren, then I don't know what is. I hope that the belated response is the first step in turning that around to being a robust response to protect our critical infrastructure.

At a hearing last week, Mr. Secretary, you appeared with your colleagues in the Commerce Committee and said that you are not confident that the Federal Government has a broad strategy in place. Maybe we can elaborate and talk a little bit about that in the Q and A.

But as we discussed at a hearing earlier this month, establishing a new DOE cyber office with marginal increases is not a substitute for the serious investment and meaningful action that we need. You told this Committee earlier this year that cyber is one of your key priorities, so I hope that we will see meaningful action from

this Administration. We don't need rhetoric at this point, we need action.

I want DOE and the Administration to be more aggressive, and I hope that we will get this assessment of where we are with our grid as a milestone to what we need to do moving forward. We do want to defend against what could be widespread blackouts and devastation to our economy and the other harmful security risks.

You and I spent many hours at our national laboratory in the Northwest, at the Pacific Northwest National Laboratory (PNNL), discussing many of these issues, so I know you know this very well.

On other budget issues, obviously the Department of Energy is a science and technology powerhouse. Yet, the President's proposed budget slashes many of DOE's essential programs, which, I think, would be devastating to our clean energy economy. It would kill science, innovation and DOE jobs by eliminating ARPA-E and making drastic cuts to energy efficiency, renewable energy and electricity and the budget would raise electricity rates in the Pacific Northwest by auctioning off federal utility assets. So I think these are, obviously, mistakes and I will ask questions about them.

The budget would also undermine U.S. energy leadership and kill jobs. As the Chair noted at our Thursday hearing, for the first time, China is expected to surpass the U.S. in total R&D expenditures. And according to the International Energy Agency, more than $30 trillion will be invested globally in new, renewable energy facilities in energy efficiency between now and 2040.

The cost of clean energy and energy efficiencies, like solar, LEDs and storage, have dropped between 41 percent and 94 percent since 2008 and much of that was driven by the R&D of the Department of Energy. This is why we think this is so important to continue the science mission.

The decreases in those technologies have helped consumers save money and have created jobs. Just in the energy efficiency and clean sector they have supported over three million U.S. jobs.

So the success story is built on lots of DOE work through our national labs, like the Pacific Northwest National Laboratory in Richland, Washington, and through many other laboratories across the country.

President Trump's budget also, I think, besides eliminating ARPA-E, the weatherization program, the state energy program which provide highly-leveraged, state-controlled funding to about 50 state projects, eliminates loan programs which leverage billions of dollars in energy infrastructure, Draconian cuts to the energy research, 65 percent for the energy efficiency and 59 percent for the electricity delivery system.

I could go on, but I have to get to Hanford, Mr. Secretary. I am disappointed by the Administration's approach to the Hanford cleanup. The Trump Administration's proposal for FY'19 cuts Hanford by $230 million from FY'17 enacted levels. Instead of the cut, Hanford needs an increase of $200 million in order to keep workers safe and meet milestones. And those budget cuts have been justified by saying, "the decrease from 2017 enacted levels reflect the demolition of Plutonium Finishing Plant (PFP) to slab on grade." PFP is still standing and there is not even a date to resume demolition work at PFP, and rightly so. DOE and the contractors have

to be able to protect the workers. As you and I saw firsthand when we visited again, we need to provide a safe work environment at Hanford. What are the technologies that we need to do that?

I think the Administration's proposal comes up short. Under this budget, the Department would only be able to maintain status quo without making progress. As you well know, there is an agreement, milestones that have to be met. We will look forward to asking you questions about this in our Q and A.

It is very important that we continue to make progress on the largest nuclear waste cleanup project in the world. It is thorny, it is challenging, but we need consistent investment.

I trust you are not going over to Veteran's Affairs. I hope that you are staying right here and making sure that Hanford is cleaned up.

Thank you, Mr. Secretary.

The CHAIRMAN. Thank you, Senator Cantwell.

Mr. Secretary, again, welcome.

If you would like to provide your comments to the Committee, and then we will have an opportunity for our questions and your responses.

Welcome.

STATEMENT OF HON. RICK PERRY, SECRETARY OF ENERGY

Secretary PERRY. Chairman Murkowski, thank you for your hospitality, and Ranking Member Cantwell, it's an honor to get to be in front of this Committee and each of the members, thank you for your hospitality, your commitment to service to this country, today to discuss the President's Fiscal 2019 budget request for the Department of Energy.

If I could, let me just say a quick thank you, Chairman and Ranking Member, for allowing me to be able to depart at 11:30 today. I'll try to be brief and allow you the opportunity to ask the questions so that we can be productive today.

Obviously, it is a great privilege for me. And Senator Cantwell, just FYI, I'll be here. I'm not going anywhere. It is an honor to serve as the 14th Secretary of Energy.

Senator CANTWELL. Well, you know my suggestion is that the Energy Secretary should be for life or until Hanford is cleaned up.

[Laughter.]

So I am happy to apply that to you. I have asked that of every other Secretary of Energy.

Secretary PERRY. Yes, ma'am. We'll take that under advisement.

[Laughter.]

Running this Department requires a significant expertise and that's one of the other things I wanted to thank you for is being able to get the nominees through this process in a very timely way, get them on the ground, and we've done that. I think we have, now, nine Presidential appointments with Senate confirmation that are on the ground and working and thank you for that assistance.

This budget request underscores the DOE's commitment to stewardship, to accountability and to service that is respectful to the American taxpayer. I hope that our interactions with you and the other Congressional committees over the past year have underscored the commitment to service and to transparency.

In total, the DOE leadership team appeared before Congressional committees 23 times in 2017, and we're proud of the strong relationship we built with Congress which brings me to a topic that I want to address before getting any into specifics.

I am fully aware, and I'm very displeased, that some of this year's budget request documents were not released in a timely fashion. It's not how I operate and nor my staff for that matter. So let me just tell you that you all may be assured that we're going to continue to refine those processes and improve the transfer of information to you all.

When I first appeared before this Committee last year, I committed DOE to advancing several key objectives. I know that we needed to modernize our nuclear weapons arsenal, continue to address the environmental legacy that the Cold War programs left us, further advance our domestic energy production, better protect our energy infrastructure and accelerate our exascale computing capacity. The FY2019 $30.6 billion budget request for the Department seeks to move us forward on these and other goals.

Our greatest duty is to protect our citizens and nuclear deterrence is a core part of the DOE mission. This year we requested an 8.3 percent increase for that purpose to align ourselves with the President's nuclear posture review and the national security strategy.

We're also focusing on addressing the environmental legacy left at Department sites which produce the materials that help us win a World War and to secure the peace. Last year we promised to focus on that obligation, and this year we're requesting additional funds to do so. I know the Department's Environmental Management Program is a high priority for this Committee, especially for those of you, like Ranking Member Cantwell, with a major project in her state. My visit to Hanford last year helped shape my commitment to that just cause.

We also have a duty to advance a fundamental mission of our Department, and that's America energy independence. And thanks to U.S. ingenuity and innovation, we're on the cusp of realizing this mission objective for the first time since the 1970s. In the coming years, we will produce enough energy from all of our abundant fuels, not only to meet our own needs, but our friends, our allies and our partners as well as we export to them. Just last year we became a net exporter of natural gas. Today we are exporting LNG to 27 nations on five continents. And because technology is also making our energy cleaner, we can pursue an all-of-the-above policy that will efficiently develop and use all of America's energy resources. Innovation can grow our economy and protect our environment.

We drive further energy innovations, or I should say, to drive those energy innovations, we're requesting continued funding of our energy program offices, as well as funding for research in fossil fuels and nuclear power, including advanced modular reactors.

Now, if we have a duty to advance domestic energy production, we also have a duty to ensure that our energy is delivered without interruption. That's why last year I promised to step up our efforts to protect and maintain America's energy infrastructure in the face of all hazards. The devastation caused by the 2017 hurricanes and

the impact to the electricity sector highlighted the importance of improving grid reliability and resilience. This Committee has significant interest in our hurricane relief and restoration efforts and I thank you for your continued support there, but we also need to protect from manmade attacks, including cyberattacks.

So this year we've requested funding increases to strengthen cybersecurity as well as the agency's cyber defenses. We're establishing a new Office of Cybersecurity, Energy Security, and Emergency Response. It's called CESER. It's going to be led by a new Assistant Secretary.

Since much of our nation's greatest technology breakthroughs affecting energy have come through the work of our great national laboratories, we need to ensure their funding as well. I could speak extensively about some of the great work that they're doing, but today, I'll only mention two.

Our effort to accelerate exascale computing systems in order to keep the U.S. at the forefront of super computing is extremely important; therefore, a 31 percent increase in that line item. This will have positive implications on everything from artificial intelligence to some of the great work we're doing to improve the health of our veterans.

Chair Murkowski, in my first year I visited nine national labs with four more coming up the end of this month. I've also visited WIPP, the Nevada National Security Site, Pantex, Y-12, the Kansas City National Security Complex, McNary Dam and Hanford. And in a few weeks, I am looking forward to being in your home state and joining you there in Alaska.

Wherever I go there's one thing that is made abundantly clear to me, those who work for the Department of Energy are dedicated, they're patriotic and they're committed to serving the American people. In the end, it is you, the people's elected representatives, who will decide how to best allocate the resources of our hard-working taxpayers.

My commitment to each of you on this Committee is that we will do our best to use these resources wisely in the pursuit of the vital goals that I've outlined.

I thank you and will do my best to answer your questions.

[The prepared statement of Secretary Perry follows:]

Testimony of Secretary Rick Perry
U.S. Department of Energy
Before the
Energy and Natural Resources Committee
United States Senate

March 20, 2018

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 2019 Budget Request for the Department of Energy ("the Department" or "DOE").

It is a privilege and an honor to serve as the 14th Secretary of Energy.

This budget represents a request to the American people through their representatives in Congress to fund the priorities of this Department.

As such, it represents a commitment from all of us at DOE– that we will honor the trust of our citizens with stewardship, accountability and service.

As Ronald Reagan reminded us in his First Inaugural, "We are a nation that has a government – not the other way around."

When I appeared before this Committee last year, I committed to modernize our nuclear weapons arsenal, protect our energy infrastructure from cyber and other attacks, achieve exascale computing, advance strong domestic energy production, and address obligations regarding nuclear waste management and the Nation's nuclear legacy.

This FY 2019 $30.6 billion Budget Request for the Department of Energy ("Budget") delivers on these commitments.

The Department's world-leading science and technology enterprise 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.

Our National Laboratories are doing outstanding work in many areas, and they have a rich history of innovation that has bettered the lives of millions across the globe. For example, in FY 2017, the National Laboratories won 33 of the prestigious R&D 100 Awards, including technologies regarding new materials, protecting our environment, incorporating renewable energy reliably on to our electric grid, and

sophisticated cybersecurity tools. These are but a few examples of the work the National Laboratories have done just last year to push the boundaries of research, development, and commercialization. I have had the opportunity to visit many of the Laboratories over the past year, and witness first- hand this outstanding work done by the dedicated workforce across the nation.

I am especially proud of how our National Laboratories, in working with the Department of Veteran's Affairs and other federal agencies, universities, doctors, and researchers, are harnessing the power of our world-class supercomputers to improve the health of our veterans. This work is part of DOE's proud legacy in the biosciences, and as the initiator of the Human Genome Project.

This Budget proposes over $12 billion in early stage research and development (R&D) that will focus 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 to improve the lives and security of all Americans.

Restoring the Nuclear Security Enterprise

The security of the United States and its allies is one of our primary DOE missions.

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 $15.1 billion for the National Nuclear Security Administration (NNSA), $2.2 billion or 16.7 percent above the FY 2017 enacted level.

The Request makes necessary investments consistent with the February 2018 Nuclear Posture Review (NPR) to modernize and rebuild a nuclear force and nuclear security enterprise; prevent, counter, and respond to nuclear proliferation and terrorism threats; and provide safe, reliable, and long-term nuclear propulsion to the Nation's Navy.

The Budget includes $11.0 billion for Weapons Activities. This $1.8 billion increase over the FY 2017 enacted level supports maintaining the safety, security, and effectiveness of the nuclear stockpile; continuing the nuclear modernization program; and modernizing NNSA's nuclear security infrastructure portfolio in alignment with the NPR.

The Budget includes $1.9 billion for our ongoing Life Extension Programs (LEP)

and Major Alterations, a $580 million increase. Funding for the W76-1 warhead LEP supports the Navy and will keep the LEP on schedule and on budget to complete production in FY 2019. An increase of $178 million for the B61-12 LEP will keep us on schedule to deliver 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 $435 million 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 $23 million for the W88 Alteration 370 to provide the scheduled first production unit in FY 2020. The request includes $53 million for a replacement for the W78, one of the oldest warheads in the stockpile, by 2030.

The Budget for Weapons Activities also increases investments to modernize our nuclear infrastructure. For example, we include $703 million, a $128 million increase from FY 2017, for construction of the Uranium Processing Facility needed to replace deteriorating facilities at the Y-12 National Security Complex, as well as $27 million for a Tritium Production Capability at Savannah River and $19 million for a Lithium Production Capability at Y-12.

The Weapons Activities Budget request also includes $163 million, a $68 million increase from FY 2017 enacted, for NNSA collaboration with the Office of Science on the development of exascale computer systems, which I address below.

In the 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 $1.8 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.

Today, over 45% of the Navy's major combatants are nuclear powered. DOE's role in propulsion plants, spent fuel handling, and recapitalization is critical to the Navy's ability to conduct its mission around the globe.

The Budget also includes $1.9 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 continues termination activities for the Mixed Oxide Fuel Fabrication Facility project proposed in the FY 2018 Request, providing $220 million for use toward an orderly and safe closure of the project. The Budget also includes $59 million for the continuation of preliminary design and the initiation of long-lead procurements for the Surplus Plutonium Disposition project in support of the dilute and dispose strategy.

The Budget provides $319 million for Nuclear Counterterrorism and Incident Response, $47 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 includes $423 million for the federal workforce at the NNSA. This $35 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 ensure Americans have a resilient electric grid and energy infrastructure. Protecting this infrastructure means it has to be resilient and secure to defend against the evolving threat of cyber and other attacks.

Unfortunately, cyberattacks pose an ever-increasing threat to the Nation's networks, data, facilities, and infrastructure. A reliable and resilient power grid is critical to U.S. economic competiveness and leadership, and to the safety and security of the nation. We need to understand the increasing and evolving natural and man-made threats and develop the tools to respond to those threats across our energy infrastructure.

The Department is the sector-specific agency for the energy sector, and therefore, is the lead federal agency for the Emergency Support Function #12 that partners with the energy sector to ensure infrastructure security and resilience and to coordinate response and recovery. To elevate the Department's focus on energy infrastructure protection, the Budget Request splits the Office of Electricity Delivery and Energy Reliability, which totals $157 million, into two offices. Doing so will increase focus on grid reliability in the Office of Electricity Delivery (OE)

and cybersecurity in the Office of Cybersecurity, Energy Security, and Emergency Response (CESER).

CESER will allow more coordinated preparedness and response to emerging cyber and physical threats and natural disasters and support the Department's national security responsibilities. To work toward this critical objective, the Budget provides $96 million for the CESER office to develop tools needed to protect the U.S. energy sector against threats and hazards, mitigate the risks and the extent of damage from cyberattacks and other disruptive events, and improve resilience through the development of techniques for more rapid restoration of capabilities.

CESER will work in an integrated manner with private industry, as well as Federal, State, and Local jurisdictions and other DOE offices, to enable industry to enhance the resilience (the ability to withstand and quickly recover from disruptions and maintain critical function) and security (the ability to protect system assets and critical functions from unauthorized and undesirable actors) of the U.S. energy infrastructure.

Also, in FY 2019, the Office of Nuclear Energy's budget includes $5 million for the Nuclear Energy Enabling Technologies (NEET) Crosscutting Technology Development (CTD) program to expand its nuclear reactor cybersecurity research to support development of intrusion-resistant systems and practices. Research will be conducted in four areas: cyber risk management, secure architectures, modeling and simulation, and supply chain cyber security assurance. NEET-CTD will also perform simulated cyber-attacks against existing and next generation control system architectures to verify attack difficulty and control efficacy, methods, and metrics.

Securing against cyber threats means we must also protect against threats to the Department's own infrastructure in science, technology, and nuclear security. This Budget takes major steps to safeguard DOE's enterprise-wide assets against cyber threats. The Budget provides funding to secure our own networks, and increases funding for the Chief Information Officer by $16 million from the FY 2017 enacted level to modernize infrastructure and improve cybersecurity across the DOE IT enterprise. Funding for cybersecurity in the National Nuclear Security Administration is increased to $185 million to enhance security for our nuclear security enterprise. In the Environmental Management program, we provide $43 million for cybersecurity to ensure the security at seven cleanup sites. This Budget provides the resources we require to secure our systems and our infrastructure.

Improving Grid Resilience

As we protect our energy infrastructure from cyber threats, we also must improve resilience and reliability of the nation's electricity system. The Budget provides $61 million for Electricity Delivery to support transmission system resource adequacy and generation diversity, move forward with new architecture approaches for the transmission and distribution system to enhance security and resilience, and advance energy storage. The Budget supports research and development at DOE's National Laboratories to develop technologies that strengthen, transform, and improve energy infrastructure so that consumers have access to reliable and secure sources of energy.

Advancing Exascale and Quantum Computing

As I discussed last year, the Department's leadership in developing and building the world's fastest computers has faced increasingly fierce global competition over the last decade. Maintaining the Nation's global primacy in high-performance computing is more critical than ever for our national security, our continuing role as a science and innovation leader, and our economic prosperity.

The Budget includes $636 million to accelerate development of an exascale computing system, including $473 million in the Office of Science (Science) and $163 million in NNSA. This unprecedented investment, which is $376 million—or 145 percent—above the FY 2017 enacted level, reflects the Department's plan to deliver an exascale machine for the Office of Science in 2021 and a second machine with a different architecture by 2022.

To achieve these goals, 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. 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.

We will not, however, satisfy our need for computing advances with the achievement of exascale computing alone. The FY 2019 Budget Request also includes $105 million in quantum computing to address the emerging urgency of building our competency and competitiveness in the developing area of quantum information science. This early-stage, fundamental research will concentrate on accelerating progress toward application of quantum computing techniques and quantum sensing to grand challenge science questions.

Addressing the Imperative of Nuclear Waste Management

As I mentioned to this Committee last year, 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 implement a robust interim storage program.

The Budget devotes $110 million for DOE to support the Nuclear Regulatory Commission (NRC) licensing proceeding for the nuclear waste repository at Yucca Mountain, including funding for technical, scientific, legal and other support.

In addition, the Budget includes $10 million to implement a robust interim storage program to ensure earlier acceptance of spent nuclear fuel and accelerate removal from sites in 39 states across the country. 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 demonstrates the Administration's commitment to nuclear waste management and will help accelerate fulfillment of the Federal Government's obligations to address nuclear waste, enhance national security, and reduce future burdens on taxpayers. This also will increase public confidence in the safety and security of nuclear energy, 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 $6.6 billion for Environmental Management (EM), $182 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.

The Budget continues funding of $150 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 $1.4 billion 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 $747 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 $1.7 billion, $287 million above enacted FY 2017, to support activities at the site. This will include the Liquid Tank Waste Management Program, completing commissioning and beginning operation of the Salt Waste Processing Facility, continued construction of the Saltstone Disposal Unit #7, a start to construction of the Saltstone Disposal Units #8/9, 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 $403 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 critical infrastructure repair/replacement projects, including $84 million for the Safety Significant Confinement Ventilation System and $1 million for the Utility Shaft (formerly Exhaust Shaft). These steps will increase airflow in the WIPP underground for simultaneous mining and waste emplacement operations.

The Budget includes $359 million to continue cleanup 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 $409 million for Oak Ridge 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 construction activities for the Outfall 200 Mercury Treatment Facility at the Y-12 National Security Complex.

For Portsmouth, the Budget includes $415 million, $33 million above FY 2017 enacted, 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 construction activities at the On-Site Waste Disposal facility. 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 2019 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.

Focusing Priorities on Core Missions

The Budget continues to focus 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.

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. Termination of these programs will save over $300 million in FY 2019 alone while significantly reducing financial risk to the taxpayer moving forward.

Advancing American Energy Dominance

The Budget requests $2.1 billion for the applied energy programs. Within these offices, the FY 2019 Budget focuses resources on early-stage, cutting-edge R&D conducted by the scientists and engineers at our 17 National Laboratories who continually develop the next great innovations that can transform society and foster American economic competitiveness and then on transitioning these breakthroughs to the private marketplace.

The Budget consolidates programs focused on bringing technologies to the market in the Office of Technology Transitions, requesting a 23% increase from FY 2017. 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

Nuclear energy provides 20 percent of our electricity baseload, and 60 percent of our carbon-free generated electricity. The Budget provides $757 million for the

Office of Nuclear Energy to continue innovating new and improved nuclear energy technologies. The budget focuses funding on early-stage research and development, such as the Nuclear Energy Enabling Technologies program, that enables the research and development of innovative and crosscutting nuclear energy technologies to resolve fundamental nuclear technology challenges.

The FY 2019 Budget includes $163 million for the Reactor Concepts Research, Development and Demonstration program. Within this total, $128 million is for early-stage R&D on advanced reactor technologies, including $54 million for a new Advanced Small Modular Reactor R&D subprogram. This new subprogram is a one-time effort to fund cost-shared early-stage design-related technical assistance and R&D, the results of which are intended to be widely applicable and employed by nuclear technology development vendors for the purpose of accelerating the development of their advanced SMR designs. The Budget also provides $15 million within Reactor Concepts for early-stage R&D and pre-conceptual design work related to Versatile Advanced Fast Test Reactor concept.

Within the Fuel Cycle Research and Development program, the Budget provides $40 million to support the development of one or more light water reactor fuel concepts with significantly enhanced accident tolerance.

Finally, the Budget for Nuclear Energy also supports robust safeguards and security funding of $136 million—a $7 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 (FER&D) 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 81 percent of the country's total energy use and are critical for the nation's security, economic prosperity, and growth. The FY 2019 Budget focuses $502 million on cutting-edge fossil energy research and development to secure energy dominance, further our energy security, advance strong domestic energy production, and support America's coal industry through innovative clean coal technologies.

FER&D will support early-stage research in advanced technologies, such as materials, sensors, and processes, to expand the knowledge base upon which industry can improve

the efficiency, flexibility, and resilience of the existing fleet of coal fired power plants. The request also focuses funding on early-stage research that enables the next generation of high efficiency and low emission coal fired power plants that can directly compete with other sources of electricity in the market and provide low cost reliable power 24/7.

Funding is also provided to support competitive awards with industry, National Laboratories and academia focused on innovative early-stage R&D to improve the reliability, availability, efficiency, and environmental performance of advanced fossil-based power systems. For example, the Advanced Energy Systems subprogram will focus on the following six activities: 1) Advanced Combustion/Gasification Systems, 2) Advanced Turbines, 3) Solid Oxide Fuel Cells, 4) Advanced Sensors and Controls, 5) Power Generation Efficiency, and 6) Advanced Energy Materials. While the primary focus is on coal-based power systems, improvements to these technologies will result in spillover benefits that can reduce the cost of converting other carbon-based fuels, such as natural gas, biomass, or petroleum coke into power and other useful products in an environmentally-sound manner.

Energy Efficiency and Renewable Energy

The Energy Efficiency and Renewable Energy budget funds $696 million to maintain America's leadership in transformative science and emerging energy technologies in sustainable transportation, renewable power, and energy efficiency. Knowledge generated by early-stage R&D enables U.S. industries, businesses and entrepreneurs to develop and deploy innovative energy technologies and gives them the competitive edge needed to excel in the rapidly changing global energy economy.

Energy storage is an important area of focus, and the Request includes $36 million for battery R&D as well as $90 million for a new "Beyond Batteries" R&D initiative. As part of grid modernization efforts, "Beyond Batteries" considers energy storage holistically, and focuses on advances in controllable loads, hybrid systems, and new approaches to energy storage, which are essential to increasing the reliability and resiliency of our energy systems.

Advances in these areas, as well as in battery technologies, will allow for loads to be combined with generation from all sources to optimize use of existing assets to provide grid services, and increase grid reliability. The FY 2019 also invests in 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, can drive the breakthroughs that will promote economic growth and manufacturing jobs in the United States.

Leading World-Class Scientific Research

The Department of Energy is the Nation's largest Federal supporter of basic research in the physical sciences, and the President's FY 2019 Budget provides $5.4 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 22,000 researchers in FY 2019.

We provide $899 million for Advanced Scientific Computing Research, an increase of $252 million above the FY 2017 enacted level. This funding will continue supporting our world-class high-performance computers that make possible cutting-edge basic research, while devoting $472 million in the Office of Science to reflect the Department's plan to achieve 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 FY 2019 Request also supports quantum computing R&D and core research in applied mathematics and computer science, and high-performance computer simulation and modeling.

The Budget also provides $1.8 billion for Basic Energy Sciences, supporting core research activities in ultrafast chemistry and materials science and the Energy Frontier Research Centers. We will continue construction of the Linac Coherence Light Source-II at SLAC National Accelerator Laboratory and the Advanced Photon Source Upgrade at the Argonne National Laboratory, and initiate the Advanced Light Source Upgrade project at the Lawrence Berkeley National Laboratory, and the Linac Coherence Light Source-II High Energy project at SLAC. The operations of the light sources across the DOE science complex and supporting research across the

Nation will ensure our continued world leadership in light sources and the science they make possible.

The Budget also provides $770 million for High Energy Physics, including $113 million for construction of the Long Baseline Neutrino Facility and Deep Underground Neutrino Experiment at Fermilab, $63 million above the enacted FY 2017 level. We will continue to fund ongoing major items of equipment projects, and initiate three new projects at the Large Hadron Collider, the High Luminosity Large Hadron Collider Accelerator Project, and the High Luminosity ATLAS and CMS detector upgrade projects. 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 $340 million for Fusion Energy Sciences, including $265 million for domestic research and fusion facilities and $75 million for the ITER project. For Nuclear Physics, the budget provides $600 million to discover, explore, and understand nuclear matter, including $75 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 $500 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 ensures 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 $175.1 million, $47.5 million below the FY 2017 enacted level, to support the Reserve's operational readiness and drawdown capabilities. The Request also includes a drawdown and sale of up to 1 million barrels of crude oil from the SPR to provide funding for Congressionally-mandated crude oil sales and emergency drawdown operations.

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.

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 2019, resulting in an estimated $77 million in receipts.

Power Marketing Administrations

Finally, the Budget includes $77 million for the Power Marketing Administrations (PMAs). The Budget 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) and to reform the laws governing how the PMAs establish power rates to require the consideration of market based incentives, including whether rates are just and reasonable. The Budget also proposes to repeal the $3.25 billion 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, along with 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. The President's FY 2019 Budget Request for the Department of Energy positions us to take up that challenge and delivers on the high-priority investments I proposed to you last year.

As we move forward over the coming weeks and months, I look forward to working with you and your colleagues in Congress on the specific programs mentioned in this testimony and throughout the Department. Congress has an important role in the path forward on spending decisions for the taxpayer, and I will, in turn, ensure DOE is run efficiently, effectively, and we accomplish our mission driven goals. Thank you, and I look forward to answering your questions.

The CHAIRMAN. Very good.

Thank you, Mr. Secretary.

Before I begin my questions, Senator Heller has asked that a letter that he has provided to the Committee, be included as part of the record. We will include that and you will see a copy of it as well, Mr. Secretary.

[Senator Heller's letter follows:]

DEAN HELLER
NEVADA
(202) 224-6244

United States Senate
WASHINGTON, DC 20510

COMMITTEES:
FINANCE
BANKING, HOUSING, AND URBAN AFFAIRS
COMMERCE, SCIENCE, AND TRANSPORTATION
VETERANS' AFFAIRS

March 20, 2018

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

Dear Chairman Murkowski:

I write today to reiterate my steadfast opposition to the Administration's efforts to restart licensing activities at Yucca Mountain, Nevada, given the outstanding and unresolved safety concerns. Despite Congress' continuous refusal to pass a law funding the high-level nuclear waste repository, the Administration's fiscal year 2019 budget includes a request for $120 million for the Department of Energy (DOE) to revive this ill-conceived and fiscally irresponsible plan. This request perpetuates a long-standing fight over states' rights and distracts us from the real task at hand, which is finding a viable long-term nuclear waste storage solution that meets the needs of the American people.

