DOE MODERNIZATION: ADVANCING THE ECONOMIC AND NATIONAL SECURITY BENEFITS OF AMERICA'S NUCLEAR INFRASTRUCTURE

HEARING

BEFORE THE

SUBCOMMITTEE ON ENERGY

OF THE

COMMITTEE ON ENERGY AND COMMERCE

HOUSE OF REPRESENTATIVES

ONE HUNDRED FIFTEENTH CONGRESS

SECOND SESSION

FEBRUARY 6, 2018

Serial No. 115–97

Printed for the use of the Committee on Energy and Commerce
energycommerce.house.gov

U.S. GOVERNMENT PUBLISHING OFFICE
30–989 PDF WASHINGTON : 2018

COMMITTEE ON ENERGY AND COMMERCE

GREG WALDEN, Oregon
Chairman

JOE BARTON, Texas
Vice Chairman
FRED UPTON, Michigan
JOHN SHIMKUS, Illinois
MICHAEL C. BURGESS, Texas
MARSHA BLACKBURN, Tennessee
STEVE SCALISE, Louisiana
ROBERT E. LATTA, Ohio
CATHY MCMORRIS RODGERS, Washington
GREGG HARPER, Mississippi
LEONARD LANCE, New Jersey
BRETT GUTHRIE, Kentucky
PETE OLSON, Texas
DAVID B. MCKINLEY, West Virginia
ADAM KINZINGER, Illinois
H. MORGAN GRIFFITH, Virginia
GUS M. BILIRAKIS, Florida
BILL JOHNSON, Ohio
BILLY LONG, Missouri
LARRY BUCSHON, Indiana
BILL FLORES, Texas
SUSAN W. BROOKS, Indiana
MARKWAYNE MULLIN, Oklahoma
RICHARD HUDSON, North Carolina
CHRIS COLLINS, New York
KEVIN CRAMER, North Dakota
TIM WALBERG, Michigan
MIMI WALTERS, California
RYAN A. COSTELLO, Pennsylvania
EARL L. "BUDDY" CARTER, Georgia
JEFF DUNCAN, South Carolina

FRANK PALLONE, JR., New Jersey
Ranking Member
BOBBY L. RUSH, Illinois
ANNA G. ESHOO, California
ELIOT L. ENGEL, New York
GENE GREEN, Texas
DIANA DEGETTE, Colorado
MICHAEL F. DOYLE, Pennsylvania
JANICE D. SCHAKOWSKY, Illinois
G.K. BUTTERFIELD, North Carolina
DORIS O. MATSUI, California
KATHY CASTOR, Florida
JOHN P. SARBANES, Maryland
JERRY MCNERNEY, California
PETER WELCH, Vermont
BEN RAY LUJAN, New Mexico
PAUL TONKO, New York
YVETTE D. CLARKE, New York
DAVID LOEBSACK, Iowa
KURT SCHRADER, Oregon
JOSEPH P. KENNEDY, III, Massachusetts
TONY CÁRDENAS, California
RAUL RUIZ, California
SCOTT H. PETERS, California
DEBBIE DINGELL, Michigan7

SUBCOMMITTEE ON ENERGY

FRED UPTON, Michigan
Chairman

PETE OLSON, Texas
Vice Chairman
JOE BARTON, Texas
JOHN SHIMKUS, Illinois
ROBERT E. LATTA, Ohio
GREGG HARPER, Mississippi
DAVID B. MCKINLEY, West Virginia
ADAM KINZINGER, Illinois
H. MORGAN GRIFFITH, Virginia
BILL JOHNSON, Ohio
BILLY LONG, Missouri
LARRY BUCSHON, Indiana
BILL FLORES, Texas
MARKWAYNE MULLIN, Oklahoma
RICHARD HUDSON, North Carolina
KEVIN CRAMER, North Dakota
TIM WALBERG, Michigan
JEFF DUNCAN, South Carolina
GREG WALDEN, Oregon *(ex officio)*

BOBBY L. RUSH, Illinois
Ranking Member
JERRY MCNERNEY, California
SCOTT H. PETERS, California
GENE GREEN, Texas
MICHAEL F. DOYLE, Pennsylvania
KATHY CASTOR, Florida
JOHN P. SARBANES, Maryland
PETER WELCH, Vermont
PAUL TONKO, New York
DAVID LOEBSACK, Iowa
KURT SCHRADER, Oregon
JOSEPH P. KENNEDY, III, Massachusetts
G.K. BUTTERFIELD, North Carolina
FRANK PALLONE, JR., New Jersey *(ex officio)*

C O N T E N T S

DOE MODERNIZATION: ADVANCING THE ECONOMIC AND NATIONAL SECURITY BENEFITS OF AMERICA'S NUCLEAR INFRASTRUCTURE

TUESDAY, FEBRUARY 6, 2018

HOUSE OF REPRESENTATIVES,
SUBCOMMITTEE ON ENERGY,
COMMITTEE ON ENERGY AND COMMERCE,
Washington, DC.

