

Testimony of Deputy Secretary Dan Brouillette
U.S. Department of Energy
Before the
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Subcommittee on Energy
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Chairman Upton, Ranking Member Rush, and Members of the Committee, speaking for myself and three of my colleagues who will also testify before you today, it is an honor to appear before you on behalf of the Administration. This is my first opportunity to testify before Congress as the Deputy Secretary of Energy, and I appreciate the opportunity to update you on our progress at the Department of Energy (the “Department” or “DOE”).

As you may be aware, this is not my first tour at the Department, and when the Energy Secretary asked me to come back to serve, it was an easy sell. I believe there is no better place to work inside the federal government, and I am proud to be a part of such a great enterprise.

I am also proud to work under the Energy Secretary, a true leader with exceptional management skills. He has set important priorities for the coming years. These priorities include refocusing the Department on its core missions:

- Promoting America’s energy security;
- Spurring innovation;
- Reducing regulatory burden;
- Restoring the nuclear security enterprise and enhancing national security through the military application of nuclear science; and
- Addressing the obligation of legacy management and nuclear waste.

I will elaborate momentarily on our progress regarding these priorities.

There remains much to do. As the Energy Secretary stated, Congress has a distinct role in helping us achieve these goals, and I look forward to our ongoing dialogue.

Sunday marked my five-month anniversary as Deputy Secretary, and during my brief tenure, I have visited several DOE sites, including five national laboratories (Los Alamos, Pacific Northwest, Oak Ridge, Sandia, and the National Renewable Energy Laboratory - NREL), Hanford, and the Western Area Power Administration, to name a few, and have attended DOE’s 2017 Solar Decathlon in Denver, Colorado. I have interacted with some of the Department’s best and brightest individuals and have gained an even greater appreciation of the breadth and critical importance of DOE’s mission.

On national security, the Secretary and I have worked extensively with the National Nuclear Security Administration (NNSA) and the National Security Council to strengthen our nuclear deterrent and enhance our nation’s security.

Because our work extends beyond our borders, I have traveled abroad to reiterate the President's and the Secretary's message that the U.S. is open for business and is a willing partner to those sharing our vision of making this world safer and more prosperous. I will depart tomorrow for Saudi Arabia and the U.A.E. to share that message with some of our Middle East partners and friends.

Now let me summarize our initiatives to achieve our priorities.

PROMOTING AMERICA'S ENERGY SECURITY

The United States is making remarkable strides toward energy security. Today we use energy more cleanly and more efficiently, obtain it from a wider diversity of sources, and produce it more affordably and in greater abundance than was predicted a few short years ago. As a result, we are closing in on our Nation's long-elusive goal of full energy independence. We are also on a path to achieving the Administration's goal of energy dominance, freeing our people at home and our allies abroad from reliance on other countries for our energy needs.

With our energy supplies increasingly secure, it is time to advance overall energy security further. It is time to ensure its reliable delivery to the American people in the years to come. We are attending to this critical need in a number of ways.

Grid Security

Among the most essential ways to ensure this outcome is by ensuring America has a reliable and resilient electric grid powered by a diverse mix of generation resources that help mitigate disruptions and enable rapid response when disruptions occur.

Last August the Department released the *Staff Report to the Secretary on Electricity Markets and Reliability*.

The report's recommendations included a call for the Federal Energy Regulatory Commission (FERC) to "expedite its efforts" to improve energy price formation in centrally organized wholesale electricity markets. This recommendation, in part, prompted the Secretary to exercise his authority under section 403 of the Department of Energy Organization Act and make a concrete proposal for pricing reform in FERC-approved organized markets.

The Secretary and I are grateful to those who submitted comments and engaged in vital conversation on the proposal. This includes PJM, whose leadership invited me to its headquarters in Valley Forge, Pennsylvania to tour the facility and discuss this issue.

I understand that FERC's decision is forthcoming. We look forward to working with the commissioners – and with you – to ensure tomorrow's grid remains as reliable and resilient as it is today.

Increasing Cybersecurity

In addition to electric grid resilience, our national and economic security also depends on the reliable function of the Nation's overall energy infrastructure in the face of the threat posed by malicious cyber actors. Cybersecurity is one of our top priorities and we are addressing it in a variety of ways.