Chairman Murkowski and Ranking Member Cantwell, I want to commend for your leadership in helping find bipartisan solutions to our nation's long-term nuclear waste problem. We all recognize the important role nuclear power plays in a stable and secure all-of-the-above energy strategy as well as the need to properly store spent nuclear fuel, and I want you to know that I stand ready to work with you to implement consent-based siting. I firmly believe consent-based siting presents a viable path forward on this issue and a means of addressing our nation's high-level nuclear waste problem while at the same time respecting the sovereignty of states to object to becoming dumping sites.

The proposed high-level nuclear waste repository at Yucca Mountain presents a very different path, however. Indeed, this project represents the exact opposite of consent; it is a unilaterally imposed federal mandate that runs contrary to the will of the people that it directly affects. Yucca Mountain poses numerous health and safety risks to the people of southern Nevada and potentially catastrophic financial risks to our state's tourism economy, and yet we, as Nevadans, have received no assurances that these safety concerns will be properly accounted for or dealt with, nor have we received any assurances from DOE or the Nuclear Regulatory Commission (NRC) that concerned stakeholders will receive the due process to which they are entitled under existing law.

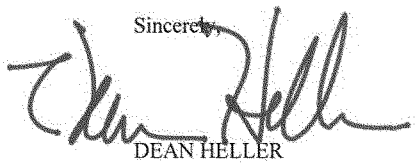
Before the adjudication proceeding on the DOE's application to open the Yucca Mountain facility was suspended in September 2011, the NRC's Atomic Safety and Licensing Board Panel had admitted hundreds of technical and legal contentions. Decisions on these contentions, as well as those related to a potential future DOE application to possess high-level nuclear waste at

Yucca Mountain, which would also likely number in the hundreds, if not thousands, would have to be issued for this project to move forward. From the perspective of Nevadans, however, very little consideration has been given to how to fairly adjudicate these contentions.

Given Nevada's significant interest in receiving fair and full consideration of these contentions, much work remains to be done to adequately resolve the issues they present. For example, procedural safeguards, like local hearings and local adjudication, must be put in place to guarantee affected parties receive the process they are due. In addition, basic safety and security measures, as recommended by the National Academy of Sciences and the Blue Ribbon Commission, must be considered and implemented to ensure the risk of radiological hazards and severe accidents does not go unmitigated. I intend to follow up with DOE on these and other issues to ensure that if the Yucca Mountain proposal moves forward over the objections of Nevadans and Nevada, basic procedural and safety measures are not also forgotten.

Because of these outstanding and unresolved concerns, I will continue to stand with the State of Nevada in its staunch opposition to any effort to restart the repository licensing process. I strongly urge you not to fund the Administration's request, and I once again encourage you to devote resources toward DOE's consent-based siting initiative for the storage and disposal of high-level nuclear waste. Thank you for your timely attention to this request.

Sincerely,



DEAN HELLER
U.S. Senator

The CHAIRMAN. Senator Cantwell has mentioned in some detail here the cybersecurity issue and the joint alert from Department of Homeland Security and the FBI regarding Russian government cyber actors and how they have targeted critical infrastructure here in this country, including our electric and generation sources.

Know that I share Senator Cantwell's concern on this. I want to make sure that DOE is cooperating with DHS and the FBI with implementation of actions in response to this, but also, to make sure that DOE is taking the lead as the Sector-Specific Agency.

Mr. Secretary, you and I had a conversation yesterday just about making sure that DOE—which does have this legislatively designated authority as the lead in the Energy Sector when it comes to cyber—that continues.

I would like you to speak specifically to that with regards to DOE's role, and then I have one more quick question for you.

Secretary PERRY. Yes, ma'am. Senator, thank you.

Just we work very closely with the Department of Homeland Security. There's clear bifurcation, if you will, of our responsibilities. And certainly, the Department of Energy, we are the Sector-Specific Agency that partners with the Energy Sector to ensure infrastructure security and resilience and coordinate response and recovery.

The CESER office that we make reference to that we're standing up here is our response to the clear challenges that the sector has relative to these, sometimes, non-state players or state players that are coming in and attacking NotPetya, that attack last year that the Russian government was involved with. There has been ransomware that's been stuck in. WannaCry was the codename for it that we've seen.

The formation of CESER, this office, if you will, enhances the Department's role in the sector-specific agency for the Energy sector and it better positions the Department to address emerging threats and natural disasters and support the Department's expanded national security responsibilities. The reporting relationship to the Under Secretary of Energy will ensure the importance and the direct pipeline of information, if you will, back to the Secretary of Energy. I think this placement is very important to bridge the gap between science and technology development and the operators and implementers focused on securing our systems.

So, there is a clear role that DOE plays on cyber. We are committed to being as technically advanced as possible, and it's the reason that we request the funding and the reason we have structured the agency, or not the agency but the Department as such, to clearly send a message that this is important and that we're going to fund it as such.

The CHAIRMAN. Let me ask you, Mr. Secretary, the same question that I ask every other Cabinet member when they are in reporting to us on their budget, and this relates to the Arctic because this is an area, not just of interest to me, but really of interest around the world. My complaint or my fear has been that Administration after Administration fails to really appreciate the opportunities, the challenges, that the Arctic presents.

And so, I ask the same question, effectively. What is contained in your budget request that is specific to Arctic-related activity and

how you view the Department's mission and role, effectively, in the Arctic?

Secretary PERRY. Senator, I think it's good news for you that I've been there before. I've been on the North Slope. I have visited that part of the state as an appropriator when I was in the Texas legislature and even before that, time spent in your state taking in the grandeur and the beauty and the diversity of that state.

I think it's very important to have people with eyes on, situational awareness, if you will, of the state, of the needs.

One of the reasons I'm going with you is I'm going to see some things I've never seen before, whether it's microgrids, the importance of microgrids or the chat or the conversation on the small modular reactors, is there a role that they could play in a state as diverse as thinly populated, if you will, as your state.

The idea that a transmission system as we have in the continental 48 of the United States is going to work in Alaska is a myth. It can't. It's going to take some unique ways to address challenges that the Arctic has.

We're committed to those, our national labs, the Office of Electricity. We're going to be working with you and commit to you to be very open to the innovation and the technology that can serve the people of Alaska in, hopefully, a way that they've never seen before.

The CHAIRMAN. Well, I appreciate that.

My time is up.

I will just note, not only for you, Mr. Secretary, but for the other colleagues on the Committee that Alaska is hosting the National Lab Day at the end of May which will be an opportunity to not only have national labs understand what the Arctic holds but vice versa.

So, thank you.

Senator Cantwell.

Senator CANTWELL. Thank you, Madam Chair.

Mr. Secretary, on Hanford, the cleanup budget, you have made some assumptions about the Plutonium Finishing Plant that I actually think are off in this assessment of cutting $230 million out of that. Will you go back and review those assessments as it relates to Plutonium Finishing Plant and live up to the tri-party agreement, make sure that as you are making this budget that you are going to live up to making the milestones in that agreement?

Secretary PERRY. Yes, ma'am. I think it's very important for us.

As you said in your opening remarks that there are some real challenges there and going out there and spending the time, my Deputy Secretary spending multiple trips to the area and others, I think, it was really important for an edification process for us to understand just the complexity, the breadth of the mission there. And I am committed to finding the solutions.

Senator CANTWELL. And living up to the tri-party agreement?

Secretary PERRY. Yes, absolutely.

Senator CANTWELL. Okay, great.

Now on the PNNL side, we saw some great technology, whether that was in cyber or smart grid.

Secretary PERRY. Batteries.

Senator CANTWELL. Batteries, thank you. You remember, good.

Secretary PERRY. Yes, ma'am.

Senator CANTWELL. Alright.

So why cut this area of the budget? I am not the only one here representing national laboratories, right?

Secretary PERRY. Absolutely.

Senator CANTWELL. So.

Secretary PERRY. And I hope and I lay on the table a history of being a manager of a rather large enterprise as the Governor of the State of Texas. I was an appropriator and an agency head in that state as well. So, the experience that I bring, just because there is a reduction of a line item, doesn't necessarily mean that there's going to be a reduction in results. I hope there's some comfort that what we're doing is prioritizing in these national labs.

Are we going to be able to fund every line item the way that the line items were funded back prior to the 2018 proposed budget? Probably not. But that doesn't necessarily mean that the results that we're going to have out of those national labs are any less consequential.

Senator CANTWELL. Well, I'm not sure I agree with that, but I hope you are right. I definitely want science to be a bigger priority within this Administration.

But let me turn to cyber for a second because you were, I think, at a House Committee. I wasn't sure if this was before the Commerce Committee, which you were also there with a member of the Cabinet, but you said you were not confident that the Federal Government has a broad strategy in place as it relates to cybersecurity. I don't know if you were talking about duplication or issues, but my concern is that we still don't have an assessment. We don't have a risk assessment.

Secretary PERRY. Okay.

Senator CANTWELL. So, if we don't have the risk assessment, how do we know what we are really budgeting toward?

Secretary PERRY. Yeah.

Senator CANTWELL. Now, you took one step at it which, I think, given everything that has happened, a 10 percent increase is not where we need to be. I have called for a doubling, but I could see where I am wildly underfunding what is one of the most serious threats to us as a nation right now.

So what can we do to get this threat assessment done by these agencies?

I think I mentioned to you when I hear from our colleagues at Armed Services or Homeland Security, the military sit at the very table you are sitting at and then tell them, yes, this is a real threat, a real problem, but DOE has to fix it. And then, here you are sitting with a 10 percent increase and no threat assessment.

Secretary PERRY. Yeah.

Senator CANTWELL. So what can we do to get both a better understanding of our real risks and an accurate budget increase to fund what is critical, critical, to our national security?

Secretary PERRY. Senator Cantwell, thank you for recognizing the challenge that we have. It is very real. It is ever changing.

And again, I don't want to belabor this point of a 10 percent increase being less than what you think is appropriate for this. That's why we have these hearings is to discuss these areas of conflict.

When it comes to you believe it needs to be more, I might believe it needs to be a bit more myself, but the fact is we're spending some dollars in other areas in our budget that are going to have real concrete effect on cyber. And I'll give you an example. In exascale computing and our ability to be able to manage massive amounts of data is going to be, I think, tantamount to our success in combating the cyberattacks that are going on. That amount of money has been increased by 31 percent. So it's not just in that line item on standing up the cyber——

Senator CANTWELL. Do you believe that we need a risk assessment as a nation?

Secretary PERRY. Do I?

Senator CANTWELL. Do we need a risk assessment of this problem?

Secretary PERRY. I think that's going on as we speak.

We have three different areas in DOE that are focused on cyber and have been meeting and having these conversations before. The coordination and the conversation is ongoing, Senator.

Senator CANTWELL. Well, I am sure that all of us, either in a secure room or publicly, would like to see the government's risk assessment.

Secretary PERRY. Absolutely.

Senator CANTWELL. I hope you agree that they need one. I don't think we have gotten it yet, so I hope you can help us get one.

Thank you.

The CHAIRMAN. Thank you, Senator Cantwell.

Senator Cassidy.

Senator CASSIDY. Hi, Secretary Perry. How are you?

Secretary PERRY. Doctor, how are you, sir?

Senator CASSIDY. Last week this Committee advanced the Small Scale LNG Access Act of 2017 which gives Caribbean and Central American countries greater access to liquified natural gas. The legislation mirrors DOE rulemaking announced last September. This bill, just to put a plug in for it, benefits American workers, the American economy, American geopolitics and lowers global greenhouse gas emissions.

There are some objections that somehow this would raise domestic natural gas prices, but according to the CIA World Factbook, the entire energy demand of all Caribbean nations combined is 1.2 percent of the U.S. Given that only small volume projects are eligible to benefit from the legislation and the 1.2 percent, the low energy demand, what do you think will be the impact of this legislation on U.S. natural gas prices?

Secretary PERRY. In a simple statement, I would suggest it would be miniscule, even if identifiable at all.

Senator CASSIDY. And how do you think this would impact the energy markets that we are targeting, those in the Caribbean and Central America?

Secretary PERRY. I think opening up those markets is incredibly important whether it's being able to modernize, get away from some very ineffective fuels from the standpoint of both cost and to the environment. Being able to bring that LNG to play in those markets would be good for their——

Senator CASSIDY. And many on this Committee are concerned and just to speak to them about global greenhouse gas emissions.

So, if we're replacing high sulfur, highly viscous Venezuelan crude as an energy source with, I would prefer natural gas from Louisiana, but you would probably prefer Texas, but U.S. natural gas. What would that do for those global greenhouse gas emissions?

Secretary PERRY. Yes, sir.

Texas gas does burn cleaner. That's true that you identified that.

[Laughter.]

In all seriousness, we saw a major transition from older inefficient plants in my home state in the 2000s to gas plants and we saw the sulfur dioxide down by 60+ percent emissions, the nitrogen oxide down by almost over 50 percent.

Senator CASSIDY. And that is not even using Venezuelan sour crude.

Secretary PERRY. That's correct.

Senator CASSIDY. Which many of these folks do.

Secretary PERRY. That's right.

Senator CASSIDY. You are using something cleaner than that.

Secretary PERRY. Yup.

So the point is we know that you can see emission reductions and substantial emission reductions when you transition away from older inefficient plants and particularly plants that are using, you know, we can get into a whole other discussion which we don't have time here for about the Northeast being forced to use some pretty ineffective fuels because they do not allow the transport of natural gas across some of those states.

Senator CASSIDY. Well, let me ask you something else.

Texas was a leader in wind power, probably is the leader in wind power.

Secretary PERRY. Still is, yes, sir.

Senator CASSIDY. One thing that we have noted is that using more natural gas because you can have your startup plant in background work, that actually you enable expansion of renewables by converting your baseload, if you will, to natural gas. Any comments on that?

Secretary PERRY. No, sir, you're correct.

Senator CASSIDY. Yes.

I think we saw that you get an 0.8 incremental increase of renewables for every one percent or every unit of one, if you will, increase of that.

Secretary PERRY. Yeah.

Senator CASSIDY. So anyway, just to, kind of, explore that with you. Thank you.

One more thing that is a concern.

There is a MOX plant being built in South Carolina. I won't ask you to comment on this too much except that there was an order for a, kind of, contractor collaborative process to re-baseline Order 413.B from the Department of Energy. I am not sure that has been updated in this collaborative process. Can I have your commitment just to review that and get back to us on that process?

Secretary PERRY. Yes, sir.

Senator CASSIDY. I appreciate that.

Secretary PERRY. Yes, sir.

Senator CASSIDY. I yield back. Thank you.

The CHAIRMAN. Thank you, Senator.

Senator, I guess it is now, Cortez Masto.

Senator CORTEZ MASTO. Thank you.

Secretary Perry, yesterday I sent you a letter on current Yucca Mountain activities and expenditures and an update on expenditures that would be associated with a restarted Yucca Mountain licensing proceeding. It is important that my constituents have an accurate understanding of the balances of the accounts for nuclear waste disposal and what expenditures are being made in regards to Yucca Mountain in the absence of Congressional direction.

Would you commit to giving this letter your attention and providing a quick response within the next two weeks?

Secretary PERRY. I literally just had it in my hand this morning, and I'm going to review and give you as timely a response as possible, so.

[The letter on current Yucca Mountain activities follows:]

United States Senate
WASHINGTON, DC 20510

March 19, 2018

The Honorable Rick Perry
Secretary
U.S. Department of Energy
1000 Independence Avenue SW
Washington, DC 20585

Dear Secretary Perry:

I am writing to request information on current Yucca Mountain activities and expenditures, and an update on expenditures that would be associated with a restarted Yucca Mountain licensing proceeding.

As you know, the Nuclear Waste Policy Act (NWPA), as amended in 1987, named Yucca Mountain in southern Nevada, as the nation's sole candidate site for a permanent high-level nuclear waste repository. NWPA required the Department of Energy (DOE) to study the site and seek a license from the Nuclear Regulatory Commission (NRC) to build a repository at that location. Due to overwhelming opposition from the State of Nevada and other Nevada-based stakeholders, the Department decided to halt the Yucca Mountain project, and no funding was requested by DOE, or appropriated by Congress, for it since FY 2010.

Subsequent to this decision, the Department of Energy established the "Blue Ribbon Commission on America's Nuclear Future" to develop an alternative nuclear waste policy. The Commission issued its final report on January 26, 2012, recommending a siting process based on the consent from host location stakeholders for future nuclear waste storage and disposal facilities.

In January 2013, DOE issued a nuclear waste strategy based on the Commission's recommendations. The strategy called for a pilot interim storage facility for spent fuel from closed nuclear reactors to open by 2021 and a larger storage facility to open by 2025. A site for a permanent underground waste repository would be selected by 2026, and the repository would open by 2048. DOE issued a draft consent-based nuclear waste siting process on January 12, 2017.

However, the Trump Administration has dismissed further consideration of the aforementioned plan, and reversed the decision that had been made in FY 2010 by including $120 million in the President's FY 2018 Budget request to Congress to restart the Yucca Mountain licensing process.

According to the DOE FY 2019 Congressional Budget Justification, released last week, the Department is again requesting $120 million for the Yucca Mountain and Interim Storage Program. However, the FY 2019 Budget Justification, like the FY 2018 Budget Justification, provides little meaningful information on how DOE would actually spend these funds to participate in U.S. Nuclear Regulatory Commission licensing activities for the Yucca Mountain nuclear waste repository.

Moreover, neither of these budget documents provide any information on DOE expenditures from the Nuclear Waste Fund for Yucca Mountain activities during FY 2017 and FY 2018. In an October 2014 letter to the House Committee on Energy and Commerce, then-Assistant Secretary Peter Lyons informed the Committee that the current available carryover funds in the Defense Nuclear Waste Disposal and the Nuclear Waste Disposal accounts totaled roughly $41.7 million ($21.7 million of which was obligated for specific purposes and $20 million of which had not yet been obligated).[1] However, more than 3 years later in a January 23, 2018 letter from the United States Nuclear Infrastructure Council references an estimated $10 million available in carryover funding that is available to DOE to make preparations to restart the Yucca Mountain licensing process.[2] Because no additional funds have been appropriated for Yucca Mountain purposes since FY2010, Congress has been clear in its wishes that this licensing not proceed, and I am greatly concerned about the drawdown of these carryover funds that would be used for this purpose.

Understanding the high-level of importance this matter is to my constituents, I request that you provide the following information on Yucca Mountain activities and expenditures, and provide transparency to these outstanding balances.

1. At the beginning of FY 2017, what were the unobligated balances in the Department's Defense Nuclear Waste Disposal and Nuclear Waste Disposal accounts? What were the Department's beginning FY 2017 obligated but unspent funds in those accounts?

2. During FY 2017, how much did the Department spend from these accounts for Yucca Mountain licensing activities? In addition to licensing activities, please provide a breakdown of FY 2017 expenditures for pension fund obligations for retired Yucca Mountain workers and closeout of legacy accounts; administration of the Nuclear Waste Fund, financial audits, investment guidance, and other analyses; and maintenance of Yucca Mountain Project records and technical and scientific information, including preservation and security of the geologic samples.

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[1] Letter to Rep. John Shimkus, House Committee on Energy and Commerce, from Asst. Secretary for Nuclear Energy Peter Lyons, U.S. Department of Energy, October 17, 2014.
[2] Letter to Secretary Rick Perry, U.S. Department of Energy, from David Blee, Executive Director, United States Infrastructure Council, January 23, 2018.

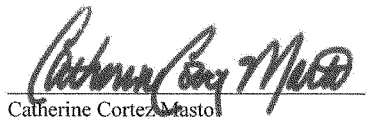
3. At the beginning of FY 2018, what were the unobligated balances in the Department's Defense Nuclear Waste Disposal and Nuclear Waste Disposal accounts? What were the Department's beginning FY 2018 obligated but unspent funds in those accounts?

4. During the first five months of FY 2018, how much did the Department spend from these accounts for Yucca Mountain licensing activities? In addition to licensing activities, please provide a breakdown of FY 2018 expenditures to date for pension fund obligations for retired Yucca Mountain workers and closeout of legacy accounts; administration of the Nuclear Waste Fund, financial audits, investment guidance, and other analyses; and maintenance of Yucca Mountain Project records and technical and scientific information, including preservation and security of the geologic samples.

5. In 2008, the Department estimated that the cost of all activities associated with the NRC Yucca Mountain repository licensing proceeding, for the period FY 2007 through FY 2016, would be about $1.66 billion (2007$) in addition to $670 million (2007$) spent through the end of FY 2006.[3] How much did the Department spend for licensing activities in FY 2007 through FY 2011, before the NRC suspended the adjudicatory portion of the licensing proceeding? If the full legally-mandated NRC licensing proceeding is restarted, what is the Department's estimate of the cost of completing all activities associated with licensing the Yucca Mountain repository?

Thank you in advance for your prompt attention to my request.

Sincerely,



Catherine Cortez Masto
United States Senator

[3] DOE, *Analysis of the Total System Life Cycle Cost of the Civilian Radioactive Waste Management Program, Fiscal Year 2007*, DOE/RW-

0591, Washington, DC (July 2008). All values were stated in 2007 dollars; see pages 8, 17 - 19.

Senator CORTEZ MASTO. Thank you. Thank you.

Your budget recommends spending $120 million to bring high level nuclear waste to Nevada and, prior to your confirmation you were asked about Yucca Mountain and you stated to this Committee in writing that, "I cannot at this time make an assessment about the time and cost associated with the Yucca project, but I am committed to learning more about the project and helping to resolve this national problem."

I want to focus on the first part of your answer which is the time and cost. In regards to cost, are you aware of the last year in which the Department of Energy completed a total system, life cycle cost assessment for Yucca Mountain?

Secretary PERRY. I am not.

Senator CORTEZ MASTO. Let me tell you. It was 2008, more than a decade ago.

Are you aware of the detailed estimates this report included on the total costs for Yucca Mountain?

Secretary PERRY. I am not.

Senator CORTEZ MASTO. Okay.

In 2007 dollars, about $96 billion, and it has not been adjusted for inflation.

Are you aware that this report also indicates the Department of Energy will need $13.5 billion, again, in 2007 dollars, and 10 years just to obtain a construction authorization and license from the Nuclear Regulatory Commission?

Secretary PERRY. I take your word for it, Senator.

Senator CORTEZ MASTO. Thank you.

One of the many yet-to-be-addressed concerns regarding engineering safety and costs pertains to DOE's design for titanium drip shields that are supposed to sit over each of the thousands of waste canisters in Yucca Mountain's underground tunnels to keep out corroding water. No plan has been made to design these structures, no pay-for has been determined which is particularly crucial considering the amount of material required has been said to exhaust the nation's supply of titanium and no plan has been made on how to install the shields. This unacceptable state of affairs was detailed by former NRC Commissioner, Victor Gilinsky, in a bulletin of the Atomic Scientists Journal article in November 2014.

Has any such consideration like this been made?

Secretary PERRY. Senator, I would tell you that in the decade that's passed since that report that you're making reference to that a lot of technology has changed and I don't want to——

Senator CORTEZ MASTO. Has the Department of Energy done a consideration or analysis based on that, to put costs associated with it?

Secretary PERRY. No.

Senator CORTEZ MASTO. Okay.

And if you are going to make a budget request to restart licensing for a facility that requires such expensive, innovative engineering, wouldn't it be more appropriate to lay all of these considerations before Congress before asking for more money?

Secretary PERRY. I think what we're asking, Senator, is that these dollars are for the licensing side that the NRC is working on and for our operational side of it just to cover the cost of that. It's

not to be looking at the structural issues that are involved there that may or may not be final.

Senator CORTEZ MASTO. So, in that regard, did the Department of Energy feel confident in the current license application for Yucca Mountain or would it need to submit a new application for changes?

Secretary PERRY. I think we would be going forward with the licensing process as the law requires us to and I think——

Senator CORTEZ MASTO. Are there additional costs associated with it?

Secretary PERRY. Not that I'm aware of.

Senator CORTEZ MASTO. Would the Environmental Impact Statements for the project require any updates?

Secretary PERRY. I would suggest it probably would.

Senator CORTEZ MASTO. Does the Department of Energy even have a final design for the facility?

Secretary PERRY. No.

Senator CORTEZ MASTO. So why should Congress agree to appropriate any funds without answers to any of these questions?

Secretary PERRY. Well, I think this issue has been on the table for a long time and Congress has, you know, Congress funds a number of things without having a final plan done. So, this is nothing out of the ordinary. This is basically the——

Senator CORTEZ MASTO. I appreciate that comment, but I disagree.

Secretary PERRY. Yes, ma'am.

Senator CORTEZ MASTO. I am sitting here in Congress, and I want a final plan. I want to know how the money is being spent. I want an analysis. I want an assessment. I think it is irresponsible not to ask those questions, to ask for that information and it is your job to provide that information.

I am looking forward in the future if we are going to go down this path, and we have had this conversation before, I think you need to come up with concrete answers and an assessment and a cost affiliated with it for many things that are happening right now at the Department of Energy and I disagree with some of the comments you have made and have concerns and echo some of the concerns of my colleagues with respect to the budget cuts that are occurring and being requested for the Department of Energy and the impact it is going to have on Nevada as well.

Thank you. I notice my time is up.

The CHAIRMAN. Thank you, Senator.

Senator Barrasso.

Senator BARRASSO. Thank you, Madam Chair.

Mr. Secretary, thanks for coming back. It is always good to see you.

As you and I have discussed, I am strongly opposed to the Department's practice of bartering excess uranium to fund the clean-up and decommissioning of the Portsmouth plant. We have talked about that and that is not something that you, or this Administration, had begun and we have talked about the need to get rid of it because the GAO has repeatedly said that the barters are illegal.

The barters have also contributed to record low uranium prices and put uranium workers, certainly in Wyoming as well as states

who are producing uranium, out of work. Last year U.S. uranium production was at the lowest levels since 1950, and we are on the cusp of losing our ability to produce our own nuclear fuel. So the Administration, I think, in terms of our own national security cannot let that happen.

Could you commit to ending these barters, funding the cost of cleanup and decommissioning services at Portsmouth exclusively with the Congressional appropriations?

Secretary PERRY. Senator, thank you.

It's a privilege to be back here in front of you and as you and I have had conversations both privately and as I've stated publicly, I think this uranium bartering process has to be on my list of one of the most poorly designed policies I've ever come across since becoming Secretary of Energy. It pits two very important objectives against each other and it doesn't serve either one of them very well and, personally, I'd like to see it stopped completely.

We realize what the challenge is. Our efforts should be focused on letting the uranium marketplace work as it should while continuing, without disruption, the important work that's taking place at the Portsmouth site.

So, given the needed funding is passed in the 2018 Omnibus, I would be pleased to announce the suspension of the barter program in 2018 and between now and then decide on the Fiscal Year '19 budget and I'm certainly committed to working with Congress on that. I hope we can extend ending the barter beyond this Fiscal Year, working together to fully fund our environmental management cleanup through the appropriations process.

Senator BARRASSO. Thank you, Mr. Secretary.

I want to move to one other area.

In your testimony you expressed support for advancing America's coal industry through innovative clean coal technologies. The Department proposes in its budget, however, to cut funding for carbon capture utilization and storage research and development by about 80 percent.

I think now is not the time to cut this funding for carbon capture utilization and storage. Expanded use of these technologies is going to help us protect our environment, support the continued use of America's abundant fossil resources that we have.

Just over a month ago I worked with a bipartisan group of colleagues to pass legislation extending and expanding tax credits for carbon capture utilization and sequestration. We should, I believe, build upon the success of this legislation by maintaining a robust research and development program to support the expanded development of this technology. What assurances can you give me that the Department's budget request is sufficient to support this development and commercialization of clean coal technologies?

Secretary PERRY. Senator, as I said earlier to Senator Cantwell, just because there's a reduction in any particular line item, it doesn't mean that the results that we're going to be having are not appropriate and our commitment to carbon capture utilization, storage, is very strong.

We went to China last year to the Clean Energy Ministerial. We got CCUS placed into the list of different technologies that they're going to be funding and working on in a worldwide way. We were

in the UAE with substantial fossil fuel developers and promoting carbon capture utilization in that arena as well. So not only is the agency committed to continuing to fund, but also in our national labs, to use their substantial technology and innovation to come up with new techniques, new avenues to be able to use coal in a way that is not only appropriate to the environment but that's also, from an economic standpoint, very pleasing.

Senator BARRASSO. Well, thank you very much.

I have some additional questions I will submit in writing.

Thank you, Madam Chairman.

Thank you, Mr. Secretary.

The CHAIRMAN. Thank you, Senator Barrasso.

Senator Duckworth.

Senator DUCKWORTH. Thank you, Madam Chairwoman.

Secretary Perry, when we met during your confirmation process, you promised me you would visit both Argonne and Fermi labs in Illinois, and I want to thank you for following through with your commitment and visiting both of those labs.