The subcommittee met, pursuant to call, at 10:04 a.m., in room 2123, Rayburn House Office Building, Hon. Fred Upton (chairman of the subcommittee) presiding.

Members present: Representatives Upton, Olson, Barton, Shimkus, Latta, Harper, Kinzinger, Griffith, Johnson, Long, Bucshon, Flores, Mullin, Hudson, Cramer, Walberg, Duncan, Walden (ex officio), Rush, McNerney, Peters, Green, Doyle, Castor, Sarbanes, Welch, Tonko, Loebsack, Schrader, Kennedy, Butterfield, and Pallone (ex officio).

Staff present: Allie Bury, Legislative Clerk, Energy/Environment; Kelly Collins, Staff Assistant; Jordan Davis, Director of Policy and External Affairs; Wyatt Ellertson, Professional Staff Member, Energy/Environment; Melissa Froelich, Chief Counsel, Digital Commerce and Consumer Protection; Adam Fromm, Director of Outreach and Coalitions; Jordan Haverly, Policy Coordinator, Environment; Zach Hunter, Communications Director; A.T. Johnston, Senior Policy Advisor, Energy; Ben Lieberman, Senior Counsel, Energy; Mary Martin, Deputy Chief Counsel, Energy & Environment; Brandon Mooney, Deputy Chief Energy Advisor; Mark Ratner, Policy Coordinator; Tina Richards, Counsel, Environment; Annelise Rickert, Counsel, Energy; Dan Schneider, Press Secretary; Peter Spencer, Senior Professional Staff Member, Energy; Jason Stanek, Senior Counsel, Energy; Madeline Vey, Policy Coordinator, Digital Commerce and Consumer Protection; Hamlin Wade, Special Advisor for External Affairs; Andy Zach, Senior Professional Staff Member, Environment; Priscilla Barbour, Minority Energy Fellow; Jeff Carroll, Minority Staff Director; Rick Kessler, Minority Senior Advisor and Staff Director, Energy and Environment; John Marshall, Minority Policy Coordinator; Alexander Ratner, Minority Policy Analyst; Andrew Souvall, Minority Director of Communications, Member Services, and Outreach; Tuley Wright, Minority Energy and Environment Policy Advisor; and C.J. Young, Minority Press Secretary.

OPENING STATEMENT OF HON. FRED UPTON, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF MICHIGAN

Mr. UPTON. Good morning. Welcome to our second DOE modernization hearing, which will consider various issues that affect the economic and national security benefits associated with maintaining and advancing our Nation's nuclear infrastructure.

In 1954, Congress amended the Atomic Energy Act to provide for the peaceful, civilian use of nuclear energy, both domestic and abroad. Congress gave the Atomic Energy Commission—the predecessor agency of DOE and the NRC—the responsibility to oversee this nascent nuclear industry. And the nuclear industry in time achieved great success for the U.S., and contributed to global safety and security.

Today, more than 60 years later, many Atomic Energy Act provisions remain unchanged. Yet the world nuclear outlook has changed dramatically, and certain policies governing domestic involvement and participation in global markets really no longer reflect reality.

The U.S. is no longer the undisputed leader in civilian nuclear technology. Four hundred and forty commercial nuclear power reactors operate in 31 countries, with additional countries pursuing peaceful nuclear power programs. And for many years, subsidized state-owned nuclear companies have been successfully competing against our companies for commercial opportunities.

Throughout this Congress, we have examined two key challenges confronting the nuclear industry: how electricity markets function, as part of our "Powering America" series, and how to get our Nation's nuclear waste management back on track.

Today's hearing is going to look at a wide array of other challenges facing the U.S. nuclear industry, and what is needed at DOE and NRC to maintain U.S. nuclear capabilities and leadership, and the security benefits that flow from that.

Some of the examples:

For instance, the U.S. lacks a vibrant domestic fuel cycle. Domestic uranium production has dropped to levels not seen since before nuclear reactors were commercialized. The sole domestic uranium conversion plant is on standby, and there is no U.S.-owned enrichment capacity.

Last year brought news of Westinghouse, an historic leader certainly in the nuclear fuel cycle, filing for bankruptcy protection; the abandonment in South Carolina of one of just two nuclear power plants under construction; and more operating nuclear power plants announcing premature shutdowns.

In my home district in Michigan, two nuclear sites provide hundreds of well-paying jobs, support local communities through tax revenue, and partner with charities throughout Southwest Michigan.

And as we examine these issues, we should remember that nuclear technology is not just about generating electricity. It serves critical economic and national security functions, such as powering our space exploration missions, developing lifesaving medical treatments, protecting our Nation's borders, maintaining international nuclear safety and security leadership. These activities depend on

the intellectual and technical capabilities provided by a robust nuclear infrastructure.