A 2015 amendment to the Federal Power Act establishes DOE as the sector-specific agency for cybersecurity in the energy sector. DOE is the only statutorily-defined sector-specific agency, making it the lead sector-specific agency for supporting energy infrastructure owners and ensuring cyberattacks do not have a catastrophic impact on the energy sector. DOE is a unique sector-specific agency given that we experience these threats as energy infrastructure owners and bring deep technical expertise from 17 national labs to our work with industry. Private industry owns or operates the vast majority of the Nation's energy-sector assets, so strong partnerships with industry as well as our Federal colleagues are essential.

Accordingly, in coordination with the Department of Homeland Security and other Federal agency partners, we are working with the private sector to prepare, mitigate vulnerabilities, and help reduce impacts from threats. We also seek to enhance visibility and situational awareness. We are working to improve preparedness, planning and response capabilities for cyber incidents and to align them across state, local, tribal, territorial, and Federal jurisdictions. Finally, we are seeking to leverage the cutting-edge power of DOE's national labs to drive cybersecurity innovation across the energy sector.

As we do so, we must respond to the risks to our Department's own science, technology, nuclear security and energy infrastructure.

To that end, we are focused on improving enterprise cybersecurity risk management. We are creating an enterprise-wide threat management capability through our cyber operations center. We are bolstering organizational structures and supporting a culture of cybersecurity. We are investing in our infrastructure to reduce our exposure to threats and manage cybersecurity risks holistically.

DOE Efforts in Puerto Rico

In addition to focusing on grid resilience and cybersecurity throughout the United States, the Department continues to support restoration and long-term resilience planning efforts specifically in Puerto Rico. Last month, we held a workshop at our headquarters with public and private energy experts and stakeholders – including the Puerto Rican government and DOE's national labs – to consider long-term strategies to ensure the resilience of the island's energy infrastructure.

FOCUSING ON INNOVATION

Our Nation's continued progress on energy security – as well as economic prosperity – clearly depends on continued American ingenuity and innovation. The Secretary and I are very proud of the advancements that DOE's research and development have spurred.

DOE-funded R&D is truly inspirational.

Our national labs have put a distinctly American stamp on the last century of science. We support better coordination, communication, and collaboration between the labs and DOE program offices and are confident that they will continue to expand the frontiers of energy research and development.

REDUCING REGULATORY BURDEN

For too long, U.S. energy policy assumed a tradeoff between two great national goals – growing our economy and enhancing our environment. At DOE and throughout the Administration, we recognize that innovation provides the breakthrough technology to achieve them both. The same innovation-driven technology revolution that birthed America’s energy revolution has ignited a clean energy revolution.

Accordingly, we support eliminating burdensome regulations that needlessly restrict energy production in the name of this tradeoff, and unleashing the American spirit of innovation.

Shortly after taking office, the President issued an executive order calling for a review of such regulations. The Administration has cut 22 regulations for every one new regulation, the most in the history of our country. In addition, during this Administration, an easement was approved by the Army and the Army Corps of Engineers across Corps managed lands that allowed oil flow through the Dakota Access Pipeline, the Keystone XL pipeline was approved, and the Environmental Protection Agency has proposed to repeal the Clean Power Plan. The President also signed legislation repealing a rule that hindered coal development, and is working to revive nuclear energy. While reducing these regulations will give Americans greater freedom to innovate, the recently enacted tax reform legislation could provide incentives to invest in further innovation.

By reducing government regulation and unleashing American innovation, we are fueling prosperity and strengthening our security.

ENHANCING NATIONAL SECURITY

Beyond securing energy dominance, DOE also has a unique role in our nation’s security; the Secretary is a member of the National Security Council and the Department is responsible for managing our nuclear stockpile. We undertake these responsibilities with the utmost gravity.

Under the President’s leadership, the Department, through NNSA, will work to deter those who threaten the United States, while convincing allies to put their full trust in our extended deterrence.