Although I don't agree with all aspects of the budget the Administration is proposing, I am happy to see that the work that Argonne and Fermi labs are leading, like exascale computing and the Long-Baseline Neutrino Facility, are actually priorities for the Administration.

Secretary Perry, I also want to thank you and your team for working with my office to provide input on bipartisan legislation I am working on along with Senators Graham and Bennet to help veterans secure good jobs in clean energy.

Our nation has experienced an exponential growth in clean, renewable energy. Today solar energy is the fastest growing industry in the U.S. and wind energy is quickly becoming a dominant form of energy.

In addition, rapid innovations in technology are unlocking additional forms of low carbon emission energy options. I believe there is tremendous opportunity for our veterans to find careers in these energy sectors. Will you support passing my bill at this Congress to create an innovative Department of Energy program that will promote the hiring of veterans in the clean energy industry?

Secretary PERRY. Senator, I think you know, probably as well as anyone in this room, my commitment to our veterans and in a multitude of ways. We look for ways to bring them into the workforce because you and I both know that they already have matured beyond their years. They're already trained up in a lot of different areas so that we don't have to retrain them or to give them initial training. We are supportive of all programs that help employ those that we have made a commitment to because they have served this country in a sacrificial way.

Senator DUCKWORTH. Thank you.

I was also very pleased to learn from Argonne that under your leadership DOE is prioritizing research in precision medicine. There appears to be several direct applications for this work in our military community, including helping to prevent suicide, addressing heart disease and treating some forms of cancer.

I know you have mentioned this to me in the past. Could you please provide recommendations on how Congress can better sup-

port the work of DOE and our national laboratories in advancing precision medicine research and development?

Secretary PERRY. We will and let me just say in a broad way that we already have in our national labs working on some of the nuclear medicine and obviously down in, I think, Jefferson lab in Norfolk there in their physical particle lab, some science that's going on that has the ability to really improve our, the scientific side of, the health community and using nuclear medicine there.

But one thing that I would invite you to do sooner, better yet, let me send them to you, and I'd love to have my ACTIV program that we're just now standing up that is focused on veterans' mental health. And it's not just veterans, it's also our first responders. You know, the NFL is going to be intrigued with this as will our Olympic athletes for that matter, a mother who's got a daughter who plays soccer, any place where concussions can come into place. And we're using our massive computing capacity at the national labs, particularly in your district, for that purpose. I'd love for them to come up and brief you so that you have a really good handle on this, because I know your love for our servicemen and women and our veterans, as well as the science on this, can change some people's worlds in a really positive way.

Senator DUCKWORTH. Thank you. I do appreciate the increases in the budget to both of our national labs.

We need to remain at the forefront of the supercomputing capability on a global scale. If we don't, other nations will not only catch up but surpass us, and they are actively investing huge amounts of money in that. It is good to see that that is covered in this year's budget.

Thank you. I yield back, Madam Chair.

The CHAIRMAN. Thank you, Senator Duckworth.

Senator Portman.

Senator PORTMAN. Thank you, Madam Chair, I appreciate it.

Secretary Perry, I appreciate you making good on your promise which was made during the confirmation process to come out to the Portsmouth Gaseous Diffusion Plant. We heard talk of it earlier. It is in Piketon, Ohio.

For 50 years it enriched uranium for our government, for our nuclear Navy, for our nuclear power plants, for the tritium we need in our nuclear arsenal. The workers at that plant made a lot of sacrifices with some health issues, and now we are cleaning up that plant.

And to my colleague from Wyoming, who has departed, he talked about the need for us to stop using barter. Well, unfortunately we had to rely on barter because in the last Administration, they did not provide us the appropriations. In fact, they even slowed down the cleanup from 2025 to 2044, slowed it down by about 20 years with the funding they provided, even including the barter which is a huge mistake, not just for that site and for the safety of that area and the reindustrialization that everyone wants, but also for the taxpayer because it ends up costing the taxpayer a lot more when you extend the life of these cleanups. So we need the funding.

I just did a little research. There were 323 mining jobs in Wyoming last year in uranium. When the funding was to be cut off at Piketon, as you know, 800 jobs were on the chopping block.

Secretary PERRY. Yes, sir.

Senator PORTMAN. We have 1,800 people that are doing this cleanup. You have seen what they do firsthand.

They are great people. They are doing it in a smart, committed way, but man, this funding going up and down and the barter being pulled, would obviously create, again, this crisis out there where we would lose a lot of good people and we need them. It is a community that has very high unemployment already. I guess what I am suggesting today is let's not pull the plug on the barter until we have the appropriations.

Secretary PERRY. Sure.

Senator PORTMAN. I guess I am looking for a commitment from you today that you will continue the barter program unless adequate appropriations are provided in the funding for FY'18 and FY'19 with regard to the Piketon plant.

Secretary PERRY. Yes, sir.

Senator, I am committed to the cleanup of that facility. My preference, obviously, is to have it appropriated the old-fashioned way, if you will, from a straight-up appropriation where your citizens and the workers at that plant know that Congress is committed to the funding of that through a normal appropriation. Obviously, if that does not happen, and then I have shared that with Senator Barrasso as well, if that does not happen the commitment to that cleanup is there and it is solid and it is long-term.

Senator PORTMAN. Thank you. I appreciate it, Mr. Secretary.

I do not disagree with you, as you know, and I appreciate your commitment to it. We are just trying to clean this thing up.

Secretary PERRY. Yes, sir.

Senator PORTMAN. It is not good for the area, and it is not good for the taxpayers.

The other issue, as you well know, because I have talked about this and you saw the site. The Obama Administration, toward the end of its term, pulled the plug on the new generation of enrichment. I listened to what my colleague and my good friend, and he is from Wyoming, said, if we don't have this mining, he said, we would lose our ability to produce our own nuclear fuel, but we have already lost it.

Secretary PERRY. Yes, sir.

Senator PORTMAN. We do not have any domestic-owned or domestic-controlled enrichment process in the country now because we have shut down Piketon. We shut down Paducah. We were on track under the previous Administration, through the ACP program, which is American Centrifuge Plant, to create that with this new, much more energy-efficient technology called centrifuge.

So my question to you is, are you aware of the fact that there was going to be a re-evaluation of the Obama Administration approach to this? I believe you talked about it in your confirmation? And if so, what are the results of that? Do we have any sense as to where we are going on the next generation of enriched uranium?

Secretary PERRY. Yes, sir. The short answer is yes, sir. We're working toward that as we speak.

I think my commitment to bringing the civil nuclear program in this country back to one of stability and, frankly, to lead the world is pretty much on display. It has been.

We think that there has been, for whatever reason, a—I'm not going to call it an anti-nuclear mentality but the nuclear, civil nuclear business, has been left by the wayside, whether it's building new plants here, whether it's been committing to small modular reactors. We have tried to reinvigorate that, send some clear messages that this country needs to lead the world in civil nuclear technology and these centrifuges are obviously a very important part of that process.

Senator PORTMAN. I appreciate that. We need to have a source for enriched uranium. We also need it for our nuclear Navy, as you know, as well as anybody, and we also need it for our tritium because that low-enriched uranium is necessary to keep our nuclear arsenal up to date. Finally, from a national security point of view, in terms of non-proliferation, maybe the single most important thing we can do as Americans is say if you don't enrich uranium in your country, which often, as you know, has gotten diverted into nuclear weapons programs, Iran being the greatest example, we'll provide you that enriched uranium. We can't do that now. We can't tell people we can provide the enriched uranium. We do have a stockpile, admittedly.

Secretary PERRY. Yup.

Senator PORTMAN. But we have no program to be able to continue that. By not having a commitment to it, to restart it, it is going to take billions of dollars and years and years. I just wish we could get started on it now so we have that capability into the future.

I thank you very much. I have other questions for the record I will ask, and I appreciate your service.

Secretary PERRY. Thank you, sir.

The CHAIRMAN. Thank you, Senator Portman.

Senator Manchin.

Senator MANCHIN. Thank you, Madam Chairman, and thank you for holding this hearing. And Secretary, it is always good to be with you and it is good to see you again.

I am reminded that our friendship goes back to our days as Governor in 2005 that we really knew each other, knew quite well when you had Katrina and you graciously took all of the hundreds of thousands of people from Louisiana and Mississippi and helped them. We were able to send troops down, also send C-130's and assist, and we have been hooked together ever since.

Also, you have been quite busy fulfilling all your promises and commitments in a bipartisan way to visit all the states you have. I want to thank you too, because you came to West Virginia and you looked at what we had and what we did, at some of the power plants that we have.

And also, NETL, the National Energy Technology Lab, in Morgantown which is working on the clean coal technology which, I think, Senator Barrasso had asked you about. I appreciate your commitment on that and using the great coal that we have in our state in a much cleaner fashion and looking for different technologies there.

Also, the storage hub, which we will talk about and also the rare earth elements which we have found that we were able to extract and be self-sustaining here in America. Those are very important

projects that NETL has been leading the charge on and you have been very supportive.

What I would like to ask you about is the Title 17 Loan Guarantee Program from the DOE. I know it had been recommended to be phased out, but there is still an awful lot of mileage left there. I think there is about $8.5 billion in authority left for the fossil projects on clean coal technology but also the storage hub which is extremely important to us and, I think, the security of our nation.

So, I think first of all, your concerns about the program being eliminated in spite of strategic importance and also do you agree/disagree on that program and what we can do to make it even stronger?

Secretary PERRY. Yes, sir.

Senator, thank you for your longtime friendship and, just as an aside, I'll say that coming to your district, sitting down with you and Senator Capito, the leadership over at the University of West Virginia and the Governor's Office, economic development folks in that community, really turned on a bright light for me from the standpoint of how developed that region of America, who's sitting on top of the Marcellus and the Utica and that huge gas deposit and creating a duplicative national security of a refining capability in petrochemical. It was a really important trip for me.

To the LPO, the Loan Programs Office, I think the key words from my perspective in a realistic way is phasing out. There are billions of dollars there that have already been appropriated I think that we could certainly, with your guidance, use in a very thoughtful way that can affect a lot of citizens in a positive way.

I'm not going to try to get into anybody's head other than to say that if this Committee and Congress, collectively, decide to go forward with that program, that we will operate it with the type of oversight and transparency and the results that you all will be proud of.

Senator MANCHIN. Secretary, also, I want to talk to you about, and you and I have spoken directly on this, the storage hub for the national security of our nation, but also with the tremendous find of new resources we have in the fracking that we have done. West Virginia, Kentucky, Ohio and Pennsylvania have been a tremendous boon for our energy independence, if you will.

With that, we have promised, we have promoted a storage hub which will give us the product and keep it in a very safe location, also strategically away from our weather-torn areas such as your state gets hit quite frequently and so does Louisiana.

I don't know what you all are doing toward that and how your support—or do you feel that it would be a great strategic direction for our nation?

Secretary PERRY. As the Governor, I'd wake up in August and September and say a little prayer that a Category Five hurricane did not come up the Houston ship channel. I'd seen that model before and it's devastating, not just in the number of people that lose their lives, which is obviously at the top of that, your concern list, but the devastation that it does to the country's petrochemical capacity to have a duplication of that in a region of the country that is protected from that type of a natural disaster would be, I think, invaluable.

So duplicating that in that Appalachian region—Pennsylvania, Ohio, Kentucky, West Virginia—not only in an area that economically could certainly use the shot in the arm, sitting on top of the great natural resources of the Marcellus and the Utica can transition a region of America that would be very pleasing economically.

Senator MANCHIN. Well, your support, I will say this, the Department of Energy's support and the Administration's support is going to be vitally needed for this to be accomplished, but it is something, I think, that is drastically needed. The economic impact is $36 billion, almost at the turn of the switch, but on top of that, the security of our nation. And sir, your attention to this is greatly appreciated.

Secretary PERRY. We are going to be focused on it like a laser.

You're absolutely correct from the standpoint of this is one of the projects that I've seen that the government can help with and actually not have to fund. I mean, the private sector will supply the funding. They just want to make sure that the permitting process isn't—the ability to get done what we're asking them to get done can be done, as expeditiously as possible.

Senator MANCHIN. Thank you.

Secretary PERRY. Yes, sir. Thank you.

The CHAIRMAN. Thank you, Senator Manchin.

I appreciate your bringing up the loan guarantee program. I think there are many of us around here who feel that well, that program needs some reforms, and we actually suggested those in our energy bill that we had moved out of here, but we have some funding that is left in it that, we think, could certainly be used to leverage some infrastructure out there. So thank you for raising that.

Senator Gardner.

Senator GARDNER. Thank you, Madam Chair. And thank you, Secretary Perry, for your testimony and leadership today.

I had the honor of joining a couple of our colleagues in a visit to the Middle East here a couple of weeks ago. As we were flying over Jordan, right around dusk, I could not help but look down and see Amman, Jordan, right below us on an airplane and think about what if the great inventions surrounding us hadn't been discovered by people in America?

I was looking down at roads that were filled with cars, Henry Ford, who perfected the assembly line and the mass manufacturing of automobiles; looking at houses that were lit up by lights that Thomas Edison helped invent; flying on an airplane that is the outgrowth of work first done by the Wright Brothers in the United States—all of whom played an incredible part of who we are today as a nation. And I began to wonder, what happens if those next inventions are not from the United States? What happens if it is not America that discovers those things or people in America that discover those things, but it is China, it is India, it is Russia, it is somebody else? What happens when the great things that have fundamentally transformed our economy come from somewhere else?

And so, that is when I look at the budget for the Department of Energy, I am concerned about some of the areas of research and the advanced research, in particular. I want to make sure that we

continue to advance in this country because what happens if that great next energy discovery is not in the United States, but it is indeed in China, or India and they are able to manufacture it? They are able to capitalize on those jobs and the next time we fly over, whether it is Amman, Jordan, or Denver, Colorado, we look down and do not see the impact that America has had, but the impact that some other nation has had because we took our eye off the ball.

We are proud of the contributions that our national lab system has made, the efforts we have made at advanced energy research, incredibly proud of the work the National Renewable Energy Laboratory has done in Colorado. I think we have achieved so much because we have had that research and that partnership with the Federal Government that we can't, you know, we can't get rid of that, sort of, idea that we have the opportunity to partner and build funding opportunities.

And so, the benefits for our nation in energy security, energy resiliency, energy affordability, significant economic job creation, the economic advantages to this research that we will only be able to achieve if we continue to support our scientists and engineers at our federal facilities and research facilities.

Can you give me the assurances that I need, many of us need, to make sure that we continue our strong support of our national labs and that you understand the importance of DOE-sponsored research and that you will support it going forward?

Secretary PERRY. Yes, sir.

Senator, the thing I've been most proud of in the year that I've spent as the Secretary of Energy is being able to go to these national labs. As I said in my opening remarks and I talked about, I never met any more patriotic, more committed individuals as those that are working at our national labs. Obviously, the support of them from Congress is very powerful, is palpable. It will continue on, I know that.

And to address with specificity what you brought up in a really beautiful observation about this country, the dollars that you all are going to appropriate, the dollars that we've asked for, for exascale computing, probably will make the biggest impact upon all of that type of research that you're making reference to, the innovation that's going to come out of the labs, it's going to be expedited exponentially by the commitment to the exascale, supercomputing capacity that we have at those. And our commitment is very deep and broad in that arena.

Senator GARDNER. Well, Mr. Secretary, I look forward to working with you on that funding.

Secretary PERRY. Thank you.

Senator GARDNER. As well as a number of other areas of funding, to make sure that we continue being the pride of United States in our national lab system. But more than that, the pride and envy of the world as they look at our great centers of innovation and excellence, represented by our research, development and national lab system.

Switching now, real quick, to grid cybersecurity issues. The Office of Electricity Delivery and Energy Reliability has led an effort, in coordination with the labs, to talk about the technological chal-

lenges of grid modernization. In many cases these assets that we are working with are privately owned and do not have the resources for research and development on their own. Therefore, DOE has provided a lot of support in the research testing and validation and deployment of technologies for the grid.

The budget request splits the office into two, I believe, with one focused on cybersecurity and energy security and one focused on electricity delivery.

I am going to ask a few questions. I am going to run out of time, so maybe we can continue this conversation after the hearing.

The DOE Grid Modernization Initiative and the Grid Modernization Laboratory Consortium have brought together technical expertise from national labs to address the challenges that the grid faces from a cybersecurity and energy storage standpoint. The cross-cutting initiative has been a success. I think most people would admit it, and it is important the DOE continue to lead this program.

So, number one, can you comment on the Department's plans for these two efforts? If you could get back to us on that, that'd be great.

Secretary PERRY. Yes, Senator.

Senator GARDNER. And then this week we have heard a lot about foreign nations attacking our grid. We have the possibility of a foreign nation that has attacked our Colorado Department of Transportation with the SamSam ransomware virus, shutting down 2,000+ computers in the Department of Transportation. Are you confident the Department's budget request will provide the resources necessary to ensure that our electric grid remains secure? Is there something else that we can do to support a strong, coordinated, interagency, federal effort to make sure critical infrastructure has the necessary cybersecurity tools? And there are other discussions we can have. I am out of time, but——

Secretary PERRY. Senator, I will get those to you post haste.

Senator GARDNER. Thank you. Thank you.

Secretary PERRY. Yes, sir.

The CHAIRMAN. Thank you.

Recognizing again the Secretary's time schedule and that we have four more colleagues, we will try to get through this quickly.

Senator Wyden and then Senator Heinrich.

Senator WYDEN. Thank you, Madam Chair.

Mr. Secretary, it is good to see you.

Secretary PERRY. Thank you, Senator.

Senator WYDEN. A little bit of Pacific Northwest business.

I told the Bush Administration, George W. Bush, his folks, that Bonneville was not going to get sold off on my watch and it is not going to get sold off now either. So I just want to put you on notice on this.

Secretary PERRY. Yes, sir.

Senator WYDEN. We also are very concerned in our part of the world about eliminating the National Energy Technology Lab in Albany which, I think, is doing singularly good work. I was in Albany, Oregon, just a couple of days ago and heard again, and I hope you will reconsider that.

I do want to ask you about Hanford because you are up on the layout there. You were there recently. On March 6th, the project

director for the waste treatment plant sent the private construction contractor a letter demanding that the company explain why it could not document that the steel used at the plant was up to safety standards, and the project director said that this was a potentially unrecoverable quality issue. Basically what that means in English is they could not open the plant after billions of dollars had been spent and decades of effort, if that was actually the case. A week later, Mr. Hamel was transferred and I would like to believe the best in people, but it is hard to see that that was a coincidence.

So I want to ask a couple of yes or no questions. I want Mr. Hamel to promptly provide the Committee with the detailed history and explanation about this potentially devastating safety issue at the $17 billion waste treatment plant that has not yet treated an ounce of radioactive waste. Will you, yes or no, direct him to provide us that information.

Secretary PERRY. Yes.

Senator WYDEN. Great.

Second, I would like you to make Mr. Hamel available to us so that we can ask him directly, without interference, about this issue. Will you do so?

Secretary PERRY. I am not sure I can make him do that, but——

Senator WYDEN. No, will you——

Secretary PERRY. But the request would certainly be there.

Senator WYDEN. You will tell him that it is acceptable to you for him to sit down directly with us?

Secretary PERRY. Yes, sir.

Senator WYDEN. Thank you.

Then, I think that just allows me to wrap up and save the Chair a little bit more time.

This is extraordinarily important.

Secretary PERRY. Yes, sir.

Senator WYDEN. We have seen billions of dollars go into this. You have now got the project director saying that there is a potentially devastating safety issue, and he has just been transferred after reporting this. So this story really needs now to get into the details. It is a whistleblower story. It is a safety story. It is an accountability story.

When you met with me privately before you were confirmed, you said that on those kinds of issues, we could work together. The answers you have given this morning are constructive.

I need follow-up. We need to have this done promptly and if it's not, then we will have to go the route of the Inspector General. I would rather not have to go that route. And by indicating that you will tell him to provide us the information, the detailed history and the explanation of this potentially devastating safety issue, that is a constructive first step. And that you will tell him it is acceptable to you that he meet with us without interference, that is a constructive step. So I look forward to pursuing this and talking about it more in the future.

Secretary PERRY. Yes, sir.

Senator WYDEN. Thank you, Madam Chair.

The CHAIRMAN. Thank you. Sounds like you have a plan.

Senator Manchin. Oh, excuse me, Senator Heinrich.

Senator HEINRICH. Thank you.

Secretary Perry, welcome.

I want to start out by talking a little bit about laboratory-directed research and development, or LDRD. It is, in my view, an incredibly important investment in high risk but high reward activities at our national labs. It allows our scientists at places like Los Alamos and Sandia, as well as other labs around the country, to pursue innovative solutions to some of our nation's most vexing energy and also national security problems. Do you agree that LDRD is important, in fact, vital to the lab's ability to recruit and retain the best and brightest scientists and engineers?

Secretary PERRY. Certainly important. Yes, sir.

Senator HEINRICH. Do you support maintaining the lab director's current discretion to set aside up to six percent, as authorized by Congress for LDRD?

Secretary PERRY. I will follow the directions of Congress, sir.

Senator HEINRICH. So you are comfortable with that figure as it is currently set?

Secretary PERRY. If you all think that is the appropriate number, we will work within the parameters of that.

Senator HEINRICH. Let me ask you a little bit about ARPA-E. I am still trying to wrap my head around it. Given the advancements that have been made there with solar cells, with power controls, with lithium-ion batteries, why would we want to zero out that program?

Secretary PERRY. Senator, I come from a background of having worked in that type of environment, if you will. That was what I did when I was the Governor of the State of Texas with the emerging technology fund.

I know the results of really well-managed programs, and I know that there are people on both sides of the aisle that are very supportive of ARPA-E. I looked at the results of it and have found some very, very positive things that came out of it.

So let me just leave it at this. If this Congress, if this Committee, they support the funding of that, it will be operated in a way that you will be most pleased with.

Senator HEINRICH. I appreciate that. I know the Chair is a supporter, and I as well think it is important that this body revisit some of those funding levels.

The CHAIRMAN. Concur.

Senator HEINRICH. Moving on to storage, Secretary.

Your testimony indicates that energy storage remains an important area of focus. We have certainly seen huge strides in storage in the last few years.

I am pleased to see the request restores full funding for the Energy Storage Innovation Hub, known as JCESR. I hope the hub will soon be renewed for five years or reauthorized.

However, your budget, as I mentioned, zeros ARPA-E, nearly eliminates the Office of Electricity Storage Research Program and starts a new Beyond Batteries initiative. Talk to me a little bit about your focus on storage and then explain what the Beyond Batteries initiative is.

Secretary PERRY. Yes, sir.

In a broad sense, I think that battery storage is the "Holy Grail" of the energy storage side of things. So, when we're able to do that

is, I've had great confidence and it will probably come out of a national lab or at least some of the work come out of a national lab. Programs grow, they mature and I think that's what you're seeing happen here.

Beyond Batteries is a visionary quest to find us in a position to lead the world in battery storage, new materials. It's one of the reasons that this country needs to be self-sufficient as we can be when it comes to rare earth minerals, what Senator Manchin was talking about in his district, some deposits there that are very positive in that direction.

So, I hope you will look at this, Senator, as the next step, an appropriate next step. DOE has been, historically, done early stage financing, get innovations to particular places, commercialize them and those programs are mature and we go on to the next challenge. So that's what we see it doing.

Senator HEINRICH. I am going to run out of time before long.

Secretary PERRY. Yes.

Senator HEINRICH. I would just make the argument, I am certainly intrigued by what Beyond Batteries would mean. I think we need to be open to new technologies.

But while lithium-ion has certainly had a huge impact on the market, I think additional new chemistries, for example, are an appropriate place that is still at that same level of development within the lab's role as early stage, not late stage technology transfer.

Secretary PERRY. Yes, sir.

Senator HEINRICH. Thank you.

The CHAIRMAN. Thank you, Senator Heinrich.

Senator Hirono.

Senator HIRONO. Thank you, Madam Chair.

Mr. Secretary, Hawaii has the most forward thinking, renewable electricity goal in the country of reaching 100 percent of reliance on renewables and alternatives by 2045. And this budget goes in totally the wrong direction by cutting 66 percent for renewable energy and energy efficiency and 60 percent for electric grid modernization.

It is not only Hawaii moving to sustainable energy. There is a huge future, global market, for clean energy technologies and your budget would weaken the United States in developing the clean energy technologies that the rest of the world wants to buy.

According to a report by Bloomberg New Energy Finance, China invested $132 billion in clean energy technologies last year compared to $57 billion in the United States. China is not reducing its investments in clean energy R&D so why should the United States?

I think we are going in the wrong direction. So I want to ask you, why are we doing that? Why? I know that you said that we are continuing to provide resources for research and fossil fuels and nuclear power. Where is the commitment to renewable sources of energy when you are facing these kinds of budget cuts?

Secretary PERRY. Certainly they're still there, some, almost $700 million of funding for that and we're really focusing on early stage R&D. And we're going to maintain the United States' leadership position in these very transformative sciences. And I'm comfortable, Senator, that the commitment is still there.

We've had some great success stories, whether it was dealing with hydrogen fuel cells in automobiles, whether it's the Solar Energy Office met and exceeded its goals of five of the last five years. In short, we're hitting or exceeding our goals and then, you know, you set new goals. Some of the work that we're doing on carbon capture and utilization and getting that technology out into the world, into India and China, for instance, can be very, very helpful to the environment.

Senator HIRONO. So, Mr. Secretary, I understand the importance of the early stage R&D, but if you don't go beyond early stages then the technology that is developed can never possibly be utilized.

For example, in September this Committee's Energy Subcommittee held a hearing on how to foster innovation in the energy sector with an emphasis on the role of our national energy labs. The Director of Emerging Technology Strategy for Duke Energy, one of the largest electricity utility companies in the country, explained that utilities need to know that a new technology fully works before they trust it on their power system. She explained that it is not necessarily fundamental sciences or what I would call early stage R&D, but the fact of the matter is we can't operate out of system with technology solutions that do not have history. She continued that anybody who says the national labs are infringing upon the potential of the private sector perhaps doesn't understand the complexity of the system we are operating.

One of the reasons I introduced the Next Generation Electric Systems Act last Congress was to support public-private partnerships to demonstrate how to integrate energy storage, rooftop solar and other advanced electric grid technologies.

I do thank the Chair and Ranking Member for including Advanced Grid Demonstration grants in their energy bill, and I wish the President's budget had the same foresight. My point is, Mr. Secretary, we need to support beyond the early stage stuff. I hope that you will recognize the continual needs for the alternative energy sector.

Secretary PERRY. I do.

Senator HIRONO. Great.

The CHAIRMAN. Okay.

Thank you, Senator Hirono.

Senator Smith. Recognizing that we are trying to keep the Secretary on time, so we will be very quick.

Senator SMITH. Yes, thank you very much, Madam Chair and Mr. Secretary, it is very nice to meet you and thank you for being here.

I am very glad that Senator Hirono asked the question about the Energy Efficiency and Renewable Energy Office. I strongly support that and appreciate what, I think, was a willingness, I hope a willingness, to work with us on getting that budget number up to a place that would work much better for my state.

Secretary PERRY. Yes, Senator.

Senator SMITH. I also would just like to quickly note, I have a similar request, I will say, on the importance of weatherization assistance which is so important in Minnesota.

The Weatherization Assistance Program has helped. It helped seniors stay in their homes. It helped young families afford their homes because they can afford energy better when we weatherize their houses. It is so important in Minnesota.

As a former business person, I appreciate that the return on investment for this program is good. According to Oak Ridge National Lab, we see a $1.72 benefit for every $1.00 that is invested in weatherizing homes. Of course, it creates a lot of jobs too.

I just want to ask you, I would really like to work with you on this as well and see if we can't find some common ground on keeping the Weatherization Assistance Program working well for Minnesota and our country?

Secretary PERRY. Yes, Senator. We'll work with you.

As a Governor, let me just say, I think it's really important for the states to play a very important role in that arena as well.

Senator SMITH. Yes, I agree with that and our state does play an important role and we are looking for a good partnership with the Federal Government.

Thank you, Madam Chair.

The CHAIRMAN. Thank you, Senator Smith.

Senator King.

Senator KING. I am going to try to stop at 30 seconds.

Secretary PERRY. Go.

[Laughter.]

Governor.

Senator KING. Governor Perry, welcome.

Secretary PERRY. Yes, sir, thank you, Governor.

Senator KING. Or Secretary, you are supposed to be called by your highest ever title and Governor——

Secretary PERRY. I'm not going to get into that, sir.

[Laughter.]

I'm just glad to be here in any role.

Senator KING. Three quick points.