So, this morning we are going to hear from two panels of witnesses, including three key DOE officials who lead nuclear offices, as well as the NRC's Executive Director of Operations. These witnesses will discuss the role of nuclear leadership.

Our distinguished second panel will provide additional perspective. I would like to welcome back Bill Ostendorff to the committee. You will remember that Mr. Ostendorff testified before our panel on many occasions during his tenure as an NRC Commissioner. Now, he is a Distinguished Visiting Professor at the U.S. Naval Academy, teaching a class about Congress—maybe we need some lessons here on national security—to future naval officers.

We are also going to hear from two national thought leaders on future nuclear technology development, including Dr. Mark Peters, the Director of the Idaho National Lab; and Dr. Ashley Finan, Nuclear Innovation Alliance's Policy Director. Drs. Peters and Finan will provide their perspective on existing innovative nuclear opportunities and the Federal Government's role in providing the necessary framework.

I also welcome Maria Korsnick, the President and CEO of the Nuclear Energy Institute, NEI. This is her second appearance before the committee. And I appreciate her leadership during an uncertain time in the nuclear industry.

So, thank you all for being here.

[The statement of Mr. Upton follows:]

PREPARED STATEMENT OF HON. FRED UPTON

Welcome to our second DOE modernization hearing, which will consider various issues that affect the economic and national security benefits associated with maintaining and advancing our Nation's nuclear infrastructure.

In 1954, Congress amended the Atomic Energy Act to provide for the peaceful, civilian use of nuclear energy, both domestic and abroad. Congress gave the Atomic Energy Commission—the predecessor agency of DOE and the Nuclear Regulatory Commission—the responsibility to oversee this nascent nuclear industry. The nuclear industry in time achieved great success for the United States and contributed to global safety and security.

Today, more than 60 years later, many Atomic Energy Act provisions remain unchanged. Yetthe world nuclear outlook has changed dramatically, and certain policies governing domestic involvement and participation in global markets no longer reflect reality.

The United States is no longer the undisputed leader in civilian nuclear technology. 440 commercial nuclear power reactors operate in 31 countries, with additional countries pursuing peaceful nuclear power programs. And for many years, subsidized state-owned nuclear companies have been successfully competing against our companies for commercial opportunities.

Throughout this Congress, we have examined two key challenges confronting the nuclear industry: how electricity markets function, as part of our "Powering America" series, and how to get our Nation's nuclear waste management back on track.

Today's hearing will look at a wide array of other challenges facing the U.S. nuclear industry, and what is needed at DOE and NRC to maintain U.S. nuclear capabilities and leadership, and the security benefits that flow from that.

Examples of challenges abound.

For instance, the United States lacks a vibrant domestic fuel cycle. Domestic uranium production has dropped to levels not seen since before nuclear reactors were commercialized. The sole domestic uranium conversion plant is on standby and there is no U.S.-owned enrichment capacity.

Last year brought news of Westinghouse, an historic leader in the nuclear fuel cycle, filing for bankruptcy protection; the abandonment in South Carolina of one

of just two nuclear power plants under construction; and more operating nuclear power plants announcing premature shutdowns.

In my home district in Michigan, two nuclear sites provide hundreds of well-paying jobs, support local communities through tax revenue, and partner with charities throughout Southwest Michigan.

As we examine these issues, we should remember that nuclear technology is not just about generating electricity. It serves critical economic and national security functions, such as powering our space exploration missions, developing lifesaving medical treatments, protecting our Nation's borders, and maintaining international nuclear safety and security leadership. These activities depend on the intellectual and technical capabilities provided by a robust nuclear infrastructure.

This morning, we will hear from two panels of witnesses, including three key DOE officials who lead nuclear offices, as well as the NRC's Executive Director of Operations. These witnesses will discuss the role of nuclear leadership.

Our distinguished second panel will provide additional perspective. I would like to welcome back Bill Ostendorff to the committee. Mr. Ostendorff testified before our panel on many occasions during his tenure as an NRC Commissioner. Now, he is a Distinguished Visiting Professor at the U.S. Naval Academy, teaching a class about Congress and national security to future Naval officers.

We will also hear from two national thought leaders on future nuclear technology development including Dr. Mark Peters, the Director of Idaho National Laboratory, and Dr. Ashley Finan, the Nuclear Innovation Alliance's Policy Director. Drs. Peters and Finan will provide their perspective on exciting innovative nuclear opportunities and the Federal Government's role in providing the necessary framework.

I also welcome Maria Korsnick, the President and CEO of the Nuclear Energy Institute. This is Ms. Korsnick's second appearance before this committee and I appreciate her leadership during an uncertain time in the nuclear industry.

Thank you all for being here today, and I yield back.

Mr. UPTON.

With that, I yield to the ranking member of the subcommittee, my friend Mr. Rush, for an opening statement.