ADDRESSING THE OBLIGATIONS OF LEGACY MANAGEMENT AND NUCLEAR WASTE

In addition to maintaining and safeguarding our nuclear stockpile, the Secretary and I are committed to safely advancing the environmental clean-up from the nuclear weapons development and government-sponsored nuclear energy research which helped us win the Second World War and the Cold War.

I am proud of our progress in advancing that mission since I last served at DOE.

At Hanford, all 20 tons of plutonium have been shipped out. We have made significant progress on key sections of the Waste Treatment Plant (WTP). We are treating over two billion gallons of groundwater and removing more than 100,000 pounds of contaminants each year. Work along the Columbia River has so advanced that a portion of land has been transferred by Congress to the community to help boost jobs and the local economy.

But there is more work to be done, and we need your help to complete this cleanup safely and as efficiently and cost-effectively as possible.

In 2018, we will continue to make progress on key facilities and capabilities.

We will continue our progress on those sections of the Hanford WTP necessary for the Direct Feed Low Activity Waste (DFLAW) approach, which is vital to beginning actual tank waste treatment at Hanford. In addition, we will ramp up activities to increase shipments of transuranic waste (TRU) to the Waste Isolation Pilot Plant (WIPP). We also will initiate construction of the Oak Ridge Mercury Treatment Facility, where we broke ground last November. We will keep pressing ahead in dealing with deteriorating excess facilities. We will continue deactivating and decommissioning facilities at Portsmouth. Finally, we will deactivate and initiate demolition of the C-400 Cleaning Building at Paducah.

DOE MODERNIZATION

To further the Department's mission in light of the ever-changing world in which we operate and work, we as a Department must continue to adapt and to adjust our focus.

Accordingly, last month, the Secretary announced his intention to modernize the Department not only to deploy its magnificent resources more effectively and efficiently in order to address present and future challenges, but also to return the Department to its statutory framework.

Under the DOE Organization Act, the Secretary of Energy has the authority to organize the Department in order to meet current needs and advance the Administration's policy priorities. As the President and the Secretary have made clear, the Administration's priorities are: achieving U.S. energy dominance, protecting our energy and national security, and advancing innovation.

The modernization plan announced last month directs several key changes. First, we have now separated the Office of the Under Secretary for Science and Energy (established in 2013 during the previous Secretary's tenure) into two Under Secretary positions, restoring the three Under Secretaries outlined in the statute: the Under Secretary of Energy, the Under Secretary of Science; and the Under Secretary of Nuclear Security and Administrator of NNSA.

You will hear from all three Under Secretaries today.

The new Under Secretary of Energy will focus on energy policy, applied energy technologies, energy security and reliability, and certain DOE-wide management functions, while the new Under Secretary for Science will focus on innovation, basic scientific research, and environmental cleanup.

In addition, elements of the former Under Secretary for Management and Performance's portfolio now fall under the responsibility of the Deputy Secretary.

Finally, we have now called the former Office of Energy Policy and Systems Analysis the Office of Policy, which reports to the Under Secretary of Energy.

These changes are a first step to empowering the Department to carry out its mission with greater efficiency and effectiveness. We look forward to continuing the conversation internally and in consultation with Members of Congress.

ADVANCING ENERGY DOMINANCE THROUGH ENERGY PROGRAMS

The President's America First Energy Plan rightly calls for utilizing all of our energy sources to achieve energy security and economic strength at home and energy dominance through exports to markets abroad. Let me discuss how the Department is working to promote the responsible development of these resources as well as ensure the reliability and resilience of our electrical grid.

Fossil Energy

When it comes to fossil fuels, the United States has become the world's largest combined producer of oil and natural gas, resulting in an abundance of reliable and affordable energy resources available for domestic use and for export. We continue to support expeditious approval of natural gas exports, which provides both economic and strategic benefits to the United States and our allies.

Through the National Energy Technology Laboratory (NETL), we are pursuing early-stage R&D on clean coal technologies to improve the efficiency and reduce emissions on the existing fleet of coal-fired power plants, as well as developing transformational technologies to help build the coal plants of tomorrow. NETL is leading an effort to assess and develop technologies for the recovery of rare earth elements (REEs) from coal and coal by-products. Due to their unique chemical properties, REEs have become essential components of many technologies including electronics, computer and communication systems, transportation, health care, and national defense. NETL's REE Program aims to provide a pathway to improve the economics and reduce the environmental impact of a domestic coal-based REE value chain.