Number one, congratulations on the formation of the Cybersecurity, Energy Security, and Emergency Response Office. Very timely. Very important. I think a great initiative and look forward to working with you on it. This is one area of huge national vulnerability. The fact that you have created an office to focus exclusively on that problem, I think, is commendable and I certainly, as I say, look forward to working with you on that. That is number one.

Secretary PERRY. Thank you, sir.

Senator KING. Number two is please maintain a focus on research. I believe one of the most important things the Federal Government can do is do research that isn't necessarily going to pay off right away because the commercial sector does that very well. But we all know that we would not have fracking, would not have the revolution in the price of oil and gas that we have but for support for the Department of Energy many years ago. We need to be thinking in the future about that kind of support for future technologies that we, perhaps, can't even imagine now.

So, research, however it is defined, whichever department it is in, I think, is one of the most important functions that the Department of Energy can perform. I hope you will continue that focus on things like storage, for example, which you have characterized

as one of the really important parts of the energy future of this country. Committed?

Secretary PERRY. Yes, sir. All the way.

Senator KING. And number three, weatherization. It really is important. I want to echo my colleague from Minnesota.

We face situations in Maine where people have to choose between medication, heating their home and putting food on the table. Weatherization is a great way of avoiding expenditures in the future.

So, please, if the Congress refunds, re-establishes that, I hope the Department will continue to actively promote it because it is very important to our constituents.

Secretary PERRY. Senator King, the Department is going to be a good partner, but more importantly, if having been an appropriator in one of my previous lives, having been an agency head and then having been a Governor and now the Secretary of Energy, I respect this process.

And if you see fit, this Committee sees fit, Congress sees fit to fund particular line items, I give you my solemn oath that it will be administered and managed as transparently and as successfully as possible.

Senator KING. Mr. Secretary, I cannot ask more than that.

Thank you very much.

Secretary PERRY. Thank you, sir.

Senator KING. Thank you, Madam Chairman.

The CHAIRMAN. Thank you, Senator King.

Mr. Secretary, thank you.

This is well ahead of Senate time. We are one minute over your hard stop, so I think we did pretty well.

I think you heard, sir, the concerns from many about these budget category areas. We will be looking critically at them as we focus on these important priorities, whether they be weatherization, cleanup, cyber, but we appreciate the opportunity to work with you and your team.

Secretary PERRY. Senator, thank you and thank you again for your thoughtfulness in allowing me to walk out.

Thank you all for your pleasant experience today.

[Laughter.]

The CHAIRMAN. Happy to be with you.

[Laughter.]

The Committee stands adjourned.

[Whereupon, at 11:32 a.m. the hearing was adjourned.]

APPENDIX MATERIAL SUBMITTED

U.S SENATE COMMITTEE ON ENERGY AND NATURAL RESOUCES
Questions for the Record Responses from Secretary of Energy Rick Perry
Fiscal Year 2019 Department of Energy Budget
March 20, 2018

QUESTIONS FROM CHAIRMAN LISA MURKOWSKI

Q1. The Department of Energy has provided considerable federal support for R&D for decades. Nevertheless, new energy technologies that were originally developed here (including renewable energy technologies) are increasingly being commercialized by other nations, especially China. Meanwhile, we have many more research ideas that are in the pipeline from the scientists at our universities and National Labs.

Q1a. How and through what program or programs, will DOE help move research breakthroughs and resulting technologies to market such that domestic enterprises may maintain (or regain) our nation's world-leading position for bringing innovation to market?

A1a. The Department of Energy (DOE) is committed to spurring discovery and innovation at our national labs, and ensuring that America retains its place as a leader in scientific research and technological commercialization in an increasingly competitive world. The Fiscal Year (FY) 2019 President's Budget continues to focus DOE's energy and science programs on early-stage research and development with a renewed focus on cutting-edge innovation and transitioning those breakthroughs to the private marketplace. This budget is designed to connect the intellectual prowess of our scientists and engineers with the ingenuity and capital of our innovators and entrepreneurs.

Further, DOE has a robust management of intellectual property emanating from DOE funded research and development (R&D) and enforcement of intellectual property (IP), along with U.S. manufacturing provisions in our agreements. Both of these better ensure DOE funded technologies create impact in the U.S.

Q1b. How will these efforts complement and not crowd out more basic research?

A1b. DOE is the Nation's largest Federal supporter of basic research in the physical sciences, and the President's FY 2019 Budget provides $5.4 billion for the Office of Science to continue and strengthen American leadership in scientific inquiry. 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 22,000 researchers in FY 2019.

Q1c. What is the current global market size for clean energy technologies?

A1c. According to U.S. Energy Information Administration's (EIA) 2017 International Energy Outlook, about 103 GW of global renewable generation capacity was projected to be added between 2017 and 2018. EIA's International Energy Outlook is not designed to provide similar estimates for cleaner coal power plants, more efficient buildings, or many other technology categories that also could be considered clean energy technologies.

For energy storage, comparable numbers are found within the DOE Global Energy Storage Database. According to the database, 175 GW of energy storage projects are currently operational, 660 MW are under construction, 2.98 GW are contracted, and 12.6 GW are announced.

Q1d. There appears to be a global trend toward cleaner energy technologies, including renewables, advanced nuclear, and energy storage. Do you agree? How large does the Department expect the global market for new energy technologies to be over the next several decades?

A1d. As you have stated, the trend toward cleaner technologies includes – but is not limited to – renewables, advanced nuclear, and energy storage. In addition to these, clean coal technologies also play a critical role in the trend towards cleaner energy. DOE's early-stage research and development on new uses of coal and on clean coal technologies will improve the efficiency and reduce emissions on the existing fleet of coal-fired power plants, as well as develop transformational technologies to help build the coal plants of tomorrow. DOE research also has contributed to technological advances in energy efficiency. From 2008 to 2015, total installation of home LED lightbulbs increased from under 100,000 to over 200 million, while LED costs fell by nearly 90 percent.

To give a few examples of the global market for new energy technologies – the most recent EIA projections in the 2017 International Energy Outlook – renewables are projected to be the

fastest-growing sources of global electricity generation over the period of 2015-2040, rising from 5386 billion kWh/year to 10702 billion kWh/year. Over the same 2015-2040 time period, natural gas generation is projected to grow from 5205 billion kWhr/year to 8770 billion kWhr/year, and nuclear generation is projected to grow from 2510 billion kWhr/year to 3657 billion kWhr/year. Plug-in electric vehicles, which are powered by electricity from the grid, could grow from less than 1% of current vehicle stock to 14% by 2040.

Q1e. How much growth, in the new energy technology market, would a market of the size you anticipate represent?

A1e. According to the most recent EIA projections in the 2017 International Energy Outlook, global renewable generation is projected to rise by an average of 2.8%/ year between 2015 and 2040. Over the same 2015-2040 time period, natural gas generation is projected to grow by an average of 2.1%/year and nuclear generation is projected to grow by an average of 1.5%/year. Plug-in electric vehicles could grow from less than 1% of current vehicle stock to 14% by 2040.

Q1f. Will a reduction in funding for the Department of Energy's applied offices cause the U.S. to lose greater market share in clean energy technologies?

A1f. DOE's world-leading science and technology enterprise engages in cutting-edge research that expands the frontiers of scientific knowledge and generates new technologies. Through our applied offices and 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 2019 Budget Request maintains America's leadership in transformative science and emerging energy technologies.

Q1g. How do late-stage R&D DOE programs de-risk technologies or help to accelerate their path to market?

A1g. Knowledge generated by early-stage R&D enables U.S. industries, businesses and entrepreneurs to develop and deploy innovative energy technologies and gives them the competitive edge needed to excel in the rapidly changing global energy economy. The

Administration's budget reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies by fostering collaboration between National Laboratories, universities and companies.

The statutory Technology Commercialization Fund (TCF) is a specific example of public-private collaboration in de-risking technologies, accelerating the path to market for these technologies. Through the TCF, DOE competitively selects and awards funding for maturation of lab-developed, applied energy technologies that have attracted matching private funds.

Through careful prioritization and ensuring that funding goes to the most promising research, 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.

Q2. You and I have discussed the importance of enabling the Office of Indian Energy to do the most good for our native communities. The Office provides important assistance with energy development, capacity building, and cost reductions for tribes and Alaska Natives. Yet, your request proposes to cut the budget for this program to $10 million.

Q2a. At that funding level, how will you prioritize the work that must be done?

A2a. The priority of work for the Office of Indian Energy (IE) is to deploy energy infrastructure on tribal lands. In the 2019 budget request, IE established its two Performance Goals of 100 MW of new generation capacity and $2 billion of cost savings in Indian Country by 2030. Specifically, in FY 2019 IE plans to award grants that will result in 4.4 MW of new installed generation capacity and that will provide a cost savings of $100 million over the life of the systems.

Q2b. Would you support making use of these funds, or a share of them, as grants to build energy projects, rather than just for technical assistance?

A2b. The Office of Indian Energy (IE) devotes a majority of its 2019 budget request to financial assistance through grants to build energy projects. Within the $10 million request, IE plans

$6.75 million for grants to build energy projects, $930 thousand for Technical Assistance, and $2.32 million for Program Direction.

IE expects to continue to receive requests for technical assistance, and we prioritize the requests of existing grant recipients in order to ensure the success of the projects. Should meritorious grant applications exceed the $6.75 million requested, the Director has the flexibility, within the funds available in the Indian Energy budget control point, to increase the amount made available for grants to build energy projects.

Q3. I believe that ARPA-E is an essential part of the development pipeline. It helps ensure more promising concepts can reach the market. The type of work that ARPA-E undertakes is inherently too risky for private parties to do. Although I agree with your support for basic research, I also believe there is a role for the Department across the spectrum, including demonstration of clean energy technologies. You have often voiced support for ARPA-E, yet your proposed budget would do away with the program entirely.

Q3a. Please elaborate on the benefits, as you see them, of new energy technologies being commercialized in the United States, including the impact on our nation's competitiveness in global markets?

A3a. DOE is committed to creating commercially viable economic solutions to protect our environment and enhance our nation's energy independence. Advanced energy technologies are critical not only to our national and economic security, but also to America's global leadership in science and technology. Developing the next great innovations here in the United States can enhance our competitiveness in global markets and bring about a new era of American prosperity. Through careful prioritization and ensuring that funding goes to the most promising research, 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.

Q3b. Has ARPA-E met delivering on its statutory goals effectively?

A3b. ARPA-E is developing impressive technologies. However, if ARPA-E is eliminated, DOE will still continue to be a world-leading science and technology enterprise that generates the innovations that fulfill our mission of ensuring the nation's security and prosperity.

Q3c. How many technologies, which have received support through ARPA-E, have been successfully commercialized?

A3c. The success of ARPA-E programs and projects will ultimately be measured by their impact on U.S. energy dominance. ARPA-E reviews various impact indicators to measure progress. As of February, 2018, ARPA-E has provided approximately $1.8 billion in early-stage R&D funding across more than 660 projects. Since 2009, a group of 136 project teams have attracted more than $2.6 billion in private sector follow-on funding, 71 projects have formed new companies, 109 projects have partnered with other government agencies for further development, and an ever-increasing number of technologies have been incorporated into products sold on the market today.

Q3d. Without ARPA-E, how would DOE facilitate the commercialization of new energy technologies and fulfill the mission and spirit of the ARPA-E program?

A3d. The President's Budget 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. The budget reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies. Through careful prioritization and ensuring that funding goes to the most promising research, DOE will continue to be a world-leading science and technology enterprise that generates the innovations that fulfill our mission of ensuring the nation's security and prosperity. I look forward to working with this committee and both houses of Congress on these important issues.

Q4. For the second consecutive year, the Administration's proposed budget zeroes out funding for two programs within EERE that are important to Alaska – the Weatherization Assistance Program and the State Energy Program. Low-income households in Alaska spend up to 47 percent of their income on energy. Despite the relatively small amount of funding Alaska

receives, these programs have a significant positive impact in our communities, with the average homeowner achieving savings of over $1400 per year. What action will the Department take to help lower energy costs for low-income households if these programs are eliminated?

A4. In the FY19 Budget Request, 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 the affordability, energy productivity, and resiliency of our homes, 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.

The FY 2019 President's Budget Request eliminates funding for the Weatherization Assistance Program (WAP) and the State Energy Program (SEP) to reduce Federal intervention in state-level energy policy and implementation. The Request reflects the Department's and the Administration's focus on early stage research and development activities. Over time 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. A number of states also allocate a portion of their LIHEAP funding from the Department of Health and Human Services, as well as additional state funding, to support weatherization efforts. Under the President's FY 2019 Budget Request, WAP and SEP will focus on work activities associated with existing financial and technical assistance awards and initiatives with states and local governments and stakeholder organizations. Awards and agreements will be closed out as they come to the end of their periods of performance, and resources and institutional knowledge will be provided to state and local entities as practicable.

U.S SENATE COMMITTEE ON ENERGY AND NATURAL RESOUCES
Questions for the Record Responses from Secretary of Energy Rick Perry
Fiscal Year 2019 Department of Energy Budget
March 20, 2018

Q5 When you visit Alaska you will see first-hand the challenges many of our communities face because of our changing climate and diminishing sea ice. The Office of Science previously has conducted extensive research in the Arctic focused on these challenges. With cuts to funding for the program offices within the Office of Science that focus on this research, what are the Department's plans to prioritize Arctic research moving forward?

A5. The DOE Office of Science is focused on understanding change within the Arctic region based on dedicated field experts and system modeling. We have made great strides in achieving this goal, and our investments have similarly resulted in improved decision-making among our public and private stakeholders. The Arctic will continue as an important scientific domain for our current and future investments. More specifically at Utquiagvik (Barrow), we will continue to collect atmospheric observations at the permanent observatory of the Atmospheric Radiation Measurement Facility, and we will maintain a commitment to the long term field experiment at the Barrow Environmental Observatory. Because Arctic observations are critical to achieving our modeling goals, we will maintain a major focus on improving models of Arctic variability and change.

Q6. The work of DOE's loan program office is a good fit with the Administration's focus on infrastructure insofar as the program helps projects attract financing and move forward. Although the Title 17 loan guarantee program is far from perfect, and I have made suggestions in our energy bill to improve it, approximately $21.1 billion in loan authority could be leveraged for infrastructure investment. Why does your budget zero out the loan guarantee program for the second year in a row? How could it could be used to leverage infrastructure investment?

A6. The Budget proposes to eliminate the Title XVII Innovative Technology Loan Guarantee Program, the Advanced Technology Vehicle Manufacturing (ATVM) Loan Program, and the Tribal Energy Loan Guarantee Program, because the private sector is better positioned to finance the deployment of commercially viable energy and advanced vehicle manufacturing projects.

The Federal role in supporting advanced technologies is strongest in the early stages of research and development. The Government should not be in the business of picking which technologies "win" the commercialization race and displacing private sector investment

opportunities. Instead, the Government should recognize the private sector's primary role in taking risks to finance projects in the energy and automobile manufacturing sectors.

Q7. Alaska is home to more than 200 microgrids and leads the world on innovation in bringing together locally-available renewable resources in hybrid energy microgrids to decrease cost and emissions for our people. Microgrids have been a major topic for the Committee this year. Many are looking to microgrid concepts to provide increased power reliability and resilience to high-value assets on the major interconnected grids, or to provide similar value to the grids in Puerto Rico and the U.S. Virgin Islands. Although microgrids are an effective enabling technology for many small generating sources such as microreactors and marine hydrokinetics, there must be more research to refine these concepts and improve technologies.

Q7a. How do you plan to advance microgrid research, development, and deployment through the Department of Energy?

A7a. DOE's Grid Modernization Initiative (GMI) includes research activities focused on the development of innovative technologies, tools, and techniques to modernize the distribution portion of the electric delivery system. Results from the research in advanced distribution management systems, microgrids, and dynamic controls and communications will enable industry to strengthen the resilience of electrical infrastructure against adverse effects of future extreme weather phenomena and other unforeseen natural and man-made occurrences.

- RADIANCE, a project located in Cordova, Alaska, is enhancing resilience methods for distribution grids under harsh weather, cyber-threats, and dynamic grid conditions using multiple networked microgrids, energy storage, and early-stage grid technologies.
- The Industrial Microgrid Analysis and Design for Energy Security and Resiliency project is investigating, developing, and analyzing the risks, costs, and benefits of a microgrid utilizing renewable energy systems at the UPS WorldPort and Centennial Hub facilities. The roadmap developed will help industries evaluate microgrid adoption by defining institutional and regulatory challenges associated with development of industrial-based resilient systems.
- The Grid Analysis and Design for Resiliency in New Orleans project is conducting technical evaluations to assess energy and critical infrastructure vulnerabilities and to

identify cost effective options, including microgrids, to improve the resiliency of both the electrical grid infrastructure and the community.

- The Alaska Microgrid Partnership project is developing a design-basis framework and programmatic approach to assist stakeholders in their efforts to reduce diesel fuel consumption by at least 50% in Alaska's remote microgrids without increasing system lifecycle costs, while improving overall system reliability, security, and resilience.

Additionally, DOE's Office of Electricity is exploring the possibility of leveraging the recovery efforts in Puerto Rico as an opportunity to further microgrid research.

Q7b. How will that work facilitate work in the many DOE Offices?

A7b. Departmental grid activities, including microgrids, are coordinated through the GMI, a DOE collaboration that includes representation from the Office of Electricity and the Office of Energy Efficiency and Renewable Energy applied energy programs. In FY 2018 we expanded participation in GMI consultations to include the Offices of Nuclear Energy, Fossil Energy, and Cybersecurity, Energy Security, and Emergency Response programs. The GMI enhances awareness of complementary efforts and streamlines support for research of mutual interest. Microgrid technologies have the potential to increase energy security when engineered for that effect, and as such can become platforms for the innovative application of technologies developed by DOE applied offices. Further, microgrid technologies can play a role in energy system and assurance planning, and the continued innovation of these technologies can unlock those system and security benefits if effectively integrated into planning processes.

Q7c. Are hybrid-energy system microgrids a significant enabling technology for increasing grid reliability and resilience?

A7c. Yes, research activities under the Resilient Systems Distribution program (which includes microgrids) can enable the industry to strengthen the resilience and reliability of electricity infrastructure.

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Q7d. Are hybrid-energy system microgrids a significant enabling technology for distributed energy generation sources such as microreactors, small hydro, small wind, small solar, and energy storage?

A7d. Yes, microgrids can accommodate a variety of distributed energy resources including distributed generation, as well as energy storage and controllable load.

Q7e. How do you plan to advance microgrid research, development, and deployment through the Department of Energy?

A7e. DOE is leveraging on-going work through the Grid Modernization Laboratory Consortium, including control architecture, modelling and testing capabilities, and partnering with industry to field-validate technical solutions. Additionally, the Office of Electricity is exploring the possibility of leveraging the recovery efforts in Puerto Rico as an opportunity to further microgrid research.

Q8. The Department has maintained that CESER will work both on preparing for and responding to cyber threats. As I understand it, with respect to preparation, DOE staff are involved most deeply in funding security research at the national labs, and that work involves the forms, ethics, bidding, and contracting regulations of the federal government. In contrast, when it comes to responding to threats, for example, in the event of a severe cyberattack that a utility or many utilities cannot overcome without assistance, then CESER would be tasked with acting fast during an emergency.

How will CESER be staffed? Where will staff with expertise on bidding, ethics, and contracting rules and other expertise suited to preparation for threats be assigned to CESER or to another office?

Do you anticipate that DOE will be hiring military veterans – people who have proved themselves capable of acting decisively in an emergency – for the response functions? Will staff from other DOE offices be transferred to CESER for its work involved in funding lab research?

Approximately how many people is DOE expecting to hire into the CESER office in total?

A8. Initially, CESER will be staffed with existing personnel within the Department of Energy who already perform the mission activities of the new CESER office. There will be no disruptions

to existing relationships and responsibilities including among the existing R&D program management and emergency response staffs.

As the CESER office adjusts its size appropriate to its mission and when addressing normal staff attrition, DOE will value the unique experience and contributions of veteran candidates as it does for all vacancies.

DOE will fill vacancies in the CESER office consistent with mission needs.

Q9. The administration's proposed FY 2019 budget for the Office of Energy Efficiency and Renewable Energy (EERE) is $695.6 million, a 65.8 percent decrease from the FY 2018 Continuing Resolution.

- How will cutting funding for solar energy by 67.7 percent, wind by 63.3 percent, water by 46.4 percent, and geothermal by 56.8 percent impact our nation's ability to remain a leader in these technologies?

- How would a 70.9 percent funding decrease for advanced manufacturing, 63 percent for the Federal Energy Management Program, and 71.4 percent for Building Technologies affect the Department's work on energy efficiency?

A9. This Budget Request focuses DOE resources toward early-stage R&D and reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies. It emphasizes energy technologies best positioned to support American energy independence and domestic job-growth in the near- to mid-term. As part of this Budget Request, the Office of Energy Efficiency and Renewable Energy (EERE) will work with industry, academia, National Laboratories, and other partners to create technology-specific roadmaps which focus DOE resources on the most fundamental technology challenges. Knowledge generated by EERE early-stage R&D enables U.S. industries, businesses, and entrepreneurs to develop and deploy innovative energy technologies and gives them 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 sources of energy, increases energy affordability, improves energy

security and resiliency, ensures environmental responsibility and offers Americans a broader range of energy choices.

The Request directs $175 million in EERE's Renewable Power portfolio to perform early-stage research to enable solar, wind, water, and geothermal industries to develop and ultimately deploy low-cost innovative power generation technologies. Through investments in DOE labs, industry, and academia, EERE's Renewable Power technology offices will continue to lead the world in developing domestic, clean, reliable energy choices in power generation, which strengthen the U.S. economy while increasing energy security.

The Request also directs $142 million in EERE's Energy Efficiency portfolio, which 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 the affordability, energy productivity, and resiliency of our homes, 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.

Q10. Enormous amounts of methane hydrates have been found beneath the Arctic permafrost and in sedimentary deposits along continental shelves. Methane hydrates have enormous energy potential, and appears in vast quantities.

- How will they be part of the global energy future?
- How will this budget support research and development of methane hydrates?
- What partnerships is the Department currently engaged in on methane hydrates?

A10a. The United States Geological Survey (USGS) has assessed that the Alaska North Slope (ANS) holds 85 trillion cubic feet (Tcf) of technically-recoverable gas in the form of methane

hydrate. Global methane hydrate potential is enormous, estimated at 250,000–700,000 Tcf, but there are significant technical challenges that must be addressed before commercial production can be envisioned. Current year work includes efforts to provide a critical analysis of long-term U.S. natural gas supply and utilization so that the potential beneficial impact on long-term economic and energy security from U.S. gas hydrate resources can be articulated.

A10b. The FY 2019 President's budget request for the methane hydrates subprogram is $3.5 million, which will allow the Department of Energy (DOE) to continue to evaluate the occurrence, nature, and behavior of naturally occurring gas hydrates. The FY 2019 Gas Hydrates request is consistent with the Administration's *America First Energy Policy*, which provides a mechanism for U.S. global energy dominance. It allows DOE to maintain a role in gas hydrates science research while realigning project funding. The gas hydrate portfolio will be re-scoped to include only early-stage research and development activities. In FY 2019, the subprogram will continue to translate potential methane hydrate resources into latent energy assets via numerical simulations and pore-scale visualization of methane hydrate-bearing sediments. The subprogram will also continue to review and analyze materials obtained through field investigations conducted in the Gulf of Mexico to confirm the nature and regional context of gas hydrate deposits.

The Department received $20 million for gas hydrate research in its FY 2018 appropriation. This funding allowed DOE to fund the initial phases of the joint U.S./Japan–supported Alaska North Slope project, and will allow for DOE's continued participation in that project through FY 2019. Additionally, the initial phase of the Gulf of Mexico field research project has been completed and the results are being analyzed to provide detailed resource characterization of the research area.

A10c. DOE's methane hydrate research has been conducted in partnership with industry, academia, the National Energy Technology Laboratory, other DOE National Laboratories, and a number of nations. In May 2017, DOE partnered with the University of Texas-Austin and others in the successfully completed Gulf of Mexico gas hydrate coring expedition, and DOE is

currently working on the Gulf of Mexico 2 expedition for 2020. DOE's current efforts for methane hydrate include a collaboration with industry and the Japan Oil, Gas and Metals National Corp (JOGMEC) to conduct an extended-term reservoir response test within the Alaska North Slope Prudhoe Bay Unit. Under the FY 2019 funding request, these partnerships with the University of Texas-Austin and JOGMEC will be deferred. Finally, the Department maintains Memoranda of Understanding with the nations of Japan, India, and South Korea for cooperation in conducting methane hydrate research.

Q11. Since the National Appliance Energy Conservation Act was signed into law by President Reagan in 1987, a critical component of DOE's Appliance and Equipment Standards Program has been the provision that ensures federal standards preempt state standards for the same appliance or product. Putting aside the broader topic of how or if DOE's Appliance and Equipment Standards Program should be revamped, will that federal preemption for appliance standards be maintained while you are serving as Secretary of Energy?

A11. Federal preemption of State laws for consumer products and covered equipment is established by statute. Federal energy efficiency requirements for covered equipment established under the Energy Policy and Conservation Act (EPCA) generally supersede State laws and regulations concerning energy conservation testing, labeling, and standards (42 U.S.C. 6316(a) and (b); 42 U.S.C. 6297). DOE may, however, grant waivers of Federal preemption for particular State laws or regulations, in accordance with the procedures and other provisions of EPCA (42 U.S.C. 6316(b) (2) (D)).

Q12. When DOE implements a new energy efficiency standard for an appliance, shouldn't it follow its own rulemaking procedures and publish any new test procedure methods well in advance of noticing a proposed final rule? If so, has this practice been universally observed? And, if not, why not?

A12. DOE agrees, and has stated publicly[1] that it is important to have test procedures in place prior to engaging in rulemaking to revise or establish an energy conservation standard. This is

[1] See 2018-08-23 Transcript: Meeting of the ASRAC Variable Refrigerant Flow Multi-Split Air Conditioners and Heat Pumps Working Group, EERE-2018-BT-STD-0003-0009, page 45.
https://www.regulations.gov/document?D=EERE-2018-BT-STD-0003-0009

necessary to ensure parties understand the technical parameters that will be assessed in considering whether more stringent standards are justified for a particular product. However, the statutory timelines for completing both test procedure and standards rulemakings don't always coincide with such a step-wise approach. As a result, in the course of meeting its legal obligations, the Department is committed to undertaking the necessary steps to ensure that its regulatory actions are well informed and appropriately analyzed, and ensuring that stakeholders are involved throughout the test procedure rulemaking process.

Q13. Regarding product standards, there have been instances of consensus agreements among product manufacturers and non-government energy efficiency advocates submitted to the DOE. However, the agency has not always taken advantage of these consensus agreements.

- Is it correct to say that if the agency adopted these consensus agreements, they could save both money and time in bypassing the lengthy regulatory process? Is there some reason why the DOE would not accept an appliance efficiency standard consensus agreement and instead go through the rulemaking process?

A13. DOE appreciates the efforts made by stakeholders to work towards consensus agreements and works to adopt these consensus agreements when consistent with statutory requirements. To date, DOE has adopted product energy conservation standards consensus agreements for distribution transformers, clothes washers, dishwashers, refrigerators, freezers, electric motors, central air conditioners, furnaces, walk-in cooler freezers, dedicated-purpose pool pumps, commercial unitary air conditioners and heat pumps, commercial warm air furnaces, miscellaneous refrigeration equipment, and commercial and industrial pumps.

Q14. The Department of Energy has been establishing energy conservation standards for consumer products since 1979. Over the years, many of these products have been subjected to increasingly stringent standards such that there may now be little opportunity for increased energy savings, especially when the significant effort and costs associated with meeting newer standards, including financial burdens to large and small manufacturers and job losses, are taken into account.

- At what point does the agency consider that, as a practical matter, a product is at the limits of its efficiency or cannot through regulation be made more efficient given marketplace or manufacturing realities?

- Is there a next step, which may include the use of efficiency systems, encompassing buildings and consumer products as a whole and not a prescriptive product-by-product approach?

A14. Energy conservation rulemakings are generally initiated by publishing in the Federal Register a request for information that specifically asks for comment on whether or not the product in question can achieve efficiency gains through regulation. Based on the market data received, interviews with manufacturers, testimony in public meetings, and other market data, DOE can determine that amended standards are not warranted and can issue a determination to that effect. DOE, through its Appliance Standards and Rulemaking Federal Advisory Committee (ASRAC), has studied system-wide efficiency and has already promulgated energy conservation standards for products using a systems approach (commercial and industrial pumps). Statutory language, however, does limit DOE's ability to promulgate standards at the systems level.

Q15a. What is the Department's plan for reestablishing U.S. nuclear leadership?