OPENING STATEMENT OF HON. BOBBY L. RUSH, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF ILLINOIS

Mr. RUSH. I want to thank you, Mr. Chairman, for holding this important hearing today on advancing the economic and national security benefits of our Nation's nuclear infrastructure. Mr. Chairman, as I understand, there are several views regarding nuclear policy that the majority has noted in its memo. I look forward to working with the majority side as we proceed through regular order and bring these bills up in a legislative hearing in order to hear from expert witnesses on the constant questions and impacts of these bills.

Mr. Chairman, I believe we may be able to come to a bipartisan agreement on most, if not all, of these bills in order to increase their chances of actually becoming law.

Mr. Chairman, as I have stated many times, I principally subscribe to an all-of-the-above in the portfolio as we move towards a low-carbon energy economy. I have also stated on many occasions, Mr. Chairman, that I believe nuclear policy must play a vital role as a source of safe, reliable, low-carbon power, and help us meet both the energy and environmental needs of the 21st Century.

While I did not agree with the recent Department of Energy notice of proposed rulemaking issued last year that was recently removed, revoked by FERC, I continue to maintain that we must find a way to appropriately appraise nuclear energy nationally. Mr. Chairman, I believe this must be done in a fair, methodical, and transparent manner by elected policy holders rather than those that are done hastily and in secret by unelected agency officials.

Therefore, it is my hope that in addition to today's hearing, we will have other opportunities to hear from stakeholders on the benefits, on the impacts of more traditional nuclear facilities as well as more advanced nuclear technology, including nonlight water reactors and light water small modular reactor design.

Mr. Chairman, these new and emerging technologies will allow for the production of nuclear power more efficiently and with less waste than in current technology. Mr. Chairman, I can imagine a scenario where these small, less costly reactors can be utilized to power hard-to-reach, remote populations, whether they be in small rural communities in the Midwest, or native villages in Alaska, or even to help the thousands of Americans still living without power in Puerto Rico or the U.S. Virgin Islands.

To be sure, Mr. Chairman, there remains significant issues that must be addressed, including issues of safety, licensing, and commercialization of these advanced technologies. It is my intention, Mr. Chairman, that members of this subcommittee can indeed address many of these issues with bipartisan solutions that will benefit the Nation as a whole.

So, Mr. Chairman, I look forward to engaging today's distinguished panelists on both challenges and as well as the opportunities that lie ahead in this very important nuclear century.

Mr. Chairman, with that I yield back the balance of my time.

Mr. UPTON. The gentleman yields back. The Chair would recognize the chairman of the full committee, the gentleman from the good State of Oregon, for an opening statement.

OPENING STATEMENT OF HON. GREG WALDEN, A REPRESENTATIVE IN CONGRESS FROM THE STATE OF OREGON

Mr. WALDEN. I thank the chairman. And I thank our panelists and all the witnesses for your testimony today and for helping us with these very, very important issues.

This morning, as you know, we will examine several issues associated with the future of the Nation's nuclear power industry: the current domestic nuclear supply chain, international market opportunities, regulatory and policy matters, and what is necessary for developing and deploying future nuclear technologies.

Now, the testimony and our discussion represent another step in our efforts to more appropriately align the Department of Energy's missions, management, and priorities with the challenges that face our Nation today.

At root today, is a question of our Nation's capabilities, not only to propel nuclear innovation generally, but also to ensure an infrastructure that is critical to our economic and to our national security

Today's civilian nuclear industry was born out of American's national security needs and imperatives from 70 years ago. The first controlled nuclear reactions led to the Manhattan Project. That helped win World War II. The 1958 launch of the world's first nuclear-powered submarine, the U.S.S. Nautilus, marked the birth of our nuclear navy and resulted in our subsequent naval dominance.

President Eisenhower's Atoms for Peace provided for peaceful, civilian use of nuclear technology, and that remains the foundation of the nuclear industry that is in place today.

Since that time, the civilian nuclear industry and its related infrastructure have been intertwined with our national security needs: projecting U.S. safety and security practices the world over, ensuring engineering and scientific understanding to safeguard nuclear materials, and developing the economic and commercial relationships that ensure a more secure world.

To continue to harvest the economic and national security benefits associated with our domestic nuclear energy infrastructure, however, we must recognize the world looks different than it did at the birth of the nuclear age. Consequently, we must take steps to update the relevant policies. These policies must be forward looking to enable innovation and the deployment of new, advanced nuclear technologies.

Oregon-based NuScale is an example of one of those innovative nuclear companies. NuScale's small modular reactor proposed design recently received approval for a significant milestone when the Nuclear Regulatory Commission signed off on the design's passive cooling system. This decision is a game changer for the regulatory framework. And I applaud both NRC and NuScale on their breakthrough.

The Department of Energy's recent public-private partnership with NuScale helped enable these near-term successes. So, to unleash long-term innovation, DOE must capitalize and nurture its nuclear infrastructure, including research and test facilities, intellectual expertise, and institutional leadership. This foundation is critical to both economic and national security imperatives, but requires long-term program stewardship, in addition to the underlying statutory authority and direction.