Renewable Energy and Energy Efficiency

When it comes to renewable energy, DOE's early-stage R&D at its National Renewable Energy Laboratory has contributed to significant advances. DOE research has helped reduce the levelized cost of electricity from renewable resources, including wind and solar, resulting in large capacity additions. In 2017, the solar industry met DOE's goal of 6 cents per kWh for utility-scale solar, three years ahead of schedule. This success allows DOE to focus its research priorities on a more significant, long-term challenge: integrating variable renewables into the electric grid. DOE recently funded three projects to study the integration of advanced forecasting technologies with grid planning and operations systems in partnership with the California Independent System Operator, the Midcontinent Independent System Operator, and the Electric Reliability Council of Texas. This research will validate whether or not these technologies can be efficiently integrated into energy management systems and enhance grid operation efficiency, while working to identify any future research needs.

DOE research also has contributed to technological advances in energy efficiency. From 2008 to 2015, total installations of home LED lightbulbs increased from under 100,000 to over 200 million, while LED costs fell by nearly 90%.

Nuclear Energy

When it comes to nuclear energy, the Administration recognizes it as a key source of electricity generation—providing 60% of our nation's emissions-free baseload energy around the clock, 24/7. As the most reliable and resilient source of clean electricity, nuclear energy contributes uniquely to our energy portfolio. Maintaining our commercial nuclear fleet is fundamental to our domestic energy security, economic prosperity, environmental sustainability, and global security objectives.

We are improving the economics and extending the life of the existing nuclear fleet in private-public partnerships that bring together the Department's national laboratories with industry. For example, the Department is working to enable industry to deploy digital, wireless monitoring and control systems and accident tolerant fuels that will improve the economics and extend the life of today's fleet.

We are developing improved ways to integrate nuclear and renewable energy sources so we can better manage the mix of variable and distributed energy sources on the electrical grid through hybrid energy systems. We are investing in the research and development of advanced reactor technologies, including small modular reactors, and opening our national labs to the U.S. nuclear industry in unprecedented ways. The Department recently issued a funding opportunity announcement (FOA) of approximately \$30 million to support the development of advanced nuclear energy technology. Through this FOA we are soliciting proposals for cost-shared projects to develop innovative reactor designs and accompanying technologies with high potential to advance nuclear power in the United States.

Advanced nuclear technology development is a process that requires unique facilities and materials. The Department is establishing effective private-public partnerships to leverage technology advancements and focus federal investments on priority research and capability needs so we can accelerate the process of bringing innovative nuclear energy technologies to

market. By leveraging these partnerships and our national laboratory system, we are developing an advanced nuclear infrastructure, encouraging a resilient supply chain, and promoting a strong domestic industry now and for the future.

Electricity Delivery and Energy Reliability

Our economy, national security, and the well-being of our citizens depend on the reliable delivery of electricity. The Department, working with and through our national labs, supports key efforts to improve the resilience and reliability of the nation's electricity system. These include investing in our transmission system to support resource adequacy and generation diversity; developing and deploying cyber security technology for the energy sector; moving forward with new architecture approaches for the transmission and distribution system to enhance security and resilience; and advancing energy storage. Megawatt-scale energy storage is becoming a critical system asset that provides a buffer between generation and consumer demand through services such as frequency response, ramping support and bulk load shifting, allowing for greater asset utilization of generation. Initiatives within our Office of Electricity Delivery & Energy Reliability focus on developing new technologies and processes to provide a more resilient and reliable energy system and protecting critical infrastructure.

This office is also the lead for providing energy-related expertise to the Federal Emergency Management Agency (FEMA), interagency partners, and the Administration as part of DOE's emergency response activities. DOE serves as the lead agency for Emergency Support Function #12 - Energy (ESF-12) under the National Response Framework and as the Sector Specific Agency for Energy under Presidential Policy Directive 21. As the lead for ESF-12, DOE is responsible for providing information and analysis about energy disruptions and for helping to facilitate the restoration of damaged energy infrastructure.