A15a. Nuclear energy is a key element of United States energy independence, energy dominance, electricity grid resiliency, national security, and clean baseload power.

Efforts in the Office of Nuclear Energy (NE) focus on technology development required to help enable industry to meet existing energy needs while also removing roadblocks to our industry bringing new technologies to market.

Enhancing the long-term competitiveness of the existing U.S. reactor fleet is of key importance. Reducing the current operating costs, and, where possible, making further improvements in reactor performance to generate near-term advantage for U.S. consumers is key. To support industry's achievement of these critical objectives, NE works in conjunction with industry and, where appropriate, the NRC, to support the research needed to inform major component refurbishment and replacement strategies; improve performance, cyber security, and safety; enable long-term operations; and support age-related regulatory oversight decisions. The ultimate goal of NE's R&D is to enable industry to extend the operating

lifetimes, reduce the operating costs of the current reactor fleet, and help reduce or prevent the early shutdown of the Nation's nuclear power plants.

Enabling the development and deployment of advanced nuclear energy systems is also critical to the long-term leadership of the U.S. in nuclear technology. The Office of Nuclear Energy supports development of innovative next generation nuclear energy systems and providing the science and technology base for U.S. innovators of advanced nuclear energy systems. NE investments are sharply focused on early-stage R&D, while providing industry access to the national laboratory infrastructure needed for testing. The Office of Nuclear Energy activities work to bridge the gap between research and development to help enable industry's deployment of advanced nuclear energy systems.

NE has demonstrated expertise in all aspects of nuclear fuel cycle technologies. The Office conducts research and development to achieve improvements to the technical aspects of the nuclear fuel cycle. NE stewards a modern, world-class nuclear energy research, development, and demonstration infrastructure essential to the U.S. nuclear industry across the various technical aspects of the nuclear fuel cycle. The Office works to provide U.S.-based innovators in academia, private industry, and our laboratories access to the necessary tools and resources to advance the state of the art in nuclear energy science and technology. Creating processes for affordable and easy access to these national strategic assets helps maintain U.S. preeminence in nuclear energy science and technology.

Q15b. What goals has the Department established, in coordination with industry, universities, and the National Labs, to demonstrate advanced reactor technologies by a target date? How does the budget request serve those goals?

A15b. As described above, one of the Department's top priority goals is to enable industry's development and deployment of advanced nuclear energy systems. The development of improved advanced nuclear reactor designs and technologies, as well as application of advanced reactor technologies to improve the operation of the existing domestic fleet of nuclear power plants is critical to assuring that nuclear power will be a viable option for the

United States (U.S.) energy requirements for generations to come. The Office of Nuclear Energy has established and is executing programs to engage our national laboratories, the university community, and the U.S. nuclear industry. This budget request supports these programs and efforts.

A key implementing strategy to achieve this goal is the recently-issued U.S. industry-focused, comprehensive, multi-year funding opportunity announcement (FOA) to support innovative, domestic nuclear reactor designs and technologies that have high potential to improve the overall economic outlook for nuclear power in the U.S. Through this FOA, the Department will enter into cost-shared, private-public technical partnerships with U.S. companies to revitalize and expand the U.S. nuclear industry. Collaboration with the robust capabilities of U.S. national laboratories and universities is strongly encouraged to fully support these U.S. industry-driven concepts.

Limited and appropriate U.S. Government investments will accelerate development of these designs and technologies to enhance global competitiveness of U.S. designs. Funding for this FOA will be provided through multiple existing NE programs currently conducting innovative R&D activities. In FY 2018, the FOA will apply at least $60 million from the NE Advanced Reactor Technologies sub-program provided by the Consolidated Appropriations Act of 2018. In addition, as appropriate, based on quality of received applications and available funding, cross-cutting and fuel cycle-related projects will also be funded by other NE programs in FY 2018 under this FOA.

In FY 2019, the Department will continue to enter into cost-shared technical partnerships via the multi-year FOA as appropriate, consistent with meeting NE's goals and strategic enabling objectives. In addition, as outlined in the FY 2019 budget, the Department plans to provide approximately $54 million in FY 2019 to conduct competitively-awarded, cost-shared, early-stage design-related technical assistance and research focused on small modular reactors in support of the above goals and objectives under the Advanced Small Modular Reactor Research and Development program. Also, up to $30 million in additional competitively-

awarded investments may be awarded in FY 2019 under the above-described FOA for multiple NE programs in support of NE priorities.

Finally, the FY 2019 request further supports meeting the above priorities and goals by competitively investing in U.S. university-led research via the Nuclear Energy University Program that allocates up to 20 percent of the NE research funding to university-led research projects that address the full range of the NE portfolio. Also, U.S. industry, universities, and national laboratories will be provided significant support to meet the above goals and objectives via competitively-awarded projects that provide access to the unique federal and partner research capabilities and assets maintained by the Nuclear Science User Facilities.

Q15c. Many advanced nuclear reactor designs would require operating with a fast neutron spectrum. However, the U.S. currently does not have any research capabilities for producing a sufficient flux of fast neutrons to meet these research needs. What is the Department's plan for providing access to a research machine capable of producing fast neutrons for U.S. advanced nuclear reactor developers?

A15c. For the United States to regain a global leadership role in development of the next generation of advanced reactors, a fast spectrum test reactor may be an important experimental tool. In FY 2019 DOE's Versatile Advanced Test Reactor research and development (R&D) subprogram will focus on the conduct of R&D evaluation of options, and pre-conceptual design development for fast test reactor needs and concepts. The information generated by this subprogram will help inform decisions about the Department's nuclear energy R&D infrastructure. While a decision whether or not to construct an advanced fast spectrum test reactor has not been made, such a reactor could accelerate innovation in advanced fuels and materials for U.S. vendors and help pave the path to U.S. global leadership in advanced nuclear R&D by reestablishing this capability. Overall, R&D infrastructure is a cornerstone for advancing the technologies needed to revive and expand the nuclear sector in the United States.

Q15d. Advanced nuclear technology developers need access to high-assay low enriched uranium (HALEU) in order to prove their concepts to the point that they can receive NRC licenses. However, there is not currently any commercially available source of HALEU in the United

States. What will the Department of Energy do to make HALEU available for initial fuel testing for advanced nuclear reactor technology developers?

A15d. The Department of Energy is evaluating potential current and future demands for HALEU to inform future decisions.

Q15e. How could a federal power purchase agreement with a term of greater than ten years, to acquire power supply from an advanced nuclear reactor technology benefit the federal government? What are the potential benefits for increasing reliability or resilience of high-value assets of the federal government, such as national security installations?

A15e. The Department supports current standard Federal policy, which provides for power purchase agreements with a maximum term of ten years.

Q16. What is the Administration's position on the status of nuclear fusion research and development? What are DOE's plans for this research the future? How does the International Thermonuclear Experimental Reactor fit into those plans?

A16. The mission of the Fusion Energy Sciences (FES) program is to expand the fundamental understanding of matter at very high temperatures and densities and build the scientific foundation needed to develop a fusion energy source.

The FES program addresses several Administration research and development priorities. Fusion research has the potential to contribute to American energy dominance by making available a robust, clean, baseload electricity technology. Plasma science can contribute to American prosperity through the potential for spinoff applications. Established partnerships within and outside DOE increase our research effectiveness. Also, the FES program helps train a STEM-focused workforce in key areas of technological and economic importance, as well as national security.

DOE will continue to develop the predictive understanding needed for a sustainable fusion energy source by supporting experimental research on its world-leading user facilities and on flexible smaller-scale devices; enabling research by U.S. scientists on international facilities with unique capabilities; investing in fundamental theory and large-scale code simulations on the Office of Science leadership computing facilities in

partnership with SC's Office of Advanced Scientific Computing Research; and developing the scientific understanding to design materials suitable for the fusion plasma environment.

Significant progress in fusion research and development has been made with large magnetic confinement experiments in the U.S. and around the world. However, a larger and more powerful magnetic confinement device is needed to create the conditions expected in a fusion power plant and to demonstrate its scientific and technical feasibility. The goal of the International Thermonuclear Experimental Reactor (ITER), supported by seven Members comprising 35 nations, is to be the first fusion device to produce net energy (i.e., more than the energy injected into the plasma) and also to be the first fusion device to maintain fusion for long periods of time, several hundred to a few thousand seconds, during which time equilibrium conditions can be achieved within the plasma and adjacent structures.
Currently, an important U.S. review is underway to assess civilian nuclear energy activities. ITER has been included in this study. We look forward to the conclusions of the review and its assessment of continued U.S. participation in ITER.

Q17. During the hearing on March 20, you were asked about the transfer of DOE employee William "Bill" Hamel from overseeing the construction of the Waste Treatment Plant to a position at the Richland Operations Office. The news article at the following link appeared after the hearing. See http://www.tri-cityherald.com/news/local/hanford/article206148669.html

Please provide as much detail about this transfer and the circumstances outlined in the article as may be provided given appropriate regard for the limitations that apply to personnel matters.

A17. As you noted, Mr. Hamel had been the Federal Project Manager for the Waste Treatment Plant at the Office of River Protection during an important phase of that effort. Subsequently, Mr. Hamel accepted a transfer to another part of the Hanford Site working for the Richland Operations Office where his expertise was also needed. He remains a valuable member of the DOE team and he is available to speak if he wishes to do so.

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Q18. How does DOE work with the Department of Homeland Security on cybersecurity issues? How has this changed since DOE was codified as the sector specific agency in the FAST Act and provided with new emergency authorities?

A18. DOE's role in energy sector cybersecurity was established in statute under the FAST Act (P.L. 114-94), and executive action, specifically naming DOE as the Sector-Specific Agency (SSA) for cybersecurity for the energy sector. Defined in Presidential Policy Directive 21 (PPD-21), "the term 'Sector- Specific Agency' (SSA) means the Federal department or agency designated under this directive to be responsible for providing institutional knowledge and specialized expertise as well as leading, facilitating, or supporting the security and resilience programs and associated activities of its designated critical infrastructure sector in the all-hazards environment." PPD-21 states that DHS will "provide strategic guidance, promote a national unity of effort, and coordinate the overall Federal effort to promote the security and resilience of the Nation's critical infrastructure." The FAST Act further mandates that the Secretary of Energy coordinates "with the Department of Homeland Security and other relevant Federal departments and agencies" and collaborates with them on, among other things, "providing, supporting, or facilitating technical assistance and consultations for the energy sector to identify vulnerabilities and help mitigate incidents, as appropriate."

The FAST Act also amended the Federal Power Act to give the Secretary of Energy new authority, upon declaration of a Grid Security Emergency by the President, to issue emergency orders to protect or restore critical electric infrastructure or defense critical electric infrastructure. This authority allows DOE to support energy sector preparations for, and responses to, events.

In the Energy Sector, the core of critical infrastructure partners consists of the Electricity Subsector Coordinating Council (ESCC), the Oil and Natural Gas Subsector Coordinating Council (ONG SCC), and the Energy Government Coordinating Council

(EGCC). Per PPD-21: Critical Infrastructure Security and Resilience, DOE is the SSA for the energy sector, which includes both the electricity subsector and oil and natural gas subsector. In that role, DOE leads the Government's coordination with DHS and the SCCs. The SCCs, EGCC, and associated working groups operate under DHS's Critical Infrastructure Partnership Advisory Council (CIPAC) framework, which provides a mechanism for industry and government coordination. The ESCC and ONG SCC represent the interests of their respective industries. The EGCC, led by DOE and co-chaired with DHS, is where the interagency partners, states, and international partners come together to discuss the important security and resilience issues for the energy sector. This forum ensures that we're working together in a whole-of-government response.

In preparation for, and response to, cybersecurity threats, the Federal government's operational framework is provided by Presidential Policy Directive-41 (PPD-41). A primary purpose of PPD-41 is to clarify the roles and responsibilities of the Federal Government during a "significant cyber incident," which is described as a cyber incident that is "likely to result in demonstrable harm to the national security interests, foreign relations, or economy of the United States or to the public confidence, civil liberties, or public health and safety of the American people."

Under the PPD-41 framework, DOE works in collaboration with other agencies and private sector organizations, including the Federal Government's designated lead agencies for coordinating the response to significant cyber incidents: DHS, acting through the National Cybersecurity and Communications Integration Center (NCCIC), and the Department of Justice (DOJ), acting through the Federal Bureau of Investigation (FBI), and the National Cyber Investigative Joint Task Force, respectively. In the event of a cybersecurity emergency in the energy sector, closely aligning DOE's activities with those of our partners at DHS and DOJ ensures DOE's deep expertise with the sector is appropriately leveraged.

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QUESTIONS FROM RANKING MEMBER MARIA CANTWELL

Q1. What would you tell the workers at Hanford who have faced multiple contamination events over the last year, that you are cutting the budget on a project that they have yet to finish and has proven to be incredibly dangerous? Do you think this is wise?

A1. The Department recognizes its obligation to safely clean up the legacy of weapons production at Hanford and our other sites in the Environmental Management complex. DOE takes this responsibility very seriously, and protecting workers, the public, and the environment are our foremost priorities as we complete key activities such as the demolition of the Plutonium Finishing Plant (PFP). We have not cut the funding on completing the demolition of the PFP. The Budget reflects completion of PFP demolition to slab on grade with funding provided in prior years.

The focus at the Plutonium Finishing Plant is on the health and safety of the workforce, addressing worker concerns, ensuring the remaining facility debris and rubble piles are stable, and mitigating the potential for any additional spread of contamination. Demolition work at the Plutonium Finishing Plant will resume after successful demonstration of capability to perform initial debris packaging.

Q2. The Waste Treatment Plant (WTP) is essential to protecting the Columbia River from the millions of gallons of nuclear waste currently stored in underground tanks at Hanford. It has been recently reported that DOE is considering delaying the design, engineering and construction of the High Level Waste (HLW) and Pretreatment (PT) facilities at WTP for up to five years. Of particular concern is the High Level Waste facility, which is essential for treatment of Hanford's most dangerous tank waste. Can you say with certainty that DOE would still be able to meet court-mandated deadlines for full operations of the Waste Treatment Plant with this type of delay?

A2. The Department is closely examining and will continue to evaluate the milestones associated with construction substantially complete and commissioning of HLW and PT, and the hot start and initial full operations of the WTP. As part of this examination, the Office of River Protection (ORP) has asked the United States Army Corps of Engineers (Army Corps) to perform a parametric analysis of certain options and funding scenarios to evaluate the likelihood of achieving certain HLW and PT-related milestones in the

event a decision is made to keep those facilities in preservation mode for another three to five years.

Q3. How much will it cost annually just to keep the HLW and PT facilities in preservation mode, and how would project funding needs change if DOE needs to play "catch-up" in five years?

A3. DOE is evaluating this matter. As part of this evaluation, ORP has asked the United States Army Corps of Engineers (Army Corps) to perform a parametric analysis of certain options and funding scenarios to evaluate the likelihood of achieving certain HLW and PT-related milestones.

Q4. The Direct Feed Low Activity Waste (DFLAW) facility is scheduled to begin vitrifying waste as early as 2022. How will WTP's funding needs change as startup, commissioning, and operations begin at the DFLAW facility?

A4 The FY 2019 budget request supports DOE's approach to beginning tank waste treatment at Hanford by the 2023 Consent Decree milestone, through the Direct Feed Low Activity Waste (DFLAW) approach. The request allows DOE to initiate commissioning of those sections of the WTP necessary to begin waste treatment using DFLAW facilities. As the intensity of startup testing and commissioning activities increases, funding needs for DFLAW activities will shift from construction to operations.

Q5. As work to prepare the DFLAW facility for operations continues, there will still be important design, engineering, and construction work required for the High Level Waste (HLW) and Pretreatment (PT) facilities. What steps is DOE taking to ensure that all of these facilities are on track to meet their scheduled completion dates? And how much funding will these efforts require in future years?

A5. The Office of River Protection is on track to meet the court-ordered milestone date of 2023 for hot commissioning of the Waste Treatment and Immobilization Plant (WTP) Low-Activity Waste (LAW) Facility. The Department is closely examining and will continue to monitor the eight milestones associated with construction substantially complete and commissioning HLW and PT, and the hot start and initial operations milestones for of the WTP. The Army Corps' analysis will include a parametric analysis

of certain options and funding scenarios to evaluate the likelihood of achieving certain HLW and PT-related milestones.

Q6. In order for the DFLAW facility to successfully operate, it will need a steady supply of waste from Hanford's underground storage tanks. What steps is DOE taking to ensure the infrastructure and technology are in place to supply an adequate feed of waste to DFLAW, and what do you expect those associated costs will be?

A6. DOE is in the process of evaluating the associated costs, necessary infrastructure upgrades, and other information to ensure waste feed is available to support DFLAW. DOE is assessing the option of initially treating tank waste using a Tank Side Cesium Removal treatment (TSCR) unit, and an optimized Low Activity Waste Pretreatment System (LAWPS) facility as a necessary long-term pretreatment capability to provide waste feed for LAW vitrification. DOE's contractor is evaluating vendor proposals for the design, fabrication and testing of a TSCR unit, and is continuing the design development of an optimized LAWPS facility. DOE's budget request includes funds to ensure the infrastructure is in place to provide waste feed for DFLAW.

Q7. At a Congressional hearing last year, you stated that there may be ways to substantially reduce costs associated with Hanford's Waste Treatment Plant (WTP). Now that you have been Secretary of Energy for a year, do you still feel the costs can be significantly reduced? If so, can you provide additional details about how this could be achieved?

A7. DOE is still in the process of identifying and examining opportunities to improve the efficiency of its cleanup efforts including ways to advance the tank waste cleanup mission while reducing costs associated with WTP.

DOE has focused the WTP effort to accelerate construction completion and commissioning of three facilities, Low Activity Waste Facility, Analytical Laboratory and Balance of Facilities. DOE is also engaged in optimizing the design of the Low-Activity Waste Pretreatment System (LAWPS) facility to improve cost and schedule.

Q8. In November, 2017 the Office of River Protection (ORP) concluded the first phase of the Test Bed Initiative (TBI), which successfully packaged and shipped three gallons of

Hanford's low activity tank waste for permanent disposition in Texas. Two additional phases of the TBI have been considered, with each one packaging and shipping progressively larger volumes of tank waste. What are your thoughts on moving forward with the next phase of the TBI? Are there other efforts that DOE is undertaking to identify treatment and disposal options for the millions of gallons of Hanford's low-activity tank waste which is not planned to be vitrified at the Direct Feed Low Activity Waste (DFLAW) facility?

A8. DOE is currently reviewing the options available for accelerating the disposal of treated Hanford tank waste, including a potential follow-on phase of the TBI. DOE expects to continue evaluating the off-site disposal options while working on start-up and commissioning of the DFLAW system.

Q9. The Richland Operations Office (RL) is responsible for much of the active cleanup taking place at the Hanford site, with hundreds of buildings and waste sites still left to be remediated. Because of the unique challenges presented by Hanford's nuclear and chemical waste, the Richland Operations Office spends approximately $600 million every year just to keep the site in a 'minimum-safe' condition. With a total proposed FY19 budget of just $658 million for RL, only $58 million would be spent on actual cleanup, meaning that very little work would get accomplished to reduce the American taxpayers' long-term financial obligation at Hanford. Until the site is cleaned up, taxpayers will be obligated to pay hundreds of millions of dollars every year. With this in mind, wouldn't you agree that spending more on actual cleanup at Hanford will most effectively reduce the annual "mortgage" costs, and ultimately reduce taxpayers' financial burden?

A9. A large component of the EM budget is dedicated to maintaining deteriorating infrastructure at facilities across the EM complex. The Department continues to look for efficiencies and innovations to safely accelerate cleanup efforts across the nation.

Q10. Last year's subsidence event at PUREX Tunnel No. 1 is a recent example of the threats to workers, the environment, and the general public which exist at the Hanford site. Importantly, there are many other threats at the site which have yet to be addressed, including the cesium and strontium capsules currently being stored at the Waste Encapsulation and Storage Facility (WESF). How should DOE prioritize and fund the proactive mitigation of these risks while also continuing to make meaningful cleanup progress?

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A10. The FY 2019 budget for EM supports continued risk reduction and progress at Hanford and demonstrates the Administration's sustained commitment to the important work of addressing the environmental legacy from decades of nuclear weapons production and government-sponsored nuclear energy research. The Department will continue to work with regulators, labor, Tribal Nations, Congress, the public, and all stakeholders to prioritize risk reduction and cleanup activities at the Hanford Site.

Q11. Worker safety has been an ongoing concern at the Hanford site, and the HAMMER Federal Training Center is vital to ensuring that workers have the skills and knowledge necessary to conduct their work safely. What funding levels are needed at HAMMER to ensure the facility is capable of providing the highest level of training possible for the Hanford workforce in the future?

A11. The budget does not request funding levels for HAMMER. Congress directs funding of this facility.

Q12. The 300-296 Waste Site is a highly radioactive spill located underneath the 324 Building at Hanford, in very close proximity to the Columbia River. At the proposed funding level of $658 million for DOE's Richland Operations Office (RL), it is unlikely that substantial progress would be made in remediating this waste site in FY19. How do you plan to fund this important cleanup effort, and when do you expect the project to be complete?

A12. The FY 2019 Request for Richland's River Corridor Closure Project is $66 million, which includes support for the ongoing activities to remediate the 300-296 Waste Site. Our workers continue to make safe and steady progress toward the remediation of this waste site consistent with the Tri-Party Agreement completion date of September, 2019.

Q13. The Pacific Northwest National Laboratory (PNNL) is a unique national asset, with world-class scientists and engineers addressing a wide variety of high-priority issues for our country. PNNL plays an integral role in developing new technology for more efficient waste remediation and training the next generation of scientist help tackle waste remediation issues. What is your vision for the role of DOE's national laboratories in the future?

A13. One of the major priorities at the Department of Energy (DOE) is the work at National Labs. DOE has a fundamental research and development mission focused on facilitating

the next generation of energy technologies. The Fiscal Year (FY) 2019 President's Budget continues to focus DOE's energy and science programs on early-stage research and development with a renewed focus on cutting-edge innovation and transitioning those breakthroughs to the private marketplace.

The Department is establishing effective private-public partnerships to leverage technology advancements and focus federal investments on priority research and capability needs.

By further leveraging the expertise of the national lab complex, and exploring various project management and contract approaches used by the Office of Science and the Office of Environmental Management (EM), we hope to better manage costs and solve EM challenges, while ensuring the highest level of safety for our Federal and contractor employees, the public, and the environment. The FY 2019 Budget Request supports activities to make significant progress in fulfilling our cleanup responsibilities.

Q14. The capabilities we currently have in place at PNNL and the other national labs took many years to develop, but much of this capability could be decimated if the Administration's FY19 budget request were enacted. How do you propose that we maintain these capabilities given the significant requested cuts in programs such as Biological and Environmental Research, Building Technologies, and Bioenergy Technologies?

A14. The DOE national laboratories are at the forefront of science and technology efforts to improve security and resilience of energy systems. We, through our national laboratories, 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 Administration's goal is to focus on more fundamental research and move mature science and technology innovations to the private sector.
The Biological and Environmental Research (BER) program supports fundamental research and scientific user facilities to achieve a predictive understanding of complex biological, earth and environmental systems for energy and infrastructure resilience and

sustainability. At the national laboratories, the BER scientific user facilities will be supported, including the Atmospheric Radiation Measurement facility and the Environmental Molecular Sciences Laboratory managed by PNNL. In Biological System Sciences, the highest priority activities continue to be fundamental genomic science research on plants and microbes for bioenergy, biotechnology, and the environment. The Bioenergy Research Centers (two of which are led by DOE national laboratories, with additional DOE national laboratory participation as partners or collaborators) are the most recognized activity in the BER biology portfolio, underpinning efforts to produce cost effective biofuels and bioproducts from sustainable biomass resources. New opportunities arise for bioimaging, measurement and characterization technology, including using quantum materials, to understand the dynamic expression and function of genome information encoded within cells.
In the BER Earth and Environmental System Sciences, priority is given to supporting research to enhance the predictability of the Earth system. This involves maintaining and extending U.S. leadership in high-resolution Earth system model development, validation, diagnostics and projections that in turn underpin the Nation's ability to design and deploy resilient energy technologies and infrastructures. As an effort to improve predictions, we will also continue to support long-term Arctic field experiments involving the atmospheric sciences and permafrost ecology. Improved predictive capabilities based on DOE investments will ensure a maximum scientific return on existing investments and better utilization of scientific results by stakeholders. The national laboratories provide the scientific leadership for these efforts.

Q15. DOE has a number of large sites across the country where there is an active cleanup mission underway. Like at Hanford, many of these cleanup sites are also in close proximity to DOE national laboratories. How can DOE better leverage its unique capabilities, such as available land, scientific expertise, and a highly-skilled workforce, to actively pursue new missions that would support and diversify local economies?

A15. The Department is committed to addressing 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.

Q16. The Tri-City community has proposed expanding the boundaries of the Manhattan Project National Historical Park at Hanford to better allow the National Park Service to conduct interpretation and preservation work at relevant portions of the Hanford site. The community has also suggested transferring DOE's responsibility for the park (along with the funds intended to support the park) to the Office of Legacy Management, which has expertise in long-term stewardship and public access. Does this request appear to be feasible from DOE's perspective?

A16. The Department recognizes the local support for expansion of the Park boundaries, as well as transferring the Park mission from EM to the Office of Legacy Management (LM). The transfer of responsibilities from EM to LM for sites that have been cleaned up typically takes two or more years. Given the complex interactions the Park will continue to have with ongoing cleanup activities at the larger Hanford Site, this transition may take longer than the typical period. Revising the Park's boundaries consistent with the statute that established the Park will necessitate close coordination between EM and LM to ensure any new areas are appropriately protected and included in planning efforts.

A17. The people of Washington State deserve your commitment that the Department of Energy will continue the current plan to explore development of a Defense Waste Repository. Hanford is not meant to be the de facto final resting place for this high-level nuclear waste. Moreover, scientific analysis has shown there are both technical advantages and potential cost-savings associated with a separate Defense Waste Repository. Can we count on you to provide a disposal option for the Defense Waste that has resided at Hanford for 70 years?

A17. The Budget proposes providing funding through the Nuclear Waste Disposal and Defense Nuclear Waste Disposal accounts to accelerate progress on fulfilling the Federal Government's obligations to address nuclear waste, enhance national security, and reduce future taxpayer burden. I look forward to working with you and your staff to make real progress on this issue.

Q18. Despite previously saying, "Our national laboratories are the crown jewels of the nation and I plan to support and advocate for their work", why does the DOE budget again

propose draconian cuts too many of the programs that should be sufficiently funded if you value the work that national labs do?

A18. The Department of Energy's budget continues to focus the Department's energy and science programs on early-stage research and development at our national laboratories to advance scientific and energy research in an efficient and cost-effective manner.

The budget again reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies by fostering collaboration between national laboratories, universities and companies. Through careful prioritization and ensuring that funding goes to the most promising research, 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.

Q19. Given your support for ARPA-E, when will you be able to convince OMB to stop proposing to eliminate it in the budget? You said in the hearing that you will implement the budget from Congress, including funding for ARPAE. Then why did DOE illegally withhold $91 million from ARPA-E last year, as the GAO found in December?

A19. The FY18 budget request included a proposal to cancel $91 million in prior-year funds. As we waited for final enactment of the FY18 bill, the program did not obligate this funding, to avoid limiting Congressional prerogatives if it decided to rescind this funding. This action had no impact on funding for ongoing activities; final decisions on awards for new funding opportunities were temporarily delayed until a final bill was passed.

All funds have been released for obligation. As a result, GAO did not issue a formal report to Congress under the Impoundment Control Act. All funds have been made available, and will continue to be made available, consistent with the requirements of the Act.

Q20. Will you commit that the Department of Energy will not pursue the proposal to auction off PMA transmission lines, including those owned by Bonneville, or abandon cost-based rates?

A20. Under current law, DOE is responsible for the supervision of the PMAs. DOE has no authority to sell or otherwise dispose of PMA assets. Any such action would require congressional authorization.

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Q21. Secretary Perry said at a hearing in the House that he is "not confident" the federal government has an adequate strategy in place to address the cybersecurity threat.

Q21a. What additional authority do you need to meet this challenge?