Today's hearing continues the committee's ongoing review of the Department of Energy, but I should also note that it has been more than 30 years since the Nuclear Regulatory Commission was last reauthorized. Congressmen Kinzinger and Doyle's legislation to improve NRCC's efficiency—excuse me, NRC's efficiency—old habits die hard—and budget process is a good start. And I appreciate their interest and their leadership on this issue.

This morning's diverse witness panels will help inform our efforts to reinvigorate our Nation's critical nuclear infrastructure. And I look forward to your testimony.

With that, Mr. Chairman, I yield back the balance of my time.

[The statement of Mr. Walden follows:]

PREPARED STATEMENT OF HON. GREG WALDEN

This morning we will examine several issues associated with the future of our Nation's nuclear industry—the current domestic nuclear supply chain, international market opportunities, regulatory and policy matters, and what is necessary for developing and deploying future nuclear technologies.

The testimony and our discussion represent another step in our efforts to more appropriately align the Department of Energy's missions, management, and priorities with the challenges facing our Nation today.

At root today is a question of our Nation's capabilities not only to propel nuclear innovation generally, but to ensure an infrastructure that is critical to our economic and our national security.

Today's civilian nuclear industry was borne out of America's national security imperatives from over 70 years ago. The first controlled nuclear reactions led to the Manhattan Project, which helped win World War II. The 1958 launch of the world's

first nuclear-powered submarine, the U.S.S. Nautilus, marked the birth of our nuclear navy and resulted in our subsequent naval dominance.

President Eisenhower's Atoms for Peace provided for peaceful, civilian use of nuclear technology, which remains the foundation of the nuclear industry in place today.

Since that time, the civilian nuclear industry and its related infrastructure have been intertwined with our national security needs-projecting U.S. safety and security practices the world over, ensuring engineering and scientific understanding to safeguard nuclear materials, and developing the economic and commercial relationships that ensure a more secure world.

To continue to harvest the economic and national security benefits associated with our domestic nuclear energy infrastructure, however, we must recognize the world looks different than it did at the birth of the nuclear age. Consequently, we must take steps to update the relevant policies. These policies must be forward looking to enable innovation and the development and deployment of new advanced nuclear technologies.

Oregon-based Nuscale is an example of one of those innovative nuclear companies. Nuscale's small modular reactor proposed design recently received approval for a significant milestone when the Nuclear Regulatory Commission signed off on the design's passive cooling system. This decision is a gamechanger for the regulatory framework and I applaud both NRC and NuScale on this breakthrough.

The Department of Energy's recent public-private partnership with NuScale helped enable these near-term successes. To unleash long-term innovation, DOE must capitalize and nurture its nuclear infrastructure, including research and test facilities, intellectual expertise, and institutional leadership. This foundation is critical to both economic and national security imperatives, but requires long-term program stewardship, in addition to the underlying statutory authority and direction.

Today's hearing continues the committee's ongoing review of DOE, but I should also note that it has been over 30 years since the Nuclear Regulatory Commission was last reauthorized. Congressmen Kinzinger and Doyle's legislation to improve NRC's efficiency and budgetary process is a good start and I appreciate their interest and leadership on this issue.

This morning's diverse witness panels will help inform our efforts to reinvigorate our Nation's critical nuclear infrastructure and I look forward to the testimony.

Mr. UPTON. Time is yielded back.

The Chair would recognize the ranking member of the full committee, the gentleman from New Jersey, Mr. Pallone, for an opening statement.

OPENING STATEMENT OF HON. FRANK PALLONE, JR., A REPRESENTATIVE IN CONGRESS FROM THE STATE OF NEW JERSEY

Mr. PALLONE. Thank you, Mr. Chairman. Today's hearing is the second in the subcommittee's Department of Energy modernization series. It is an important step in our bipartisan efforts to advance the economic and national security benefits of America's nuclear infrastructure.

First, I must mention that while the majority's memo lists three bills for consideration today, we have been assured by the majority that this is not a legislative hearing on these bills. Without commenting on the merits of the legislation, I want to make clear that it's essential for this subcommittee to hold a legislative hearing prior to moving these bills. It's critical that Members have the opportunity to engage with appropriate witnesses who can properly analyze the impact of the proposals.

At the subcommittee's first DOE modernization hearing I noted the department can improve and more successfully fulfill its mission. Today's hearing is the logical next step, because I believe that DOE's Office of Environmental Management and the National Nu-

clear Security Administration are two of the key entities within DOE that are in greater need of oversight.

For example, the environmental management program in recent years has been plagued by high-profile leaks of radioactive waste, contractor problems, missed deadlines, and escalating cleanup costs. In 2014, an Augustine-Mies Panel report concluded that NNSA lacks a stable, executable plan for modernization. The report also found that NNSA faces challenges in its governance of the nuclear security enterprise. And I believe this is an area where we can work in a bipartisan fashion to address these issues.