Indian Energy

DOE's Office of Indian Energy (IE) promotes Indian energy development to increase efficiency, reduce costs, and strengthen tribal energy and economic infrastructure and electrification. To achieve this mission, IE offers education, technical assistance, and competitive grants to assist consenting Indian tribes and Alaska Native villages in overcoming the unique regulatory and economic challenges to developing their vast energy resources. In November of 2017, IE published a Notice of Intent to issue a FOA in the coming months for the deployment of energy efficiency, generation, or resilience projects on tribal lands on a fuel-neutral basis, consistent with this Administration's approach to energy policy.

Loan Programs

The Loan Programs Office (LPO) was created by Congress in 2005 to help American innovative energy and advanced auto manufacturing projects overcome hurdles in obtaining loans to help bring new technologies to commercial deployment. LPO manages a portfolio comprising more than \$30 billion of loans, loan guarantees, and conditional commitments covering more than 30 projects. Overall, these loans and loan guarantees resulted in more than \$50 billion in total project investment. LPO supported the latest generation of nuclear power facilities by

conditionally committing additional loan guarantees to Vogtle Units 3 & 4, the only new nuclear reactors under construction in the United States today.

Environment, Health, Safety and Security (AU)

AU is the Department's environment, health, safety and security office, and is responsible for safety analysis, security programs, and policy development to ensure the protection of DOE workers, the public, the environment and national security assets. This responsibility is accomplished through the maintenance of corporate-level policies and standards and by providing technical assistance for the implementation of those policies. The Office also provides assistance across the complex by sharing operating experiences, lessons learned and best practices and subject matter expert services to successfully manage its operations.

Project Management Oversight and Assessments

The Office of Project Management (PM) supports the Department's goal to increase the focus on efficient and effective management across the enterprise and improve performance in the areas of environmental cleanup, construction project management, and cybersecurity. Project Management is separate from our largest projects and programs - namely Environmental Management, Science, and the National Nuclear Security Administration – and strives to improve objective Departmental project management governance and project execution evaluation resulting in cost savings to be used on other projects.

ENHANCING SCIENTIFIC RESEARCH TO PROMOTE AMERICA'S ENERGY AND ECONOMIC SECURITY

DOE, through programs at all 17 DOE national laboratories but in particular its 10 national laboratories run by the Office of Science (SC), is among the largest federal sponsors of R&D in the physical sciences, covering the major disciplines that underpin DOE missions in science, energy, and national security. DOE is a federal leader in patent applications, patents, inventions disclosed, licenses and income-bearing licenses. The capabilities residing in these laboratories are well-known and highly regarded, from the world-class talent of their researchers to their state-of-the-art scientific tools and supercomputers.

One of the main priorities for SC will be the first U.S. exascale-capable supercomputer, with an intent to accelerate delivery to 2021.

Supercomputing is an area of intense international competition, in which sustained support is essential to our continued leadership in science, our economic competitiveness, and our national security. Computer modeling and simulation have become vital in all three realms, and exascale—computing at a billion-billion calculations a second—represents the future. Supercomputing paces advances in the physical sciences and high-technology areas stewarded by SC. This is just one technology area that is essential to U.S. economic security.

Working with partners Intel and Cray, ASCR has overseen a complete redesign of the planned Aurora machine for Argonne National Laboratory. This redesign tackled one of the biggest

challenges of moving to exascale—combining a major increase in computational capability with reducing power consumption. In addition, DOE is moving forward on developing applications for exascale systems, including ones for additive manufacturing and small modular reactors led by the Oak Ridge National Laboratory.

The Office of Fusion Energy Sciences has made remarkable strides using DOE's supercomputer capability to advance the understanding of how plasmas behave in fusion reactors. Recent massively parallel simulations modeled a key plasma transition for the first time, using a first-principles plasma turbulence simulation code and computing resources. The data for these simulations utilized 90% of the capacity of the Titan supercomputer, and the findings represent a major breakthrough.