A21a. DOE was designated as the Energy Sector-Specific Agency (SSA) under the Homeland Security Presidential Directive 7, "Critical Infrastructure Identification, Prioritization, and Protection" (Dec. 17, 2003), and reaffirmed by Presidential Policy Directive 21, "Critical Infrastructure Security and Resilience" (Feb. 12, 2013). DOE's role as SSA for cybersecurity for the energy sector was codified at 16 U.S.C. § 824o-1 by the *Fixing America's Surface Transportation (FAST) Act*, Pub. L. No. 114-94, § 61003(c)(2) (Dec. 4, 2015). As a result, DOE has collaborated with the energy sector for nearly two decades in a voluntary public-private partnership. DOE engages energy owners and operators at all levels—technical, operational, and executive—to identify and mitigate physical and cyber risks to energy systems. This successful partnership is built on a foundation of earned trust that promotes the mutual exchange of information and resources to improve the security and resilience of critical energy infrastructures. This relationship acknowledges the special security challenges of energy delivery systems, and leverages the distinct technical expertise within industry and government to develop solutions.

Q21b. If you have all the authority you need, why have you not been able to develop an adequate strategy?

A21b. DOE has worked to develop and implement a strategy to achieve the vision that resilient energy delivery systems will be designed, installed, operated, and maintained to survive a cyber incident while sustaining critical functions. DOE's Office of Electricity Delivery and Energy Reliability, the Department of Homeland Security Science and Technology Directorate, and the Energy Infrastructure Protection Division of Natural Resources Canada facilitated the development of the *Roadmap to Secure Control Systems in the Energy Sector* (Jan. 2006) and its update, the *Roadmap to Achieve Energy Delivery*

Systems Cybersecurity (Sept. 2011), to enhance cybersecurity across the energy sector.[2] The *Roadmap* established a common vision and strategic framework for industry and government to develop, deploy, and maintain control systems that could survive an intentional cyber assault without loss of critical functions. This strategy was constructed using the collective insights of the control systems community, including owners and operators, commercial vendors, national laboratories, industry associations, academia, government agencies, and members of the international community. As a result, a number of diverse efforts and ideas aligned toward common goals and the knowledge and resources of other sector stakeholders were better leveraged.

To effectively implement the strategic framework defined by the *Roadmap*, DOE's Office of Cybersecurity, Energy Security, and Emergency Response (CESER) released the *DOE Multiyear Plan for Energy Sector Cybersecurity* to improve cybersecurity and resilience of the Nation's energy system.[3] It lays out an integrated strategy to reduce cyber risks in the U.S. energy sector by pursuing high-priority activities that are coordinated with other DOE offices, and with the strategies, plans, and activities of government and the energy sector. The *Plan* framework helps to align the efforts of government at all levels, energy owners and operators, and key energy stakeholders.

Q21c. What have you done in the past year to advance DOE's role as the Energy Cybersecurity Sector Specific Agency?

A21c. DOE continues to implement its strategy to advance the state-of-the-art in cybersecurity, which is two-fold: work with our partners to 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.

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[2] https://www.energy.gov/sites/prod/files/oeprod/DocumentsandMedia/roadmap.pdf and https://www.energy.gov/oe/downloads/roadmap-achieve-energy-delivery-systems-cybersecurity-2011.
[3] https://www.energy.gov/ceser/articles/department-energy-releases-integrated-strategy-reduce-cyber-risks-us-energy-sector

Partnership with the energy sector is foundational to DOE's strategy. Facing today's threat landscape requires a coordinated approach to improving risk management capabilities, information sharing, and incident response. The Federal Government has also historically funded innovative research and development (R&D) that cannot be economically justified in private-sector markets. Today, this includes game-changing R&D that will build cyber resilience into energy systems for tomorrow.

OE has accelerated game changing research and development (R&D) of resilient energy delivery systems by pursuing the following objectives:

- R&D of innovative tools and technologies to prevent, detect, and mitigate a cyber incident in today's energy delivery systems and transition to the energy sector.
- R&D of game-changing cybersecurity tools and technologies that: anticipate future energy sector attack scenarios and design cybersecurity into emerging energy delivery system devices from the start; and make future systems and components cybersecurity-aware and able to automatically prevent, detect, mitigate, and survive a cyber incident.
- Build strategic core capabilities in the national laboratories and build university collaborations dedicated to advancing cybersecurity for energy delivery systems.

Q22. In response to what has been characterized by the Federal government as a "multi-stage intrusion campaign by Russian government cyber actors who...gained remote access into energy sector networks" the FBI and DHS issued a joint alert to critical infrastructure sectors, including the energy sector. Yet on the same day, Secretary Perry testified in front of the House of Representatives that he did not think the Federal government had an adequate strategy in place to address the number of cyberattacks directed at the United States. Why did it appear that the FBI, DHS, and DOE were not all coordinated in what appears to be the most significant public federal response to Russian cyber intrusions on the grid? Please explain to this committee how you have used your authority as Secretary of the Sector Specific Agency in charge of energy cybersecurity to work with the Director of the FBI and the Secretary of Homeland Security on energy cybersecurity matters? How can you ensure you will coordinate better with DHS and FBI?

A22. As the Sector-Specific Agency (SSA) for Energy, DOE oversees activities associated with the Department of Homeland Security's National Infrastructure Protection Plan (NIPP)

and the Energy Sector Specific Plan (SSP). In doing so, the Department maintains a close partnership with the Department of Homeland Security including the Federal Emergency Management Agency, the Federal Bureau of Investigation, and other Federal partners in preparing for and responding to energy emergencies. As the energy SSA, DOE's ongoing collaboration with vendors, utility owners, and operators of the electricity and oil and natural gas subsectors strengthens the cybersecurity of critical energy infrastructure against current and future threats. SSAs serve as a day-to-day Federal interface for the prioritization and coordination of sector-specific activities; carry out incident management responsibilities consistent with statutory authority and other appropriate policies, directives, or regulations; and provide, support, and facilitate technical assistance and consultations for each sector to identify vulnerabilities and help prevent or mitigate the effects of incidents, as appropriate. In meeting this requirement for DOE, the Office of Cybersecurity, Energy Security, and Emergency Response is supporting cyber risk and incident management activities with four key objectives:

- Accelerating information sharing to enhance situational awareness;
- Expanding implementation of the Cybersecurity Capability Maturity Models and Risk Management Process;
- Exercising and refining the energy sector's cyber incident response capabilities; and
- Researching and developing technologies to improve energy reliability and resilience.

Q23. Not enough meaningful action is being taken to match the severity of the very real cyber threat to our energy infrastructure. The mere announcement of a new cyber office that lacks key details is no substitute for actual progress in the space. Some of DOE's budget documents indicated it would have control over the Strategic Petroleum Reserve and some indicated it would not. Why did you move forward on announcing a new cyber office before there was internal clarity on jurisdiction and leadership? If the organizational details of the office are still very much in the air, how can we have confidence that this office is up to the task to take on of the most daunting and critical national security challenges of our lives? When can we expect a person to be nominated to head the office?

A23. The creation of the Cybersecurity, Energy Security, and Emergency Response (CESER) office better positions the Department to address the emerging threats of tomorrow while

protecting the reliable flow of energy to Americans today. By combining Departmental elements that support response and recovery, DOE will enhance the efficiency and effectiveness of the preparedness cycle for the energy sector for all hazards.

Forming one office to support energy stakeholder engagement and the Nation through planning for and responding to incidents while developing supporting capabilities, training, exercising, and evaluating lessons learned will more directly inform research and development efforts in resilience and security based on lessons learned from operational activities. Additionally, the important subject matter expertise collected supports the critical role energy plays in national security, and forming a new office supports the resourcing of the significant mission DOE is responsible for on behalf of the sector.

On June 12, 2018 Karen S. Evans was nominated to be an Assistant Secretary of Energy for Cybersecurity, Energy Security and Emergency Response.

Q24. Why has energy cybersecurity been overlooked in the infrastructure bill despite the fact that the Administration and the Department of Energy have agreed that our grid is vulnerable to cyberattack, the FBI and DHS admitted last week that our grid is currently under attack?

A24. The President's proposed infrastructure plan includes energy needs, which inherently and necessarily include cyber. As an example of our continued focus on cybersecurity, the DOE Budget Request establishes the Office of Cybersecurity, Energy Security, and Emergency Response to strengthen the Department's role as the sector-specific agency for cybersecurity in the energy sector.

Q25a. Are you confident that President Trump understands the gravity of the threat of cyberattacks to our way of life?

A25a. Protecting America's energy systems and critical infrastructure from cyber-attack risks has been a consistent top priority for the President. Within months of taking office, President Trump signed Executive Order 13800, "Strengthening the Cybersecurity of

Federal Networks and Critical Infrastructure" (May 11, 2017). This action defined a United States policy to promote an open, interoperable, reliable, and secure internet that fosters efficiency, innovation, communication, and economic prosperity, while respecting privacy and guarding against disruption, fraud, and theft. Further, the action defined an administration policy to seek to support the growth and sustainment of a workforce that is skilled in cybersecurity and related fields as the foundation for achieving our objectives in cyberspace.

To mark Cybersecurity Awareness Month in October, 2017, the President declared "In recent years, bad actors in cyberspace have launched attacks on a cross-section of America: businesses both small and large, state and local governments, schoolhouses, hospitals, and infrastructure critical to public safety and national security. Keeping our Nation secure in the face of cyber threats is our shared responsibility."[4] The Council of Economic Advisors released a study in February 2018 entitled "The Cost of Malicious Cyber Activity to the U.S. economy".[5] One of the primary conclusions of the study was "Cybersecurity is a common good; lax cybersecurity imposes negative externalities on other economic entities and on private citizens. Failure to account for these negative externalities results in underinvestment in cybersecurity by the private sector relative to the socially optimal level of investment." Also, on September 20, 2018, the Whitehouse released the National Cyber Strategy, the first fully articulated cyber strategy for the United States in 15 years. This strategy makes clear that the Federal Government will use all means available to keep our country safe from cyber threats and to protect the American people in the digital domain.

As further evidence of the President's consistent commitment to cybersecurity improvement, the Administration requested funding in multiple robust cybersecurity programs for the energy sector in its budget request for fiscal year 2019. As related to

[4] https://www.whitehouse.gov/presidential-actions/president-donald-j-trump-proclaims-october-2017-national-cybersecurity-awareness-month/
[5] https://www.whitehouse.gov/wp-content/uploads/2018/03/The-Cost-of-Malicious-Cyber-Activity-to-the-U.S.-Economy.pdf

DOE, the budget request calls for establishment of the Office of Cybersecurity, Energy Security, and Emergency Response (CESER) with a renewed focus on early-stage activities that improve cybersecurity and resilience to harden and evolve critical grid infrastructure. CESER programs will work in an integrated manner in partnership with industry and other stakeholders as well as other DOE offices, to enhance the resilience (the ability to withstand and quickly recover from disruptions and maintain critical function) and security (the ability to protect system assets and critical functions from unauthorized and undesirable actors) of the U.S. energy infrastructure.

Q25b. How will you ensure that an effective federal strategy will be developed to meet this challenge?

A25b. To address the need to protect the Nation's critical energy infrastructure, CESER released the *DOE Multiyear Plan for Energy Sector Cybersecurity* to improve cybersecurity and resilience of the Nation's energy system.[6] The Plan framework aligns DOE's distinct roles and actions with the efforts of government, energy owners and operators, and key energy stakeholders, at all levels.

CESER actively engages across the Federal Government as a member of the Networking Information Technology Research and Development (NITRD) program, which provides a forum to coordinate activities that are of common interest to the more than 20 NITRD agencies that fund networking and information technology R&D.

CESER's Cybersecurity for Energy Delivery Systems (CEDS) program works with the Grid Modernization Laboratory Consortium (GMLC), a strategic partnership between DOE headquarters and the national laboratories that brings together leading experts and resources to collaborate on the goal of modernizing the Nation's grid. Also, the CEDS program's academic collaborations are supported in partnership with Department of

[6] https://www.energy.gov/ceser/articles/department-energy-releases-integrated-strategy-reduce-cyber-risks-us-energy-sector

Homeland Security Science and Technology Cyber Security Division, which contributes funds to the ongoing Cyber Resilient Energy Delivery Consortium and the Cybersecurity Center for Secure Evolvable Energy Delivery Systems, and contributed funds to the now completed Trustworthy Cyber Infrastructure for the Power Grid.

With regard to cyber preparedness and cyber response programs, DOE engages interagency partners directly on a regular basis. DOE also uses the Government Coordinating Council and interagency policy coordination constructs under the National Security Council, such as the Interagency Policy Committee meetings, for formal coordination.

Q25c. When can we expect a comprehensive capability and vulnerability assessment to be completed?

A25c. The Infrastructure Security and Energy Restoration program has completed the assessments, and DOE would be happy to schedule a classified briefing with you during which the findings could be discussed.

Q26. There were 16 separate billion-dollar weather and climate disaster events in 2017, costing the economy hundreds of billions in losses – a record breaking year. The DOE budget proposal includes a 64 percent cut to Transmission Reliability and Resilience and an 80 percent cut to Resilient Distribution Systems. After a record year of weather and climate disaster events, which clearly illustrate the need for increased resilience for our electric grid, how do you justify these drastic cuts to electricity resiliency?

A26. DOE is prioritizing its investments around early stage research that can improve the reliability and resilience of the electric grid. Also, DOE's work through the Grid Modernization Laboratory Consortium (GMLC) efforts and funding from the applied sciences will help address these areas.

Q27. The DOE proposed budget includes a 74 percent cut to the energy storage program within the Office of Electricity Delivery and a 75 cut to battery and electrification technologies within EERE's vehicles office. At a hearing in the House, Secretary Perry said that energy storage is the "Holy Grail." If energy storage is the "Holy Grail," why does the budget proposal cut it in multiple offices?

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A27. DOE is prioritizing its investments around early stage research that can improve the reliability and resilience of the electric grid and improve the performance and reduce the cost of electric vehicle batteries through energy storage advancements. Also, DOE's work through the GMLC efforts and funding from the applied sciences will help address these areas.

Q28. China has made clear its intention to dominate the global market for electric vehicles. This is a market that the United States helped to build, with the help of critical Department of Energy and private sector research and partnerships that brought critical advances in battery performance and cost. Meanwhile, the Trump Administration's budget request is proposing a 77% cut for the Vehicles Technologies Office and a 42 percent cut for hydrogen fuel cell technology programs. How do these proposed cuts serve the department's stated goal of "enabling industry to develop and deploy clean, domestic fuels and efficient, convenient, and affordable transportation choices that improve U.S. energy security, economic productivity, and environmental quality"? Is the Department ceding our place in the global EV market race?

A28. The Department's FY 2019 Budget Request prioritizes the important early stage research in the Vehicle Technologies Office and the Fuel Cell Technologies Office. Industry is also investing in later stage development in these two areas. Under the U.S. Drive Partnership, DOE works closely with the automotive industry, energy companies and utilities to prioritize the most critical early-stage, pre-competitive research where the government role is the strongest. By focusing DOE investments on the most important breakthrough areas, our scientists can lead the world in innovation making advanced technology vehicles more affordable and efficient. By also catalyzing more National Laboratory-Industry cooperative research partnerships, we can move these breakthrough technologies on performance and cost from the laboratory to our automotive companies and their suppliers. The Vehicles and Fuel Cell Offices have a track record of accomplishments where breakthrough research has transitioned to industry for further development and commercial success. The Argonne National Laboratory research on new cathodes for lithium ion batteries is one prominent example. Others can be provided upon request.

Q29. According to the Bureau of Labor Statistics, the two fastest growing jobs in the United States are solar panel installer and wind turbine technician. This demand for skilled

workers cuts across many different parts of the energy sector. In 2015, the Department of Energy's Quadrennial Energy Review found that 1.5 million new energy jobs will need to be filled by 2030 and new training strategies reflecting a broader range of skills needed will be required to meet the energy challenges of the future. But an energy skills gap still remains, with 73 percent of employers reporting it is difficult to hire qualified workers. What role do you think the Department of Energy should have in helping to train the next generation of skilled workers to take advantage of this tremendous economic opportunity? How will this Administration's budget and infrastructure plan address the need for 1.5 million new energy workers by 2030? What role do you believe apprenticeships play in helping train an energy workforce?

A29. Job creation is a top priority of the Administration. DOE, through its laboratories and field sites, supports a variety of training programs that increase the workforce quality and the number of skilled personnel for the domestic energy sector. In priority areas like nuclear security, we will pursue initiatives to ensure the necessary capability, capacity, and responsiveness of the nuclear weapons infrastructure and the needed skills of the nuclear enterprise workforce, as described in the Nuclear Posture Review.

Apprenticeships are reflected in the budget where relevant by program office. For instance, in 2017, DOE's Office of Energy Efficiency and Renewable Energy's (EERE) Advanced Manufacturing Office (AMO) announced $2.5 million in funding to support university-led traineeship programs that address workforce training needs in the early-stage technology area of advanced materials and process technologies in energy-related manufacturing. These traineeship programs will focus on advancing critical STEM (science, technology, engineering and math) disciplines and competencies specifically relevant to the AMO mission where other U.S. government or academic workforce development programs do not exist.

Additionally, the Department recently hired a Special Assistant to the Secretary for STEM that will work with the programs to assess and address the following: 1) future workforce and skills needs of the DOE enterprise, including headquarters, field and site offices, and the national laboratories; and 2) workforce hiring challenges and best practices across the DOE enterprise.

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Q30. Last week DOE announced a new effort to use prizes and challenges to drive innovation around critical water issues, namely: Desalination, bringing down costs to treat drinking water and waste water, and using water more efficiency, and advancing market based solutions to drive innovation in water. The President's budget appears to eliminate the Energy-Water Nexus Crosscut, which was funded by contributions from 5 separate offices for precisely this type of work. What is DOE's plan to fund this activity when this budget proposal cuts the two biggest contributing offices to the Energy-Water Nexus Crosscut, EERE and the Office of Science's Biological and Environmental Research, by 66 and 18 percent?

A30. While the FY19 Budget request does not go into the level of detail to specifically list crosscutting activities, cross-office and intergovernmental collaborations within the energy-water space continue at DOE. If Congress decides to fund particular DOE programs, those programs funded by Congress will be administered and managed as transparently and as successfully as possible.

Water issues are a priority of the Administration. The White House hosted the "Roundtable Discussion on Fostering Innovation with Prizes and Challenges" where I led a conversation on the important role that prizes and challenges can play for Federal agencies, with a particular focus on the opportunity to leverage this authority to promote innovative clean water technologies. Following the discussion, DOE announced a Critical Water Issues Prize Competition Request for Information to formally request input from the public on key water issues that could be tackled through prizes and challenges.

Among other benefits, prizes and challenges can enable Federal agencies to leverage taxpayer funding by paying only for success and establishing ambitious goals without having to predict which team or approach is most likely to succeed.

Q31. This budget cuts DOE's energy efficiency programs by over 70 percent and eliminates altogether the Weatherization and the State Energy Programs. Thanks to energy efficiency, U.S. productivity is at an all-time high, saving energy consumers money and making American businesses more competitive. How is DOE going to catalyze tomorrow's energy efficiency opportunities with a disappearing budget? Please explain why this budget cuts DOE's energy efficiency work when energy efficiency is the most available and cheapest energy resource.

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A31. In the FY19 Budget Request, 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 the affordability, energy productivity, and resiliency of our homes, 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.

The FY 2019 President's Budget Request reflects the Department's and the Administration's focus on early stage research and development activities. Over time 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. A number of states also allocate a portion of their LIHEAP funding from the Department of Health and Human Services, as well as additional state funding, to support weatherization efforts. Under the President's FY 2019 Budget Request, WAP and SEP will focus on work activities associated with existing financial and technical assistance awards and initiatives with states and local governments and stakeholder organizations. Awards and agreements will be closed out as they come to the end of their periods of performance, and resources and institutional knowledge will be provided to state and local entities as practicable.

Q32. The appliance standards work at DOE has cut U.S. electricity usage by 13 percent compared to what it would be without energy efficiency standards, helping save American households billions in energy costs. Secretary Perry said in a response to questions for the record that "the rulemaking schedule, and thus the level of program activity, is determined by existing statute." And yet, DOE has failed to meet the rulemaking schedule determined by existing statute according to DOE's own recent report on the matter. According to DOE's report there are 23 missed deadlines for products from clothes dryers to air conditioners. Even worse, the President's Budget sets a goal of completing only 3 appliance standards in FY19. Why, if DOE is "committed to

meeting its legislatively mandated deadlines for covered appliances and equipment", has DOE not requested adequate funding for program activities needed to meet statutory or judicial requirements? Can DOE commit that it will be caught up with this backlog by the end of this fiscal year?

A32. DOE's Appliance and Equipment Standards subprogram will fund all required efficiency standards and test procedures, and the Department is committed to meeting all applicable legal obligations. To meet these legal obligations, in recent months, DOE has published:

- 2 final rules for energy conservation standards (Rough Service and Vibration Service lamps and Walk-in Coolers/Freezers),
- 1 final rule for test procedures (Dedicated-Purpose Pool Pumps), and
- 8 Requests for Information relating to Test Procedures.
- We also published 3 direct final rules on Central AC / Heat Pumps; Miscellaneous refrigeration equipment; and Dedicated-Purpose Pool Pumps.

Q33. Will DOE commit not to abuse the Federal Power Act to keep coal plants open that are simply not competitive?

A33. DOE's use of the Federal Power Act authority has been and will continue to be within the intent of the Act. During 2017, DOE used Federal Power Act section 202(c) authority to keep two coal-fired generation units temporarily available to the electricity grid, when a need was identified by their respective electricity grid reliability coordinators. DOE will continue to respond to future Federal Power Act section 202 requests on a case-by-case basis.

Q34. The average tractor-trailer today gets around 6 miles per gallon. Heavy duty trucks make up around 4 percent of vehicles on the road, but over 20 percent of the fuel. Even small increases in fuel efficiency can translate into big savings and emission reductions. The Department of Energy's Super Truck program has partnered with industry to increase research and development into developing fuel efficient technology. Super Truck I was highly successful with participants meeting fuel savings benchmarks and helping to bring new technology into the marketplace. Super Truck II has built on this success to help truck and engine manufacturers including PACCAR, the manufacturer of Peterbilt and Kenworth trucks and headquartered in my home state of Washington, leverage federal dollars to develop the next generation of fuel saving technology that will improve freight

efficiency and lower fuel costs for customers. Super Truck II a multi-year program with initial rounds of funding already released to the participants. However, under the Administration's budget, the Super Truck II program is zeroed out. What is DOE's assessment of the future of the Super Truck II program?

A34. The Department has supported SuperTruck II to develop energy efficient powertrain technologies that can potentially improve commercial vehicle engine efficiency by 30 percent as well as potentially improving the freight hauling efficiency of heavy-duty Class 8 long-haul vehicles by greater than 100 percent in 2020 (compared to a 2009 baseline vehicle). It will also demonstrate the applicability and cost-effectiveness of these technologies in heavy-duty Class 8 regional-haul vehicles. Class 8 trucks present a significant opportunity to increase efficiency and reduce cost for a key segment of our nation's transportation sector. Lowering vehicle fuel costs reduces the amount that companies need to spend on transportation and can allow retailers to pass that savings to consumers.

A total of $60M was appropriated in FY 2016, FY 2017 and FY 2018 for SuperTruck II and will support much of the research planned for each of the five SuperTruck II awards. Going forward, the Department will work with awardees to identify opportunities to reduce cost for later stages of the five-year program, including virtual testing of technologies developed in the first three-to-four years.

Although the FY2019 budget does not include funding for the specific SuperTruck cooperative agreements, success of the early stage research proposed in the President's budget on batteries and electrification, energy efficient mobility systems, combustion and materials will benefit the heavy duty truck manufacturers and their suppliers as they pursue deployment of energy efficient technologies.

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QUESTIONS FROM SENATOR RON WYDEN

Q1. Mr. Secretary, the Hanford site is the most contaminated nuclear site in the United States, yet DOE's FY19 budget proposal would cut funding for environmental cleanup activities by some $230 million between cuts to both the Richland and Office of River Protection budgets. This level of funding is not sufficient to meet the Tri Party Agreement milestones for the site.

How do these reductions affect the Department's ability to meet the legally binding milestones for site clean-up and for construction and operation of the Waste Treatment Plant?

A1. The Department of Energy (DOE) establishes its budget priorities considering risk, compliance milestones, and life-cycle cost considerations.

The Department takes its obligations and regulatory commitments seriously and we are actively working to safely meet our cleanup commitments at Hanford and other sites in the Environmental Management complex, while continuing key risk reduction and remediation activities.

Q2. DOE recently completed an analysis of the failure mechanism of the first double-shell tank to fail -- Tank AY-102 -- raising concerns about the long-term integrity of the remaining Hanford tanks. Continuing issues regarding quality control and design of the Waste Treatment Plant and DOE's recent escalation of its estimated cost to $17 billion raise concerns about the schedule and viability of planned high-level waste treatment capacity.

Given this, how does DOE intend to meet its obligation to treat the tank waste before it can no longer be safely retrieved from deteriorated tanks?

A2. The FY 2019 budget request supports DOE's approach at Hanford to begin treatment of the most mobile constituent of the tank waste, the low activity waste stream, by the court-ordered milestone date of 2023, through the Direct Feed Low Activity Waste (DFLAW) approach. The Department has also conducted a number of studies on the integrity of the tanks, both single-shell and double-shell, and continues to implement programs and activities to maintain tank integrity. Tank integrity is maintained through regular tank screening programs and through a chemical corrosion protection program. Because tank

integrity is essential to supporting waste treatment, the Department continues to conduct tank maintenance and integrity activities.

Q3. Radioactive contamination of the site also threatens the cultural resources of Indian tribes such as the Confederated Tribes of the Umatilla Indian Reservation. Fish consumption by Columbia River tribes is nine times higher than the national average.

How are the current and proposed levels of DOE funding meeting DOE's obligations under Executive Order 12898 (Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations)?

A3. DOE is committed to meaningful consultation and ongoing technical engagement with tribal nations. This engagement includes discussions on how best to enhance the protection of human health, tribal rights and interests, and cultural and natural resources. For over twenty years, DOE has consistently funded and supported tribal cooperative agreements. DOE also funds tribal consultation activities, staffing, and contractors. These are some of the ways DOE implements Executive Order 12898 on Environmental Justice for Low Income and Minority Populations.

At Hanford, cooperative agreements are in place with the Confederated Tribes and Bands of the Yakama Nation, Confederated Tribes of the Umatilla Indian Reservation and the Nez Perce Tribe. DOE also provides funding to the Wanapum Band. Funded activities include tribal review of documents prepared pursuant to the National Environmental Policy Act Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), and National Historic Preservation Act. DOE funding supports tribal activities related to natural resource damage assessment, cultural resource and environmental monitoring, and transportation emergency response planning. DOE has completed two of the six CERCLA Record of Decision (ROD) documents for cleanup along the Columbia River. The remaining three RODs have been identified as priorities for Hanford cleanup. The RODs for cleanup along the River Corridor support cleanup levels that are protective of human health and the environment. Currently, DOE is

collaborating with the area tribes to develop a co-sampling plan to ensure that resources are safe for tribal use.

Q4. In response to a question about budget cuts from my colleague, Ranking Member Cantwell, you said, "Just because there is a reduction of a line item, doesn't necessarily mean that there's going to be a reduction in results." I find it hard to believe that a 65% cut to the Office of Energy Efficiency and Renewable Energy (EERE) will not affect the results of those programs.

What direct impact would the proposed EERE budget cuts have on research programs?

A4. The FY 2019 Request focuses EERE resources toward 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 Request emphasizes energy technologies best positioned to enable American energy independence and domestic job-growth in the near to mid-term. The Request maintains America's leadership in transformative science and emerging energy technologies in sustainable transportation, renewable power, and energy efficiency.

EERE programs will focus on research that industry either does not have the technical capability to undertake or is too far from market realization to merit sufficient industry focus and critical mass. EERE early-stage research focuses on technology challenges that present a significant degree of scientific or technical uncertainty across a relatively long period, making it unlikely that industry will invest significant R&D on their own. Thus, this request maintains the most critical core capabilities and infrastructure at DOE national laboratories related to sustainable transportation, renewable power and energy efficiency technologies.

Knowledge generated by EERE early-stage R&D enables U.S. industries, businesses, and entrepreneurs to develop and deploy innovative energy technologies and gives them the competitive edge needed to excel in the rapidly changing global energy economy.

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Industry deployment of these technologies creates jobs, reduces U.S. reliance on imported oil, increases energy affordability, improves energy security and resiliency, ensures environmental responsibility and offers Americans a broader range of energy choices.

Q5. As discussed at the hearing, the President's DOE's FY19 budget proposal "initiates an effort to consolidate NETL's multi-site footprint to the extent beneficial to a single operational complex." (Appendix, p. 387). The NETL laboratory in Albany, Oregon has unique research capabilities in the areas of advanced geothermal and drilling technologies, as well as military testing capabilities for armor and other applications.

Please describe the consolidation effort and how the Department will avoid the disruption and loss of research capabilities and programs at NETL's Albany laboratory?