We must also ensure that taxpayer dollars are being managed in a fiscally responsible manner. For example, according to the GAO 2017 high-risk designation, DOE's Office of Environmental Management has spent $35 billion in the last 6 years alone, primarily on treating and disposing of nuclear and hazardous waste. Yet, environmental liability grew over the same period by over $90 billion. So it is particularly important that DOE address environmental liabilities in a cost effective way, while also ensuring public health and safety.

These concerns lead me to question whether DOE's nuclear activities need some sort of formal external regulation and independent oversight, whether by the Nuclear Regulatory Commission or another entity. DOE's track record for regulating itself over the past 40 years is mixed at best. External regulation may be a way to improve that record. And this is an idea that the Subcommittee on Energy had explored on a bipartisan basis in the past. It may be time to do so again.

Today's hearing also affords us the opportunity to contemplate what American nuclear infrastructure might look like in the coming decades. It is no secret that building new nuclear power plants has been a challenge. The Vogtle Project in Georgia has experienced skyrocketing costs and prolonged construction delays, while the V.C. Summer Nuclear Power Plant in South Carolina has been abandoned entirely, all the while more and more existing plants are announcing plans to permanently shut down. These include in New Jersey the Oyster Creek Nuclear Generating Station just south of my congressional district, which last week announced it will close in October of this year, 1 year earlier than planned.

If our country is going to meet its carbon reduction goals, then nuclear energy may still be needed as a part of the solution for awhile. And after all, despite the President's efforts, we are fortunately still a party to the Paris Climate Accord. So, while I do not think the Federal Government should be subsidizing nuclear plants in the competitive markets, it is important that we invest in research into advanced nuclear reactors that can potentially generate power more efficiently, with less waste than our current reactor fleet.

So I look forward to hearing from our two knowledgeable panels about DOE's nuclear mission and where we should focus efforts to improve these programs.

Thank you, Mr. Chairman. I yield back.

Mr. UPTON. The gentleman's time has expired, and he yields back. So, at this point, we will listen to our testimony by our four distinguished witnesses.

I would note that your testimony in full is made a part of the record, so we would like to limit your remarks in summary to no more than 5 minutes.

Mr. McGinnis, Principal Deputy Assistant Secretary for the Office of Nuclear Energy, we will start with you. Welcome. Thank you.

STATEMENTS OF EDWARD G. MCGINNIS, PRINCIPAL DEPUTY ASSISTANT SECRETARY FOR NUCLEAR ENERGY, DEPARTMENT OF ENERGY; ART ATKINS, ASSOCIATE DEPUTY ADMINISTRATOR FOR GLOBAL MATERIAL SECURITY, OFFICE OF DEFENSE NUCLEAR NONPROLIFERATION, NATIONAL NUCLEAR SECURITY ADMINISTRATION, DEPARTMENT OF ENERGY; JAMES OWENDOFF, PRINCIPAL DEPUTY ASSISTANT SECRETARY FOR ENVIRONMENTAL MANAGEMENT, DEPARTMENT OF ENERGY; AND VICTOR M. MCCREE, EXECUTIVE DIRECTOR FOR OPERATIONS, NUCLEAR REGULATORY COMMISSION

STATEMENT OF EDWARD G. MCGINNIS

Mr. MCGINNIS. Thank you very much, Chairman Upton. I would also like to thank Ranking Minority Member Rush, and also the other members of this subcommittee. It is a great privilege to be here today.

Let me just start out by saying the United States pioneered the development and peaceful use of nuclear power to produce around-the-clock, emissions-free electricity. As a result of U.S. leadership in nuclear energy, American citizens have benefitted from the truly unique source of electricity for the last seven decades. Nuclear power plants have served as bedrocks to communities across the country to thousands, providing high-paying, skilled jobs to hundreds of thousands of Americans. And our nuclear energy capabilities have supported our Nation's energy security, grid reliability, and national security.

However, the U.S. nuclear energy sector is now under historic downward pressure, has lost a tremendous amount of its once dominant global market share, and has seen a significant degradation in our manufacturing base. In response, the President, on June 29th of last year, announced that we would conduct a complete review of the U.S. nuclear energy policy to help find new ways to revive and expand this crucial energy resource.

The Department of Energy is now working to implement the President's direction, vigorously I might add. Within the department's office of Nuclear Energy, we focus our work in three mission areas: the Nation's existing fleet, the development of advanced nuclear reactor concepts, and also fuel cycle technologies.

The department is partnering with industry to develop the technical basis for the continued safe and economic operation of the current fleet of nuclear power plants, as well as developing technical solutions to enhance the economics, performance, and safety of nuclear power plants. This includes supporting the development of technologies such as accident tolerant fuels, which have the potential to significantly increase the performance of our Nation's current fleet of reactors, while also reducing costs.