The Long Baseline Neutrino Facility and the Deep Underground Neutrino Experiment (LBNF/DUNE) is another important SC priority, this one for the Office of High Energy Physics (HEP). This project is headquartered at Fermilab. Once completed, this international center for the study of neutrinos will pair the world's highest-intensity neutrino beam at Fermilab, with the infrastructure necessary to support massive, cryogenic far detectors installed deep underground at the Sanford Underground Research Facility in South Dakota, 800 miles to the west. Completion of LBNF/DUNE will cement U.S. preeminence in neutrino science, one of the frontiers of high-energy physics.

Additionally, the user facilities at the DOE national labs continue to foster cutting-edge scientific discoveries, supporting more than 30,000 additional researchers from academia, industry, and government spanning all 50 states and the District of Columbia. As an example, the Continuous Electron Beam Accelerator Facility at the Thomas Jefferson National Laboratory was recently upgraded to achieve up to 12 billion electron volts (GeV). This upgrade will allow for better study of the nuclear and particle physics building blocks of the universe.

The Office of Basic Energy Sciences was the first in the world to deploy accelerator-based X-ray lasers for the study of materials and chemical systems when the Linac Coherent Light Source (LCLS) was completed in 2009 at the Stanford Linear Accelerator Center (SLAC) National Accelerator Laboratory. SC leads the world in this important new realm of science through the upgrade of LCLS to become LCLS II. This upgrade will elevate X-ray science, allowing for new studies in ultrafast phenomena.

Upon completion, LCLS II will be the leading instrument of its kind in the world. This powerful x-ray laser will be capable of high-repetition rates of femtosecond observations (one millionth of a billionth of a second). These ultrafast observations provide an unprecedented window into chemical processes at the nanoscale, which will enable major advances in fields ranging from human health to energy production and storage to novel materials with extraordinary properties.

Over the last few years, Quantum Information Science (QIS) has emerged as a transformational area in science and technology, utilizing both advanced quantum theory and information theory. DOE laboratories are exploring QIS applications to physical sciences (detectors and sensors for use in materials, chemical and physics experiments), machine-learning and artificial intelligence. The national laboratories are uniquely qualified for these areas, leveraging decades of expertise

in applied mathematics, computer science, high-performance computing and high energy physics. For example, DOE sponsored a pilot project that seeks to develop fast quantum and classical algorithms for simulating quantum field theories, and quantum computing can potentially be used to identify candidate particles for dark matter.

Ongoing stewardship of the DOE Isotope Program remains critical to producing, managing, and distributing stable and radioactive isotopes for research, commercial, and medical applications for domestic use. Isotopes such as californium-252 are technologically important in oil production; while actinium-227 has improved cancer therapy. The DOE Isotope Program has produced and researched these and a host of others.

ENHANCING TECHNOLOGY TRANSITIONS

The mission of the Office of Technology Transitions (OTT) is to expand the commercial impact of the DOE R&D portfolio, advancing U.S. economic, energy, and national security interests. OTT is helping to ensure access to the cutting edge results of DOE's early stage research across the DOE complex, program offices, and national laboratories. It pursues this mission by facilitating industry and other partnerships. To accelerate these interests, DOE recently authorized national lab contractors to use Agreements for Commercializing Technology (ACT). Adding to the existing available agreements, laboratories will have fewer barriers for potential business partners to access lab expertise and capabilities.

OTT is assuming responsibility for other DOE programs, as well as consulting with NNSA to boost national lab capability in working with industry. For example, the Energy I-Corps Program accelerates lab researchers' understanding of business needs and communicating technological solutions from a market perspective.

The OTT Energy Investor Center directly facilitates national laboratories' engagement with investors and industry. In November, the Pacific Northwest National Laboratory and National Grid announced a new major partnership, resulting from an OTT-facilitated roundtable held earlier in the year.

ENVIRONMENTAL MANAGEMENT

The federal government's nuclear weapons production programs made significant contributions to our nation's defense for decades. But a byproduct of these programs are millions of gallons of liquid radioactive waste, thousands of tons of spent nuclear fuel and special nuclear material, large volumes of transuranic and mixed and low-level waste, huge quantities of contaminated soil and water, and thousands of excess facilities that must be cleaned up by the federal government.