A5. The language referred to in this question regarding consolidation of NETL sites was in the President's Budget *Appendix* which printed before the Congress reached a bipartisan agreement on the discretionary spending caps for FY 2018 and FY 2019. The language was removed from the final FY 2019 budget request.

Q6. The Trump administration proposes to sell off the assets of the Power Marketing Administrations (PMAs), including Bonneville Power Administration. This move faces bipartisan opposition, as the PMAs are fiscally-responsible investments that provide affordable power to Americans. The administration also proposes to require BPA to charge market-based rates for power sales.

Please provide any and all economic and rate impact analyses prepared by the Department is support of this decision. In addition, how would the proposal allocate endangered species protection, conservation, and other costs now included in BPA rates?

A6. Under current law, DOE is responsible for the supervision of the PMAs. DOE has no authority to sell or otherwise dispose of PMA assets. Any such action would require congressional authorization.

Q7. DOE's budget proposal would eliminate weatherization programs. Last year in Oregon, more than $30 million was spent helping 50,000 families with utility payment assistance and home weatherization programs. You have said that you think states should provide a greater role.

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What impact would the loss of conservation programs have on low-income households if states cannot or do not fund them?

A7. The Administration is committed to energy policies that lower costs for hardworking Americans and maximize the use of American resources, freeing us from dependence on foreign oil. The President's FY 2019 Budget Request focuses on activities that are properly performed by the federal government, versus those that are more appropriately left to other bodies, such as states and local governments. States have a great deal of autonomy in the development and implementation of the Weatherization Assistance Program and State Energy Program. The statutes that created both programs defer to each state's Governor's discretion in their content and delivery, including in determining the agency in charge of each program. 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. A number of states also allocate a portion of their LIHEAP funding from the Department of Health and Human Services, as well as additional state funding, to support weatherization efforts.

Q8. DOE's budget proposal reduces energy storage research at the Office of Electricity Delivery by 74%. This office is funding new types of energy storage beyond current lithium-ion technologies.
What specific next-generation energy storage research, including those currently being funded, would be disrupted with this budget cut?

A8. The energy storage program will continue to focus on early stage research to accelerate the development of new materials and device technologies that can lead to significant improvement in the cost and performance of promising megawatt-scale energy storage systems and accelerate the adoption of energy storage into grid infrastructure. The program will reduce activities related to grid-scale field validations and development of safety codes and standards.

Q9. DOE's budget proposal would eliminate ARPA-E. The National Academies of of Sciences, Engineering and Medicine reviewed the program and concluded, "ARPA-E is in many cases successfully enhancing the economic and energy security of the United States by funding transformational activities, white space (technology areas that are novel

or underexplored and unlikely to be addressed by the private sector or by other federal research programs), and feasibility studies to open up new technological directions and evaluate the technical merit of potential directions."

Given this independent, third-party assessment, what impact would shutting down ARPA-E have on the economic and energy security of the United States?

A9. The FY 2019 Budget Request focuses resources on early-stage R&D, where the Federal role is strongest, to develop energy technologies best positioned to enable American energy dominance. Through careful prioritization and ensuring that funding goes to the most promising and novel research, DOE will continue to be a world-leading science and technology enterprise that generates the innovations that fulfill our missions ensuring the Nation's economic and energy security.

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QUESTION FROM SENATOR JAMES E. RISCH

Q1. Given the processing of Idaho-stored transuranic (TRU) waste is scheduled to be completed in 2018, there will be a trained and highly competent workforce and facility capable of treating any TRU waste configuration efficiently. Additionally, by running the TRU through the super compactor located at the Advanced Mixed Waste Treatment Program in Idaho, it maximizes the efficient use of transportation assets and limited space within the Waste Isolation Pilot Plant (WIPP). What are your thoughts on a future mission for AMWTP as a national TRU waste treatment center?

A1. The Advanced Mixed Waste Treatment Project (AMWTP) has been highly successful and offers some capabilities that could potentially be used to process contact-handled TRU waste from other sites within the DOE complex. EM is evaluating the AMWTP upon the completion of its current mission.

At this time, DOE is refining analyses to assess the challenges, cost effectiveness and viability of a continuing mission for AMWTP. Issues to be addressed for effective implementation include risk prioritization (for the Idaho National Laboratory as well as for sites that might have waste suitable for processing, but are planned significantly later); the availability of an assured waste stream to support continuous operations; packaging and transportation, since some waste in question cannot be shipped in existing NRC-certified canisters; and, restrictions on the receipt and storage of off-site waste at the Idaho National Laboratory. Agreements from multiple states, relevant regulatory authorities, and stakeholders will be needed to resolve challenges. EM is engaging the State of Idaho on this issue in conjunction with discussions regarding TRU waste milestones in the Settlement Agreement.

Q2. The recently released Basis of Knowledge (BoK) document as part of the WIPP Waste Acceptance Criteria revision 8 will curtail shipments to WIPP from Idaho starting in August 2018 unless another approach to waste stream certification is implemented. What steps are the Department of Energy looking to take to address the limited shipments that WIPP can accept under the existing TRU waste certification process?

A2. DOE has been working to update the certification program for newly generated waste and to verify that previously certified waste meets the new Waste Isolation Pilot Plant (WIPP)

waste acceptance criteria (WAC). Between April 2017 and March 23, 2018, over 2,600 waste containers have been shipped from the Idaho National Laboratory to WIPP for disposal, and another 3,100 containers meeting the WIPP WAC are available for shipment.

Q3. The Idaho Settlement Agreement has specific milestones associated with spent nuclear fuel, specifically 2035. What actions will the Department of Energy take to identify a solid path forward that supports the Idaho Settlement Agreement milestones for spent fuel?

A3. Currently, the Department is transferring the remaining spent nuclear fuel in wet storage to dry storage and is on track to complete these transfers in 2023. The Department continues to evaluate long-term options for removing spent nuclear fuel from the State.

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QUESTION FROM SENATOR BERNARD SANDERS

Q1. In your testimony for this hearing, you stated that your Fiscal Year 2019 Budget Request for the Department of Energy delivers on your commitment to "advance strong domestic energy production."

In your FY 2019 proposed budget, renewable energy is facing extreme cuts despite the fact that renewable energy now makes up 20 percent of the electricity made in the U.S. – double the amount from the beginning of this century. Additionally, solar power is now responsible for one in every 50 new jobs created in the United States, and the clean energy sector is growing at 12 times the rate of the rest of the economy. Since renewable sources of energy are clearly successful sources of "domestic energy," how are your proposed budget cuts to renewable energy consistent with your commitment to "advance strong domestic energy production"?

Given your commitment to advancing strong domestic energy production, please outline your plan, including a timeline, for increasing investment in DOE renewable energy and energy efficiency programs.

A1. The Fiscal Year 2019 (FY) Budget Request focuses DOE resources toward early-stage R&D and reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies. It emphasizes energy technologies best positioned to support American energy independence and domestic job-growth in the near- to mid-term. As part of this Budget Request, the Office of Energy Efficiency and Renewable Energy (EERE) will work with industry, academia, national laboratories, and other partners to create technology-specific roadmaps that focus DOE resources on the most fundamental technology challenges. Knowledge generated by EERE early-stage R&D enables U.S. industries, businesses, and entrepreneurs to develop and deploy innovative energy technologies and gives them 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 sources of energy, increases energy affordability, improves energy security and resiliency, ensures environmental responsibility and offers Americans a broader range of energy choices.

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The Request directs $175 million in EERE's Renewable Power portfolio to perform early-stage research to enable solar, wind, water, and geothermal industries to develop and ultimately deploy low-cost innovative power generation technologies. Through investments in DOE labs, industry, and academia, EERE's Renewable Power technology offices will continue to lead the world in developing domestic, clean, reliable energy choices in power generation, which strengthen the U.S. economy while increasing energy security.

The Request also directs $142 million in EERE's Energy Efficiency portfolio, which 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 the affordability, energy productivity, and resiliency of our homes, 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.

Q2. Mainstream science tells us that rising global temperatures, driven in large part by the burning of fossil fuels, are causing the ocean's temperature to rise, and warmer waters mean bigger storms, heavier rainfall, and more coastal flooding. In April 2017, the National Academy of Sciences concluded unequivocally that climate change is shaping extreme weather all over the world. As you may know, the U.S. has spent about $141.7 billion just on disaster relief directly related to the destruction caused by Hurricanes Harvey, Irma, and Maria, and there remains much work to be done to repair the communities that were devastated by these extreme weather events.

Clearly, mitigating the intensity and frequency of future extreme weather events would save the U.S. billions of dollars annually in disaster relief spending. Given that we *can* mitigate future extreme weather events by investing in renewable energy technologies that don't contribute to global climate change, please outline your plan, including a timeline, for saving the American taxpayers money by taking action to reduce carbon pollution.

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A2. Several Department of Energy early stage research and development investments support low or zero emissions technologies. For example, nuclear energy provides 20 percent of our electricity baseload, and 60 percent of our carbon-free generated electricity. The Fiscal Year (FY) 2019 Budget Request provides $757 million for the Office of Nuclear Energy to continue innovating new and improved nuclear energy technologies. Furthermore, the Energy Efficiency and Renewable Energy budget funds $696 million to maintain America's leadership in transformative science and emerging energy technologies in sustainable transportation, renewable power, and energy efficiency.

Finally, knowledge generated by early-stage R&D enables U.S. industries, businesses and entrepreneurs to develop and deploy innovative energy technologies that give them the competitive edge needed to excel in the rapidly changing global energy economy.

Q3. In December 2017, several organizations including the Department of Energy submitted a report, *Build Back Better: Reimagining and Strengthening the Power Grid of Puerto Rico*, to New York Governor Cuomo, Puerto Rico Governor Roselló, and FEMA Administrator Long. This report recommended a resilient rebuilding plan for Puerto Rico that focuses on distributed energy sources like wind and solar as well as "islandable" microgrids. Furthermore, according to the DOE Office of Electricity Delivery and Energy Reliability's March 14 Situation Report on Hurricanes Maria and Irma:

"The U.S. Department of Energy (DOE) continues to support restoration and recovery efforts related to Hurricanes Maria and Irma. On Puerto Rico, DOE continues to provide support to FEMA. Subject matter experts from the DOE Power Marketing Administration remain deployed to provide technical assistance to the U.S. Army Corps of Engineers. DOE has also deployed a responder to Puerto Rico under the National Disaster Recovery Framework to support the FEMA recovery mission and development of a Federal Recovery Plan."

Q3a. Please outline the status of your work, including a timeline, with FEMA, the U.S. Army Corps, and private contractors to implement the suggestions laid out in the *Build Back Better* report.

A3a. DOE considered the recommendations outlined in the *Build Back Better* report as well as other insights gained from DOE's participation in restoration and recovery efforts. DOE's

resulting recommendations were published in the *Energy Resilience Solutions for the Puerto Rico Grid* report, which was released in June 2018.[7]

Q3b. Please outline the National Disaster Recovery Framework referenced in the March 14 Situation Report and describe how it relates to the *Build Back Better* report's recommendations to increase distributed energy and microgrids in Puerto Rico. Specifically, how many of the report's recommendations are currently being implemented in both recovery and rebuilding efforts in Puerto Rico?

A3b. The *National Disaster Recovery Framework* (NDRF) is a guide that enables effective recovery support to disaster-impacted states, tribes, and territorial and local jurisdictions. The NDRF provides principles that guide recovery core capability development and recovery support activities, defines roles and responsibilities of recovery coordinators and other stakeholders, and provides a coordinating structure that facilitates communication and collaboration among all stakeholders and guidance for pre- and post-disaster recovery planning.

Within the NDRF, Recovery Support Functions (RSFs) provide a structure to facilitate problem solving, improve access to resources, and foster coordination among state and Federal agencies, nongovernmental partners, and stakeholders. Each RSF has coordinating and primary Federal agencies and supporting organizations that operate together with local, state and tribal government officials, nongovernmental organizations (NGOs), and private sector partners. The U.S. Army Corps of Engineers (USACE) is the coordinating agency for the Infrastructure Systems RSF. In support of USACE, DOE is a primary agency for providing energy sector subject matter expertise and technical assistance to all levels of government during recovery.

Presently, emergency restoration work is underway. Simultaneously, plans are being evaluated and developed for recovery efforts, taking into account opportunities to improve resiliency.

[7] https://www.energy.gov/oe/articles/office-electricity-releases-energy-resilience-solutions-puerto-rico-grid-report

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Q3c. Please describe any other recommendations that the Department of Energy has considered for ensuring that Puerto Rico's electric grid is expeditiously rebuilt in a way that is decentralized and resilient.

A3c. DOE's recommendations were published in the *Energy Resilience Solutions for the Puerto Rico Grid* report, which was released in June 2018.[8]

Q3d. The March 14 Situation Report states that "responders deployed to the U.S. Virgin Islands (USVI) demobilized on January 12th." Please provide an outline of the work on the U.S. Virgin Islands that was completed with the DOE's guidance. Also, please list the justifications for the demobilization in the U.S. Virgin Islands.

A3d. DOE Emergency Support Function (ESF) #12 responders deployed to the USVI from DOE sites across the country, including the Western Area Power Administration (WAPA) and the Bonneville Power Administration. DOE ESF #12 responders were pre-deployed as part of a FEMA Incident Management Assistance Team, to both St. Thomas and St. Croix, in advance of Hurricane Irma and remained in place as Hurricane Maria impacted the Territory and throughout the restoration process to provide subject matter expertise, situational awareness, and coordination with FEMA.

DOE ESF #12 responders demobilized on January 12, in coordination with FEMA and the Virgin Islands Water and Power Authority (VIWAPA), as the restoration mission concluded and transitioned to long-term recovery and there was no longer a requirement for DOE subject matter expertise. At the time of demobilization, 97 percent of customers eligible to receive power and 89.5 percent of total customers had been restored and VIWAPA had begun a *No Customer Left Behind Campaign* to ensure all customers were restored. By the end of January, over 99 percent of eligible customers were restored and all customers were restored by the beginning of March. Throughout the restoration process, DOE worked closely with the USVI, FEMA, and private sector partners to

[8] https://www.energy.gov/oe/articles/office-electricity-releases-energy-resilience-solutions-puerto-rico-grid-report

facilitate mutual assistance and to ensure the USVI had materials and equipment necessary for the restoration effort.

In addition to DOE ESF #12 responders, a team of 25 available personnel and 10 line-trucks from WAPA went to St. Thomas to provide mutual aid, through a DOE mission assignment from FEMA and at no cost to WAPA's rate payers, to restore the transmission system on the island. The WAPA crews completed work on the transmission system and finished work on November 29, 2017.

A team from the DOE National Renewable Energy Laboratory was also deployed to the USVI to perform an assessment of electricity infrastructure under a FEMA mission assignment.

Q4. Your FY2019 Budget Request would completely eliminate the Advanced Research Projects Agency-Energy (ARPA-E) program. When asked about this cut during the hearing, you responded: I've looked at the results of [ARPA-E] and have found some very, very positive things out of it. So I'll leave it at this, if this Congress and this committee support the funding of that it will be operated in a way that you will be most pleased with. Why does your FY2019 Budget Request eliminate funding for ARPA-E?

A4. 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 ARPA-E's efforts to overlap with 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 federal role in energy R&D. The President's budget 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. The budget reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies. Through careful prioritization and ensuring that funding goes to the most promising research, DOE will continue to be a world-leading science and technology

enterprise that generates the innovations that fulfill our mission of ensuring the Nation's security and prosperity. I look forward to working with Congress on these issues.

Q5. You have previously stated that the DOE's FY2017 Budget Request didn't reflect your policy priorities and "was written before (you) got (to DOE)." You have now been Secretary of Energy for nearly a year, and your FY2019 Budget Request is nearly identical to the DOE's FY2017 Budget Request.

Please describe all the aspects of the DOE's FY2017 Budget Request, including specific program funding cuts or increases, that didn't reflect your policy priorities.

Please describe all the substantive differences between the DOE FY2017 and FY2019 Budget Requests, including specific program funding cuts or increases, which make the FY2019 Budget Request more representative of your policy positions.

A5. The FY 2019 budget request includes $30.6 billion to support the Department of Energy (DOE). This budget request advances U.S. national security and economic growth by making investments in transformative science and technology innovation to promote affordable and reliable energy. It also includes significant funding to meet our national security and environmental cleanup challenges.

The President's budget request supports the Department's efforts to enhance today's energy security while also making strategic investments for tomorrow. This proposal will empower DOE to achieve our missions efficiently and effectively while being respectful to the American taxpayer. In order to fulfill the President's long-term goal of energy dominance we are prioritizing the acceleration of transformative early-stage research and development, relying on our world-class national labs. This will advance everything from new clean energy technologies to supercomputing. The budget also bolsters DOE's national security responsibilities in Nuclear Security and Cybersecurity by calling for increased funding to modernize our nuclear security enterprise and strengthen the cybersecurity of our energy infrastructure. These two areas are critical to America's long-term national security.

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Specific budget highlights include the following:

- Ensures the safety and effectiveness of our nuclear arsenal; and begins the long-term process of modernizing our nuclear security enterprise.
- Protects our energy infrastructure from cyberattacks and other threats.
- Promotes the President's long-term goal of American energy dominance.
- Advances our efforts to develop exascale computing systems.
- Spurs scientific discovery, innovation, and commercialization.
- Addresses the obligation to clean up the environmental legacy of the Cold War.

Q6. On July 14, 2015, you released the following statement on the Iran Nuclear Deal:

"President Obama's decision to sign a nuclear deal with Iran is one of the most destructive foreign policy decisions in my lifetime. For decades to come, the world will have to deal with the repercussions of this agreement, which will actually make it easier for Iran to develop a nuclear weapon.

And Secretary Clinton, who played a significant role in initiating these negotiations with Iran, will have to justify to the American people why she supports allowing a known state sponsor of terrorism to move toward obtaining a nuclear weapon."

You recently met with Saudi Arabian Energy Minister Khalid al-Falih to discuss a nuclear agreement that would allow Saudi Arabia to enrich uranium and reprocess plutonium, activities which would move them closer toward obtaining a nuclear weapon. Given the United States' long-held bipartisan policy on minimizing the spread of enrichment and reprocessing technology, particularly for a country like Saudi Arabia that has not negotiated an IAEA Additional Protocol to its safeguards agreement, please outline your plan, including a timeline, for publically opposing any nuclear agreement that would allow Saudi Arabia to enrich uranium and reprocess plutonium.

The JCPOA limits Iran's nuclear activities, including uranium enrichment, based on an assessment of the country's practical needs. Will you commit to ensuring that Saudi Arabia is subject to a similar limitation? If you will not make this commitment, why not?

A6. As with any country considering developing a civil nuclear energy program, the United States remains committed to seeking the strongest possible nuclear nonproliferation, safety, and security commitments from its partner countries in civil nuclear cooperation. The discussions we have had with Saudi Arabia are consistent with such objectives.

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QUESTIONS FROM SENATOR STABENOW

Q1. First, thank you for requesting $75 million for the Facility for Rare Isotope Beams in the FY2019 budget. As we've discussed on several occasions, the FRIB project, administered by the Office of Science in partnership with Michigan State University, will be the world's most powerful radioactive beam facility. It will play a critical role in advancing new national defense, environmental science, and medical technologies. I thank you for including the necessary funding for this project in your budget request.

Regrettably, I have some real concerns about other parts of your budget. For example, the Department of Energy is seeking to eliminate the SuperTruck program - a 50/50 cost-shared, public-private partnership that promotes the research, development, and demonstration of technologies that improve the efficiency of Class 8 tractor-trailer trucks by more than 100 percent by 2020. These trucks haul as much as 80% of the goods transported in the country, and although they only make up 4% of vehicles on the road, they use about 20% of the fuel.

The first phase of SuperTruck produced enormous achievements that exceeded benchmarks for freight and engine efficiency. Why would the Department of Energy seek to end funding for a program that is demonstrating significant benefits, and involves close partnerships and cost-sharing agreements with industry partners? SuperTruck from my perspective epitomizes the type of smart and fiscally responsible program that the Department of Energy should be leading.

A1. A total of $60M was appropriated in FY 2016, FY 2017 and FY 2018 for SuperTruck II and will support much of the research planned for each of the five awards. The reduction in the FY 2019 budget request reflects the Department's priority for other early-stage research activities. Going forward, the Department will work with awardees to identify opportunities to reduce cost for later stages of the five-year program, including virtual testing of technologies developed in the first three-to-four years.

Q2. Your budget proposes to slash funding for DOE's Vehicles Office by 73 percent. In addition to eliminating SuperTruck, your budget would reduce support to National Lab researchers focused on better batteries; end National Lab R&D on advanced fueling infrastructure; reduce research on diesel engine emissions reductions; eliminate research on reducing the cost of lightweight aluminum, magnesium, and carbon fiber for vehicles; and cut research on high temperature materials for engine components. From my count, the words terminate, reduce, or eliminate are mentioned 61 times in the 30 pages of your Vehicle R&D budget.

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In addition, the budget seeks to eliminate the ARPA-E program, which funds innovators pursuing projects that are too advanced or untested for the private market. ARPA-E is about keeping America on the cutting-edge of energy technology, and supporting researchers on the path towards breakthroughs in energy storage, generation, and utilization. Your budget also seeks to cut EERE Advanced Manufacturing by 71 percent.

According to the Office of Management Budget, the Administration's FY2019 Budget seeks to make "strategic investments to maintain global leadership in scientific and technological innovation." Can you please tell me how the proposed cuts to the Vehicles Office, ARPA-E, and EERE Advanced Manufacturing squares with this objective? As China and other countries are investing billions in advanced energy technologies, the FY2019 budget leaves me with the impression that this Administration is willing to cede our global leadership in technological innovation.

A2. The FY 2019 Request focuses EERE resources toward 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 Request emphasizes energy technologies best positioned to enable American energy independence and domestic job-growth in the near to mid-term. The Request maintains America's leadership in transformative science and emerging energy technologies in sustainable transportation, renewable power, and energy efficiency.

The Department's FY 2019 Budget Request prioritizes critical early-stage research of advanced vehicle technologies, focusing on innovative pathways to significantly reduce the cost and improve the performance of technologies in a broad portfolio that includes electrification, advanced engines and fuels, materials for lightweight structures and advanced powertrains, and energy efficient mobility technologies and systems. Programs will leverage the unique capabilities of our national laboratory system and bring together industry and academic experts in partnerships that would not otherwise occur without government involvement. The emphasis on early-stage research supports stewardship of taxpayer dollars and avoids duplication of effort by concentrating Federal investments on high-risk/high-reward technologies that industry either does not have the technical capability to undertake on its own or are too far from commercialization to merit sufficient industry focus and critical mass. Partnerships with key stakeholders will

continue to support technology transfer, allowing industry partners to leverage successful Federally-funded research with their own prototype development, demonstration, and commercialization.

FY 2019 funding for the Advanced Manufacturing Office supports early-stage applied R&D focused on advancing and creating new understanding of underlying technologies, materials, and processes relevant to the productive use of energy in manufacturing, as well as the competitive manufacturing of energy related products, with additional emphasis on alternative approaches to energy storage and the intersection between manufacturing and the energy grid. The Budget for Advanced Manufacturing reasserts the proper role of the Federal Government by reflecting an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies and focusing funding toward early-stage R&D. By fostering collaboration between national laboratories, universities and companies (for-profit and not-for-profit), this Budget Request will enhance the foundational knowledge base in materials and manufacturing processes, focusing on research challenges that present a significant degree of scientific or technical uncertainty and are beyond the horizon in terms of commercialization, making it unlikely that industry will pursue independently.

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QUESTIONS FROM SENATOR DAINES

Q1. The President's Budget for Fiscal Year 2019 promotes the United States energy dominance through technologies that will make our energy supply more affordable, reliable, and efficient. The President's budget sets the goal of the US becoming net energy exporter by 2026. How will the Department of Energy support domestic energy production, such as coal, to meet global demands?

A1. The Office of Fossil Energy (FE) invests in research and development (R&D) as part of the Department of Energy's (DOE) broad portfolio approach to addressing our Nation's energy and environmental challenges. This Budget Request focuses DOE resources toward early-stage R&D and reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies. It emphasizes energy technologies best positioned to support American energy independence and domestic job-growth in the near- to mid-term.

The Office of Fossil Energy's FY 2019 budget request is informed by guiding principles of energy dominance, security, strong domestic energy production, and advancing clean coal technologies. Driven by the Administration's support of the coal industry and the competitiveness of the existing coal fleet, the FE R&D budget focuses on cutting edge, early-stage R&D that will prepare innovative new technologies for the private sector to further develop, scale-up, and deploy. Maintaining U.S global economic competiveness with the best energy technologies and affordable energy prices is essential to strengthen and grow our economy, create new jobs, and enhance our national security. Developing advanced, clean, high-efficiency technologies underpins our national economy and creates new products for export.

In January 2018, Secretary Perry asked the National Coal Council (NCC) to develop a white paper to assess opportunities to advance U.S. coal exports. The goal of the white paper was to focus on "current market, policy, and infrastructure challenges and opportunities that are relevant to advancing U.S. coal resources in international power

and industrial markets." As part of this request, the following key questions were outlined:

- What market, infrastructure, and policy measures could be undertaken to increase export opportunities for U.S. coal?
- What global market dynamics present opportunities for increased U.S. coal exports?
- How can U.S. coal capitalize on its advantages and become more competitive in international markets?
- What institutional and regulatory constraints are limiting the advancement of U.S. coal exports?

The NCC responded to the Secretary's request and issued the report "Advancing U.S. Coal Exports: An Assessment of Opportunities to Enhance Exports of U.S. Coal" (https://www.nationalcoalcouncil.org/studies/2018/NCC-US-Coal-Exports-2018.pdf). DOE is reviewing that report and carefully considering its recommendations, which include the following key findings:

- As domestic demand for coal has softened, coal exports are an increasingly important market sector for U.S. coal producers.
- Coal Production. Development and deployment of advanced coal mining and processing technologies to reduce production costs would enhance the competitiveness of U.S. coal in international markets.
- River Transport. Streamlining of funding for the nation's inland waterway system of locks and dam infrastructure would facilitate the cost-efficient flow of U.S. coal to international markets via East and Gulf Coast ports.
- International Coal Plant Financing. Financing of coal facilities overseas is hampered by domestic and international policy barriers at the Export-Import Bank of the U.S. (EXIM)
- To facilitate these and other recommendations to enhance U.S. coal exports detailed in the NCC report, we advocate for the establishment of a DOE-led, government-wide

Coal Exports Task Force (or Energy Exports Task Force) to monitor and coordinate policy developments relevant to advancing U.S. energy exports.

Q2. Grid security has been a major focus of mine and well as this Committee. A frequent issue for rural electric cooperatives is the lack of resources to fight against cyber-attacks against the grid. How will the reorganization of Office of Electricity and Energy Reliability and accompanying budget effect DOE's ability to support our rural electric cooperatives and can you commit to continue to work with rural electric cooperatives to secure our grid from cyber-attacks?

A2. The creation of the Office of Cybersecurity, Energy Security, and Emergency Response (CESER) better positions the Department to address the emerging threats of tomorrow while protecting the reliable flow of energy to Americans today. By combining Departmental elements that support response and recovery, DOE is enhancing the efficiency and effectiveness of the preparedness cycle for the energy sector for all hazards. Forming a stand-alone office improves DOE's ability to plan for and respond to incidents while developing supporting capabilities, training, exercising, and evaluating lessons learned, to more directly inform research and development efforts in resilience and security based on lessons learned from operational activities. Additionally, collection of important subject matter expertise supports the critical role energy plays in national security.

Indeed, DOE is committed to continue working with rural electric cooperatives as well as other energy sector stakeholders. CESER is continuing a partnership with the American Public Power Association (APPA) and the National Rural Electric Cooperatives Association (NRECA). These projects are working to increase reliability and resiliency at electric cooperative and public power utilities. Both APPA and NRECA have a direct and unique link to public power providers and electric cooperatives allowing them to reach a broad membership base. This work builds on previous efforts to continue improving the security culture within municipal utilities and electric cooperatives. Both projects are focusing on efforts to further enhance a culture of security and resiliency among their membership by advancing development of cyber security tools and guidelines, evaluating

and mitigating cyber and physical system vulnerabilities, researching, developing, and adopting emerging technologies to improve resilience and security, and enhancing capabilities to share key information among public power providers.

DOE is committed to addressing the continuing cybersecurity needs of energy owners and operators, and has defined goals, objectives, and activities to reduce the risk of energy disruptions due to cyber incidents. DOE's strategy is to work with its partners to address growing threats and promote continuous improvement to strengthen today's energy delivery systems, as well as develop game-changing solutions that will create inherently secure, resilient, and self-healing energy systems for tomorrow.