By continuing to support improvements to the efficiency, productivity, and operating lifetimes of our Nation's nuclear fleet through technology R&D, the department is helping industry realize its full potential in contributing to our Nation's emissions-free, reliable electricity supply.

The department is also working to advance our Nation's next generation of advanced reactors, including potentially game-changing advanced Small Modular Reactors. Advanced reactor concepts have the potential to deliver improved performance and efficiency, reduced costs, enhanced resource utilization and waste minimization, as well as enhanced flexibility to include nonelectric applications, and even load following.

The department recently announced a $30 million funding opportunity in fiscal year 2018 to support early stage research and development of advanced nuclear energy technology. By focusing on the development of innovative advanced reactors, and leveraging private-public partnerships in a world class national laboratory system, we can support strong domestic industry now and into the future.

The department is also working to support the civilian nuclear fuel cycle. We recently took an important step toward revitalizing our fuel cycle R&D capabilities when Idaho National Laboratory resumed operations at the Transient Reactor Test Facility, otherwise known as TREAT, which had been shut down since 1994. This capability is an important asset to nuclear scientists and engineers as they work to increase the safe and performance—safety and performance of current and future nuclear reactors.

The department is also conducting research and development activities that would be necessary for the development of a versatile, fast test reactor. Development of that would be very important potentially. While a decision whether or not to deploy an advanced fast spectrum test reactor has not been made, such a reactor would accelerate innovation in advanced fuels and materials for U.S. vendors, and pave the path to U.S. global leadership in advanced nuclear R&D by reestablishing this capability.

Finally, in conclusion, the administration is fully committed to nuclear energy as a vital component of our Nation's energy system. By leveraging private-public partnerships and our national laboratory system, we can support the development of a new class of U.S. advanced reactors; an innovative, responsive nuclear energy supply chain; and advanced nuclear energy fuel cycle technologies, positioning the U.S. for dominance in the 21st Century.

Thank you very much.

[The statement of Mr. McGinnis follows:]

Testimony of Edward G. McGinnis
Principal Deputy Assistant Secretary for Nuclear Energy
U.S. Department of Energy
Before the
U.S. House Committee on Energy and Commerce
Subcommittee on Energy

February 6, 2018

Chairman Upton, Ranking Member Rush, and Members of the Subcommittee, it is a true honor to appear before you to discuss the very important matter of nuclear energy.

The United States pioneered the development and peaceful use of nuclear power to produce around-the-clock, emission-free electricity. As a result of U.S. leadership in nuclear energy, American citizens have benefitted from this truly unique source of electricity for the last 7 decades. Nuclear energy has delivered reliable, predictable, emission-free power from plants that can operate in round-the-clock, rain, sleet, or snow, and in other extreme conditions, 7 days a week at full power for nearly 2 years at a time without stopping. These nuclear power plants have served as bedrocks to communities across the country, providing high-paying, skilled jobs to hundreds of thousands of Americans. Our nuclear energy capabilities have also served to support and reinforce our nation's energy security as well as national security, both in global nuclear nonproliferation goals and supporting our nuclear navy in a way no other energy sector has done.

Today, nuclear energy generates nearly 20 percent of our nation's electricity, representing 1 out of every 5 American homes[1]. It provides 60 percent of our nation's emission-free electricity, making nuclear energy America's largest source of clean energy – in fact, over three times as much as all other U.S. renewable sources of electricity combined. According to a Nuclear Energy Institute analysis, nuclear energy also supports approximately 475,000 jobs throughout our great nation, $10 billion in federal taxes, and $2.2 billion in state taxes each year.[2]

This Administration recognizes the vital role nuclear energy plays in support of American jobs, our communities, economy, security, prosperity, and environment. It is an essential element of our nation's electricity sector, grid reliability and resiliency, and national security. However, the Administration also recognizes that the U.S. nuclear energy sector is under historic downward pressure, has lost a tremendous amount of its once dominant global market share, and has seen a significant degradation in our manufacturing base. In response, the President, on June 29, 2017, announced that we would conduct a complete review of U.S. nuclear energy policy to help find new ways to revive and expand this crucial energy resource. This Civil Nuclear Review is

[1] https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_1_01

[2] https://www.nei.org/CorporateSite/media/filefolder/Policy/Wall%20Street/Nuclear_by_the_Numbers.pdf?ext=.pdf

currently underway, and the outcomes will inform how the Administration can best enable this important revitalization.

Having led the Department's international nuclear energy policies and activities for more than 10 years and having served at the Department for a total of 26 years, I can say that the President's announcement and direction could not have come at a more important and vital time for the U.S. nuclear energy sector and our nation.