The Office of Environmental Management (EM) has executed this mission for more than 25 years. The Department is leveraging past experiences, applying best practices and lessons learned; identifying, developing, and deploying practical technological solutions derived from scientific research; and looking for innovative and sustainable practices that make cleanup safer and more efficient. We believe the new alignment of SC and EM reporting to the Under

Secretary of Science will create added momentum in environmental cleanup. By leveraging the expertise of the national lab complex, and exploring potential project management and contract approaches used by SC, we will be able 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.

STRENGTHENING NUCLEAR SECURITY

NNSA was established by Congress in 2000 as a separately organized agency within the Department of Energy and was charged with three important and enduring missions: maintaining the safety, security, reliability, and effectiveness of the nuclear weapons stockpile; reducing the threat of nuclear proliferation and nuclear terrorism around the world; and providing naval nuclear propulsion to the U.S. Navy's fleet of aircraft carriers and submarines. NNSA continues to fulfill its national security missions, while supporting DOE and other agencies that draw upon its unique capabilities, by investing in its scientific, technical, and engineering intellectual capital and infrastructure. Since 1943, the U.S. nuclear program has relied extensively upon commercial industry and academic institutions to provide crucial technologies and innovations. NNSA is driving continued improvement in project management and the operations conducted by its management and operating (M&O) contractors, such as the establishment of clear lines of authority and accountability, and improved cost and schedule performance measures. As a result, since 2011, NNSA has delivered its \$1.4 billion capital construction project portfolio 8% under original budget.

DEPARTMENT-WIDE COLLABORATION

NNSA collaborates closely with other DOE organizations on several fronts to execute its missions. The three national laboratories for which NNSA has responsibility – Sandia National Laboratories, Los Alamos National Laboratory, and Lawrence Livermore National Laboratory – support NNSA's vital nuclear security missions and other DOE programs. Likewise, other national laboratories within the DOE complex provide significant assistance to advance NNSA's nuclear deterrence, nonproliferation, and naval reactors missions. For example, Pacific Northwest National Laboratory delivers science-based solutions to NNSA's global nuclear security mission in the areas of nuclear safeguards and export control, nonproliferation technology, and nuclear forensics. Argonne National Laboratory has played a central role since 1978 to convert research reactors and isotope production facilities all around the globe from the use of highly enriched uranium (HEU) to low enriched uranium, reducing the risk posed by weapons-usable HEU in civilian applications. Another of DOE's leading laboratories, Oak Ridge National Laboratory, covers the full spectrum of nuclear nonproliferation work, from basic research and development, to detection technologies and nuclear forensics.

This collaborative enterprise integrates the core competencies of each of the national laboratories, resulting in the most comprehensive research network of its kind. Together, the national laboratories are greater than the sum of their parts, creating a world-class scientific complex of unparalleled capability.

SUPERCOMPUTERS AND NATIONAL SECURITY

Four of the 10 fastest supercomputers in the world are located at DOE laboratories. The Department is a world leader in computational capability, as high-performance computing (HPC) is a critical component of DOE's national security, energy, and science missions. U.S. computing capabilities have been maintained over the past six decades through continuous research and the development and deployment of new computing systems, improving performance on applications of critical importance to government, industry, and academia. To maximize the benefits of high-performance computing in the coming decades, the United States will require an effective national response to increasing demands on computing power, emerging HPC technological challenges and opportunities, and growing competition with other nations.

The DOE Office of Science and NNSA are jointly responsible for executing the Exascale Computing Project (ECP), an initiative to develop a capable exascale computing program focusing on advanced simulation. The program will emphasize sustained performance on science and national security mission applications, as well as increased convergence between exascale and large-data analytic computing. In addition to underpinning NNSA's missions, the ECP will support DOE's applied energy technology developments. This joint partnership benefits our national security mission and our broader science and energy missions.

CONCLUSION

Mr. Chairman and members of the Subcommittee, I want to thank you again for inviting the Department to share our vision on how we can make America more prosperous and energy secure.

I look forward to working with the Committee and the full Congress to realize the President's vision of advancing our economic and national security by producing more reliable, affordable, and secure energy, fueling the creation of more high-paying jobs for American workers and achieving energy independence and eventual energy dominance for our country.

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