Q3. When I met with you prior to your confirmation, during your confirmation hearing, and in visits I and my staff have had with others in the Department, I have implored your assistance in addressing challenges impacting the Colstrip Power Plant in Montana. This plant, as I have said before, is one of the biggest economic drivers of our state and plays a vital role in keeping the lights on and the heat running for many Montana families. The loss of any part of this plant will have dramatic impacts to the surrounding communities and the state as a whole. Two units are scheduled to retire in 2022 and we must focus on extending the life as much as possible of the other two larger units. I understand that the Department of Energy Fossil Energy Office is currently working on a study related to the Colstrip Power Plant. It is important that any study done takes an objective look at the economics of this plant and what is needed to extend the life of generating units. If carbon capture is part of the solution, which I support, I believe we must also address regulatory roadblocks that would keep that technology from being economical. Senator Hoeven and I have sponsored a bill, called the CO2 Regulatory Certainty Act that will do just that. We also need to explore ways to deliver any carbon captured through pipelines to nearby oilfields for enhance oil recovery. The community of Colstrip deserves nothing less than a real, effective plan to be put in place to extend the life of this plant.

Will you commit to me that this proposed study will be objective and include ways to ensure any efficiency technologies can also be economical for the plant, like expressing the need to address regulatory roadblocks and infrastructure constraints?

A3. Yes. The DOE Office of Fossil Energy is conducting an objective study regarding the Colstrip Power Plant to identify potential operating efficiency improvement options and also examine opportunities to reduce CO_2 emissions at the plant so that Colstrip can continue to provide economic power generation to its customers while concurrently

meeting the established environmental targets. The focus of this study is on the larger units 3 and 4 and one of the objectives is to investigate the feasibility of carbon capture utilization and storage (CCUS) by examining the integration of the energy and utility requirements associated with the implementation of CCUS technology. This study will also include a high level assessment of primary steam cycle components of the plant such as boiler, turbine, air preheater, and condenser. The information gathered would be used to inform power plant owners of potential options to improve operating efficiency, reduce CO_2 emissions and examine other potentially marketable products from plant operation. Plant efficiency improvement options being considered include: turbine modifications, coal drying, increasing steam temperature, alternate co-firing fuels and others. The goal of this study is to help identify potential opportunities to maintain continued electricity generation at Colstrip and thereby ensure a role for coal utilization in the region's future energy development.

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QUESTIONS FROM SENATOR HEINRICH

Q1. I am pleased to see the Office of Technology Transitions is again funded in your budget. For several years DOE has successfully piloted a new approach to promote technology transfer from the DOE labs using the Technology Commercialization Fund to help speed up commercialization of lab-developed technologies. My bipartisan bill, S. 1799, builds on OTT's TCF pilot program to accelerate transfer of technologies from the labs to the private sector. What specifically is OTT proposing in FY19 to improve tech transfer from the DOE laboratories, including the national security labs?

A1. OTT is planning to expand the current Tech-to-Market portfolio by developing pilots to explore new mechanisms intended to promote commercialization of Lab-developed technologies. Some of the pilots being explored include (1) open competition through Small Business Innovation Program funding that builds upon valuable federally-funded and lab-created technology and intellectual property (IP), (2) connections to supply chains by leveraging OEM industry partners that have technologists in residence at the national labs, (3) Prizes and Challenges (authorized by COMPETES Act) seeking innovative models that mine, assess and support commercialization of Lab IP, (4) expanding the reach of lab-developed technologies and capabilities to cultivate their deployment in smart cities and resiliency efforts, (5) leveraging existing programs outside of DOE to expand the market for lab-developed technologies to veteran entrepreneurs, (6) using awards to lab researchers to stimulate public communication on technology transfer successes and incentivize technology transfer activities, and (7) reach out to potential investors through technology showcases. These new activities will be inclusive of all DOE labs and NNSA labs and plants, in a manner consistent with the entire OTT portfolio.

Q2. The unique national security mission of the national labs requires they continue to attract the best and brightest scientists and engineers. One of the biggest obstacles to recruitment continues to be the long wait times for security clearances. There are currently well over 2000 pending clearances at the two national security labs in New Mexico, and wait times are averaging well over one year. This is simply unacceptable if we are to attract the quality workforce necessary for critical security missions. Do you agree that a year is too long to wait for a clearance and what actions are you taking to improve the process?

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A2. We share your concerns on the long wait for security clearances The Office of Personnel Management, National Background Investigations Bureau (NBIB) is responsible for conducting background investigations on personnel. The Department can only proceed to adjudicate a person's access to classified information after it has received the results of that background investigation from NBIB. We respectfully refer you to NBIB for questions concerning the amount of time to conduct investigations and the backlog of investigations. To reduce the impact of the delays in background investigations, the Office of Environmental, Health, Safety and Security (AU) has taken several actions, including:

- Issuing policy/implementation guidance on granting interim security clearances (ISC) using a risk-based approach to allow programs to meet their mission needs. Prior to 2016, DOE issued no ISCs; currently 369 employees have ISCs.

- Arranged for NBIB to deploy additional personnel, known as Target Teams to DOE facilities/laboratories in the Southwest to address the high volume of investigations in that region, which helped close approximately 600 pending NBIB investigations that were over two years old.

- In February, 2018, arranged for NBIB to deploy additional Target Teams to Los Alamos and Sandia National Laboratories.

- Negotiating with NBIB to send Target Teams to Idaho, Livermore and Oak Ridge during FY18 and FY19.

- Encouraging programs to take advantage of NBIB's expedited investigation option for critical positions, which costs up to an additional $457 per investigation bringing the total cost for an expedited investigation for a Q clearance to approximately $5,500. About 1,800 expedited investigations are in process.

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Q3. For FY17, the Senate Appropriations Subcommittee's report for Energy and Water Development (S. Rep. 114-236) an explicit direction to the Office of Technology Transitions, "In awarding funding from the Technology Commercialization Fund, the Department shall assure cost match with private partners is in accordance with cost sharing in section 988 of the Energy Policy Act of 2005 (42 U.S.C. 16352)." What is the status of OTT's implementation of cost sharing under sec. 988 for funds from TCF?

A3. The report text does not modify the statutory text of section 1001(e) of EPAct 2005 (42 USC 16391), which calls for the Department to use the TCF "to provide matching funds". That text requires a 50/50 matching requirement, precisely because section 1001, unlike other parts of EPAct, does not use the phrase 'cost share', nor does it explicitly reference section 988's cost sharing requirements. Unless and until section 1001 is amended, we must continue to follow the statutory text, which requires that the other party match the federal funding from the TCF.

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QUESTIONS FROM SENATOR GARDNER

Q1. The Office of Electricity Delivery and Energy Reliability has led an effort, in coordination with the national laboratories, to address the technical challenges of grid modernization. In many cases, these assets are privately owned with little resources for research and development. Therefore, DOE has provided critical support in research, testing and validation, and deployment of technologies for the grid.
The Fiscal Year 2019 budget request would split this office into two offices, one focused on cybersecurity and energy security and one focused on electricity delivery.

Q1a. The DOE Grid Modernization Initiative and the Grid Modernization Laboratory Consortium have brought together technical expertise from national laboratories to address specific challenges facing the grid from cybersecurity to energy storage. This crosscutting initiative has been a success, and it is important that DOE continue to lead this program. Can you comment on the department's plans for these two efforts?

A1a. Departmental grid activities will continue to be coordinated through the Grid Modernization Initiative, which includes representation from DOE's applied energy programs, and Grid Modernization Laboratory Consortium (GMLC). In fact, the success of this collaboration has been recognized within DOE and now includes all applied science programs, including the Offices of Cybersecurity, Energy Security, and Emergency Response; Electricity; Fossil Energy; Nuclear Energy; and Energy Efficiency and Renewable Energy. The GMI is currently updating its Multiyear Program Plan (MYPP) to focus more on these and other important grid modernization issues. The MYPP will serve as the foundation for future research and development work, both with the national laboratories and through broader solicitations.

Q1b. Given this week's news on the attempts of foreign nations to attack our grid, are you confident the department's budget request will provide the resources necessary to ensure that our electric grid remains secure?

A1b. The budget request enables DOE to collaborate with the energy sector through a voluntary public-private partnership that has been in existence for nearly two decades. The new Office of Cybersecurity, Energy Security, and Emergency Response (CESER) is helping reduce cyber risks in the energy sector by supporting activities that assist owners and operators with near-term response and mitigation, and long-term solutions that build

resilience into next-generation cyber-physical infrastructures. CESER supports energy sector risk management functions through situational awareness, information sharing, incident coordination, and technology innovation through research, development, and demonstration led by industry, academia, and national laboratories. These activities may draw upon unique government capabilities, inherently governmental functions, or mutually shared responsibilities of industry and government.

The Cybersecurity for Energy Delivery Systems (CEDS) research and development program focuses on the Nation's critical infrastructure. The program has successfully transitioned more than 35 tools and technologies to help critical energy infrastructure survive a cyber incident. More than 1,000 utilities across all 50 states have purchased technologies made available through CEDS research partnerships, working together to keep the lights on during a cyber-attack.

Q1c. Is there something else we could be doing to support a strong, coordinated interagency federal effort to make sure our critical infrastructure has the necessary cybersecurity?

A1c. Presidential Policy Directive 41, "United States Cyber Incident Coordination" (July 26, 2016), outlines coordination between Federal agencies. DOE continues to work with all Federal partners to continuously improve our coordinated efforts to reduce cybersecurity threats. Specifically, as the Energy Sector-Specific Agency for cybersecurity, DOE continues to coordinate with the Department of Homeland Security and our sector-specific coordinating councils (the Energy Subsector Coordinating Council and Oil and Natural Gas Subsector Coordinating Council) to further our efforts in managing cybersecurity threats.

Q2. On March 1st Assistant Secretary Bruce Walker testified before this committee that his office was working with DoD and the Western Area Power Administration (WAPA) on Defense Critical Electric Infrastructure issues, essentially using WAPA as a testing ground for cyber issues. How does your elimination of WAPA's Infrastructure Security and Energy Restoration funding and your proposal that WAPA sell off its transmission assets help address these important Defense Critical Electrical Infrastructure issues?

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A2. The Infrastructure Security and Energy Restoration (ISER) program is part of the new Office of Cybersecurity, Energy Security, and Emergency Response (CESER) within DOE. WAPA and CESER are working closely to ensure that if WAPA's assets or operations of assets were transferred that Defense Critical Electrical Infrastructure strategies would be preserved.

With respect to the "elimination of WAPA's Infrastructure Security and Energy Restoration funding," $289,000 in FY 2017 fully funded WAPA support of work related to studies of space weather and electromagnetic pulses.

Q3. You and I have discussed Energy Savings Performance Contracts (ESPCs) in the past and I've heard that the Federal Energy Management Program has identified a backlog of audited energy-related projects of $9-$15B. Given the administration's push on leveraging private investment as part of their infrastructure plan, would you support an additional $250M of FEMP funding in FY19 as seed money to leverage enough private sector ESPC funding and expertise to address this entire backlog and add critical resiliency and cybersecurity at our Federal facilities?

A3. FEMP, as the primary Federal entity that provides energy management technical assistance for agencies, stands ready to support efforts to implement energy-related projects at Federal facilities. For example, in 2019, FEMP will develop performance contracting models and business case methodologies that optimize facilities and increase energy efficiency leading to enhanced energy and water resilience and security, while at the same time reducing the operating cost of Federal facilities. FEMP will provide technical project development assistance for energy savings performance contracts, utility energy savings contracts, and power purchase agreements in pursuit of energy and water efficiency improvements and renewable energy projects. FEMP will also coordinate with the agencies that have broad performance contracting vehicles including, but not limited to, the U.S. Army Corps of Engineers, Veterans Affairs, and General Services Administration to provide a consistent and standardized process for Federal agencies and the Department of Defense to design and execute all performance contracts related to energy.

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QUESTION FROM MAZIE K. HIRONO

Q1. According to documents provided by DOE to Congressional staff during DOE's February 16, 2018 budget briefing, DOE will "continue support for EERE's Federal workforce at a level consistent with the FY19 budget request." Compared to January 1, 2017 staffing levels what, if any, changes to the number of full time employees under the Office of Energy Efficiency and Renewable Energy are you planning on making for the remainder of FY2018 and FY2019? If you are staffing to suit a nearly 66 percent cut to match this FY2019 budget proposal for EERE, how will you have the appropriate levels of staff to carry out the will of Congress if it appropriates funding for EERE closer to the FY2017 funding levels, rather than the levels in the President's budget requests for FY2018 and FY2019?

A1. The Office of Energy Efficiency and Renewable Energy (EERE) Fiscal Year (FY) 2019 Program Direction Budget Request is adequate to maintain and support a world-class Federal workforce that manages mission critical early-stage research and development and regulatory functions in sustainable transportation, renewable power, and energy efficiency. The Budget Request will also adequately address our Nation's energy and environmental challenges. In keeping with the direction to generate efficiencies and reduce the cost of government, and to align with reductions in technology program budgets, the Department proposes to reduce EERE-funded Full-Time Equivalents by approximately 34 percent from the FY 2017 level. The specific reduction will be adjusted as required.

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QUESTIONS FROM SENATOR CATHERINE CORTEZ MASTO

Q1. One of those emerging challenges in solar is the so called 'soft costs' of solar, or the costs associated with permitting, financing, and installing solar – which now can make up nearly 2/3rds of the cost of a solar system. Your budget proposes to entirely eliminate the modest $15M effort that DOE currently has to reduce these costs. This program funds efforts like the Nevada Regional Test Center in Henderson, NV, which, through a partnership between Sandia Labs and UNLV, offers a testbed to measure and analyze the performance of new solar technologies, thus speeding the adoption and lowering the costs of solar. It funds efforts like the state-of-the-art outdoor solar training facility at Truckee Meadows Community College in Reno, which is training the next generation of solar technicians. By the way, solar installation jobs are the fastest growing job in America, according to the Labor Department. Overall, your budget proposes to cut DOE's solar office by 68 percent. This is even though, just last year, your Acting Assistant Secretary for Energy Efficiency and Renewable Energy, Dan Simmons was quoted as saying "With the impressive decline in solar prices, it is time to address additional emerging challenges" in a DOE press release. How can you possibly address new challenges when you want to cut the Solar Office funding from $207M annually to $67M?

A1. In the Fiscal Year (FY) 2019 Request, the Department of Energy (DOE) continues to support the goal of making solar power one of the least expensive forms of electricity by enabling cost reductions toward the 2030 target of $0.03/kWh for utility-scale photovoltaic (PV) solar power without subsidies. The Request also increases the Solar Energy Program's emphasis on additional emerging challenges related to integrating high penetrations of solar onto the electric grid, including storing solar energy so it is available on demand, as was mentioned in the Acting Assistant Secretary for Energy Efficiency and Renewable Energy's testimony. Taken together, these objectives will invigorate American technological leadership in solar energy, diversify the Nation's electricity supply, enhance grid resilience and reliability, catalyze domestic economic growth including job creation, and reduce the air and water impacts of electricity generation. The Nevada Regional Test Center is a part of the photovoltaics sub-program, rather than soft costs, and data gathered at the Center has been used to validate field performance with laboratory modeled electrical generation by a PV system.

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Q2. Geothermal energy is one of the fastest growing industries in Nevada. In 2013, there were 29 geothermal power plants operating in nine of Nevada's seventeen counties. The Nevada Department of Energy has estimated that at least 6,000 jobs would be created through geothermal energy investment. The cuts to DOE will not provide for adequate funding for the Geothermal Technologies Office to continue researching geothermal energy innovations. Why would the Administration jeopardize an industry that will be a boon to Nevada and to the region?

A2. The Request is investing a total of $175 million in Office of Energy Efficiency and Renewable Energy's (EERE) Renewable Power portfolio, with $30 million requested for the Geothermal Technologies Office to strengthen the body of knowledge necessary to enable industry to achieve a cost target of $0.06/kWh by 2030 from newly developed geothermal systems, and support enhanced grid reliability and resiliency through analyses focused on improving the ability for geothermal power to be operated flexibly and provide essential grid reliability services.

Specifically, the FY 2019 Request supports early-stage Enhanced Geothermal Systems (EGS) – to include advancing Phase 3 at the Frontier Observatory for Research in Geothermal Energy site and EGS Collab, Hydrothermal subsurface stress research and development, and Systems Analysis work in coordination with the Beyond Batteries initiative. The Beyond Batteries geothermal efforts are focused on the evaluation of geothermal's potential to respond to electrical demand fluctuations.

Q3. The Trump Administration's 2018 Budget also proposes eliminating the Weatherization Assistance Program and the State Energy Program. The DOE spends about $250 million annually to provide grants to states, territories, and some Indian tribes to improve the energy efficiency of the homes of low-income families. For over 40 years, this program has helped make 29,000 Nevada residences more energy efficient and saved the average Nevada homeowner nearly $300 a year on energy bills. Cuts to this programs hurts Nevadans and communities across the country. In addition, state-run energy programs have helped local communities save taxpayer dollars. For example, Nevada's Pershing County School District has saved $72,000 every year after installing rooftop solar panels on schools, while energy efficient lighting in the Carson City school district has saved $80,000 a year for taxpayers. Why would the Administration target programs that help rural areas?

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A3. The Administration is committed to energy policies that lower costs for hardworking Americans and maximize the use of American resources, freeing us from dependence on foreign oil. The President's FY 2019 Budget Request focuses on activities that are properly performed by the federal government, versus those that are more appropriately left to other bodies, such as states and local governments. States have a great deal of autonomy in the development and implementation of the Weatherization Assistance Program and State Energy Program. The statutes that created both programs defer to each state's governor's discretion in their content and delivery, including in determining the agency in charge of each program. 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.

Q4. Secretary, the budget would eliminate the Advanced Research Projects Agency-Energy program, which is popular in Congress and spends $300 million on basic research; Title 17 loan guarantees for new low-carbon energy projects; and the Advanced Technology Vehicle Manufacturing Program, which has helped companies such as Tesla develop electric cars and Ford develop more-efficient combustion engines and light materials. Research like this is made to further innovation. Government-sponsored research bridges that gap where privately-funded research does not have the available capital to invest in extensive R&D, or have the capacity to invest in research that may not always lead to commercial revenue-making ventures. Why are these programs being eliminated?

Q4a. Is it not in the nation's current and future interest to make ground-level investment in this type of research?

A4a. 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 ARPA-E's efforts to overlap with 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 federal role in energy R&D. The President's budget 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. The budget reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy

technologies. Through careful prioritization and ensuring that funding goes to the most promising research, DOE will continue to be a world-leading science and technology enterprise that generates the innovations that fulfill our mission of ensuring the nation's security and prosperity. I look forward to working with Congress on these issues.

Q5. The increasing use of renewable energy technologies is changing the way we power our economy. For example, Google and Amazon are making significant investments to power their facilities with renewables, the same goes for many resorts and data centers in Nevada, and the food and beverage industry is also making significant investments in renewable energy installations. This transition is happening whether or not a Democrat or Republican leads the Administration, and a lot of the major corporations investing in these installations are run by well-known Republican CEOs. How does this Budget reflect the many reasons for this economic shift toward renewables?

Q5a. What reason can you give beyond pure ideology to have such drastic cuts to research, development, and deployment of EERE technologies and to not have DOE help facilitate this transformation of the electricity system?

A5. The Request focuses DOE resources toward early-stage R&D and reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies. It emphasizes energy technologies best positioned to support American energy independence and domestic job-growth in the near- to mid-term and is investing a total of $175 million in Office of Energy Efficiency and Renewable Energy's (EERE) Renewable Power portfolio. Through investments in DOE labs, industry, and academia, EERE's Renewable Power technology offices will continue to lead the world in developing domestic, clean, reliable energy choices in power generation, which strengthen the U.S. economy while increasing energy security.

Q6. On March 15, 2018, the Department of Homeland Security released a warning that accused Russian government hackers of carrying out a deliberate, ongoing operation to penetrate vital U.S. industries, including the energy grid, including energy generation, nuclear, commercial, and water facilities. Russian cyber-attacks on our power and water infrastructure remind us the threat is not only the loss of privacy and the spread of disinformation, but the potential for physical damage to our critical infrastructure and potentially the loss of life. A security expert recently told the New York Times, regarding the Russian attacks, "They have the ability to shut the power off, all that's missing is

some political motivation." Do you believe the Russians have the ability to disrupt or damage our power grid?

A6. The Nation's energy infrastructure has become a target of cyber-attacks over the past decade, with attacks becoming more frequent and more sophisticated. Despite ever-improving defenses, attackers have evolved their aim from exploitation to disruption to destruction. Although significant progress has been made toward achieving the *Roadmap* vision of designing, installing, operating, and maintaining resilient energy delivery systems that can survive a cyber incident and sustain critical functions, additional cybersecurity capabilities need to be developed as new technologies are adopted and as threats to the energy sector become more sophisticated and pervasive. The Federal Government partners with the energy sector in the research and development of tools and technologies to help reduce cyber risks that could trigger a large-scale or prolonged energy disruption.

Reducing cyber risk to energy delivery systems requires utilities to conduct comprehensive and timely assessments of threats, identify individual system vulnerabilities and assess company practices, and analyze potential consequences to help prioritize mitigations and inform procedures. DOE supports the development and adoption of industry risk management practices, including threat analysis and risk assessment tools, and shares guidance and expert analysis to support those assessments. Timely sharing of cyber threat information across the energy sector creates the ability to identify trends specific to energy control systems that may signify a coordinated or targeted attack. In a dynamic threat environment moving at digital speed, reliable alerts about known or suspected cyber threats to energy systems can significantly limit the impact potential of an incident. To facilitate and expand efficient information sharing with the private sector, DOE leverages its intelligence capabilities and expertise as part of the U.S. Intelligence Community and advanced threat detection technologies developed by the DOE national laboratories.

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Working on a voluntary basis with owners and operators, DOE is helping develop capabilities to improve the sector-wide sharing of threat indicators and analysis, allowing each energy organization to identify effective mitigations to high-priority threats. Improving the speed and accuracy of data sharing enhances the ability to identify fast-moving cyber-attacks and to deploy effective mitigations before critical systems are affected.

Q6a. How many other countries and non-state actors can do this?

A6a. DOE would be happy to schedule a classified briefing with you during which this could be discussed.

Q7. Hydropower accounts for about 40 percent of the renewable energy produced in Nevada. Under Presidential Policy Directive-21, which addresses critical infrastructure security and resilience (also referred to as PPD-21), DOE is responsible for the security of the power grid and DHS is responsible for the security of dams. What are some of the unique challenges faced by hydroelectric facilities and how are you working with Homeland Security to address them?

A7. DOE, the Sector-Specific Agency (SSA) for the energy sector, is working closely with the critical infrastructure security lead, the Department of Homeland Security, as well as stakeholders across industry, law enforcement, the intelligence community, and state governments to ensure resilience is factored into ongoing grid modernization efforts. DOE will continue to offer subject matter expertise to support the entire energy sector, including hydroelectric facilities. Hydroelectric facilities are unique in that, pursuant to Executive Order 12656, Assignment of Emergency Preparedness Responsibilities, they also involve coordination between the Department of Interior and Department of Defense to assure maximum energy output.

Q7a. Can you further clarify your respective roles and authorities, for example in developing regulations?

A7a. As the Sector-Specific Agency for the energy sector and the lead agency for Emergency Support Function #12 – Energy under the National Response Framework, it is DOE's role

to help industry plan for, respond to, and recover from attacks. DHS, through the Office of Infrastructure Protection and the Federal Emergency Management Agency (FEMA), provides the supporting framework. The Federal Energy Regulatory Commission and the North American Electric Reliability Corporation develop and enforce reliability standards for the electricity sector. As the lead Federal agency for the National Dam Safety Program (NDSP), FEMA is responsible for coordinating efforts to secure the safety of dams throughout the United States. DOE is a member of the FEMA-chaired Interagency Committee on Dam Safety (ICODS), which works to maintain effective federal programs, policies and guidelines to enhance dam safety and security. ICODS serves as the permanent forum for the coordination of Federal activities in dam safety and security.

Q8. Through the DOE Budget Request, you recently announced your intention to establish an Office of Cybersecurity, Energy Security, and Emergency Response (CESER) "to strengthen the Department's role as the sector-specific agency for cybersecurity in the energy sector. This office would be created from existing responsibilities from within the Office of Electricity Delivery and Energy Reliability (OE). What exactly will DOE be doing differently through the creation of this new office from what OE has already been doing?

A8. The creation of the CESER office better positions the Department to address the emerging threats of tomorrow while protecting the reliable flow of energy to Americans today. By combining Departmental elements that support response and recovery, DOE is enhancing the efficiency and effectiveness of the preparedness cycle for the energy sector for all hazards. Forming one office improves DOE's ability to plan for and respond to incidents while developing supporting capabilities, training, exercising, and evaluating lessons learned, to more directly inform research and development efforts in resilience and security based on lessons learned from operational activities. Additionally, collection of important subject matter expertise supports the critical role energy plays in national security, and forming a new office supports the resourcing of the significant mission DOE is responsible for on behalf of the sector.

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Q9. Nevada's Governor Sandoval recently created the Office of Cyber Defense Coordination, which serves as the primary focal point for cyber threats and security for the State of Nevada. With the addition of a Cyber Defense Coordinator, the office will serve as the primary conduit with the federal government, as well as the primary entity managing cyber threat issues across the State of Nevada. As a former governor, how do you think the federal government can best coordinate with State cyber offices like Nevada's to perform cyber threat analysis and reporting of threat information?

A9. The Federal Government should explore ways to declassify cyber threat information more quickly through cooperation with interagency and state fusion centers. Addressing this will allow State cyber offices to receive actionable information and share it effectively among relevant stakeholders. DOE also works with state associations to host energy assurance events to discuss coordination between government and industry on planning for the potential physical consequences of cyber incidents. For example, the lessons learned from the Liberty Eclipse exercise, hosted in Rhode Island in December 2016 and featuring nearly 100 participants from 15 states, continue to inform planning and coordination efforts with states, and set the stage for future coordination exercises.[9]

[9] The after-action report is available at https://www.energy.gov/sites/prod/files/2017/05/f34/LE%20FINAL%20Exercise%20Summary%201May2017_Public%20Doc.pdf.

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QUESTION FROM SENATOR ROB PORTMAN

Q1. Another area within the Department of Energy that is also very important to me is energy efficiency. As we've discussed, I have worked in a bipartisan way with my colleague, Senator Jeanne Shaheen from New Hampshire, on energy efficiency legislation that we first introduced in 2011. Called the Energy Savings and Industrial Competitiveness Act, this legislation is projected to reduce emissions by the equivalent of taking 22 million cars off the road, create more than 190,000 jobs, and save consumers $16.2 billion per year – all by 2030.

If confirmed, will you support my efforts with Senator Shaheen on our efficiency legislation, and work with this committee on ways to improve our nation's energy efficiency?

A1. The Department of Energy does not take a position on pending legislation. However, we would gladly review and provide technical assistance or answer technical questions relating to legislative language.

Q2. Will you commit to working with me to advance building energy codes and provide states with the necessary resources and technical assistance needed to adopt model codes?

A2. DOE remains committed to its statutory directives surrounding the advancement and implementation of building energy codes. This includes participation in industry model code review processes as outlined under 42 USC 6836, and providing technical assistance to states to support code implementation (42 USC 6833). Recently, DOE issued its technical review and *determination* for the most recent model energy code for commercial buildings, ANSI/ASHRAE/IES 90.1-2016. DOE also provides technical analysis to states to help them understand the energy and cost impacts associated with code updates, delivering energy savings and cost-effectiveness analysis to 48 states in the most recent code cycle.

Q3. And finally, I am very interested in new technologies for carbon capture, storage, and utilization. In my home state of Ohio, coal provides 58% of electricity generation. Last Congress, I worked with Senator Bennett on legislation that would help facilities finance the installation of carbon capture and storage equipment. We must continue to develop ways to ensure that our electricity supply remains affordable, abundant, and reliable.

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If confirmed, will you commit to ensuring that the Department of Energy continues to research carbon capture technologies, with the goal of commercial deployment?

A3. The DOE Office of Fossil Energy is committed to supporting R&D to develop innovative carbon capture technologies to reduce the cost of capture and make carbon dioxide (CO_2) from both pre- and post-combustion coal-fired power systems commercially available. This R&D will support making CO_2 a widely available commodity for utilization as a chemical feedstock and for enhanced oil and gas recovery in Ohio and the rest of the United States. DOE also recognizes the importance of coal mining and power generation in Ohio and how these technologies could be applied to existing power plants in the region.