The Department of Energy (DOE) is now vigorously working to implement the President's direction. In fact, the Secretary has already taken a number of decisive actions, supporting 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. The Secretary also took action to support a resilient, reliable, and affordable electricity sector by initiating a Notice of Proposed Rulemaking with the Federal Energy Regulatory Commission to address potential risks to our nation's electricity grid, in part due to the historic number of nuclear and other baseload plant closures. DOE recognizes the vital role of Congress, including in particular this Committee, in addressing the challenges faced by our nuclear energy sector, and is committed to, and looks forward to, working closely with Congress on this critical matter to revitalize and expand our nuclear sector.

Within the Department's Office of Nuclear Energy (NE), we focus our work in three major mission areas; the nation's existing nuclear fleet, the development of advanced nuclear reactor concepts, and fuel cycle technologies. Utilizing our greatest strengths, we are emphasizing early stage research and development, mobilizing our unique national laboratory capabilities, and implementing targeted R&D partnerships with the U.S. nuclear industry.

Revitalizing the Existing Nuclear Fleet

The Department is working aggressively and with a sense of urgency with nuclear industry partners to support the continued health and vitality of our nuclear reactor fleet. For example, we are partnering with industry to develop the technical basis for the continued safe and economic operation of the current fleet of nuclear plants through subsequent license renewal from 60 to 80 years. Recently, the Light Water Reactor Sustainability program completed irradiation of Reactor Pressure Vessel (RPV) materials at Idaho National Laboratory's (INL) Advanced Test Reactor. Preliminary data from this experiment indicate that RPV steels currently used in a majority of the U.S. pressurized water reactor fleet should safely support continued reactor operations through 80 years.

The Department is also developing technical solutions to further enhance the economics, performance, and safety of nuclear power plants by supporting the development of technologies such as accident tolerant fuels. Accident tolerant fuels is a technology that has the potential to significantly increase the performance of our nation's current fleet of reactors, while also reducing costs. We expect multiple nuclear power plants to begin installing lead test rods and

assemblies in their commercial power plants beginning as early as this year. This is a crucial step in the development and qualification of advanced fuels and could support industry's desire to implement this technology in the 2025 timeframe or earlier, if possible.

Preserving and improving our commercial nuclear fleet is fundamental to our domestic energy security, economic prosperity, environmental sustainability, and global security objectives. By continuing to support improvements to the efficiency, productivity, and operating lifetimes of our nation's nuclear fleet through technology R&D, the Department is helping industry realize its full potential in contributing to our nation's emission-free, reliable electricity supply.

Supporting the Advanced Reactor Pipeline

The Department is also working to advance our nation's next generation of advanced nuclear reactors, including potentially game-changing advanced Small Modular Reactors (SMRs), through targeted early-stage R&D investments and cost-shared technical partnering on R&D projects to ensure a strong domestic industry now and into the future. The Department has a long history of nuclear power technology development, specifically in innovative technologies that have the potential to improve our economic and energy security. In fiscal year 2018, the Department will actively support nuclear energy innovation through early-stage, cross-cutting research, R&D technical partnering, general advanced reactor design development, to improve the cost and schedule for accelerated development of U.S. advanced reactors.

Advanced reactor concepts have a variety of features that have the potential to result in improved performance and efficiency, reduced costs, enhanced resource utilization and waste minimization, and enhanced flexibility to include non-electric applications. Modularity and size variation across designs may make them attractive for specialized applications that are not suitable for gigawatt-scale reactors. Across all areas of nuclear reactor technology, we are now seeing a considerable focus by American industry to invest in the development of innovative nuclear reactor concepts—almost 50 companies and institutions are working on nuclear innovation. Dozens of developers are seeking to deploy innovative advanced reactor concepts in North America. According to an analysis by Thirdway, a DC-based think tank, these developers are backed by almost $2 billion in private investment. In fact, one could arguably say that the U.S. is indeed leading the world in innovative and advanced nuclear reactor designs.

In order to preserve American technical leadership and competitiveness, DOE is executing a number of R&D initiatives to help enable industry to realize the advanced reactor pipeline in the United States.

For instance, the Department recently published a multi-year funding opportunity announcement to support early-stage research and development of advanced nuclear energy technology. This funding opportunity makes up to $30 million available in FY 2018 awards, and will remain open for a five-year period. This industry funding opportunity is intended to provide efficient, versatile, and flexible ways by which DOE can effectively implement R&D partnerships to

support our U.S. nuclear industry leaders. We recently received the first round of proposals for cost-shared early-stage R&D projects to develop innovative, industry-driven reactor designs and accompanying technologies with high potential to advance nuclear power in the United States.

Nuclear power plants provide critical reliable, resilient, clean baseload energy for the national electric supply, and SMRs could play a game-changing role with walk-away safe designs; in-ground reactors that offer unique security benefits; a high degree of flexibility, scalability, and distributed power generation; and the potential to be largely factory built. Further research and analysis is needed to better understand the potential of all advanced designs, including SMRs.

The Department is exploring other innovative and win-win approaches to supporting our nation's next generation of advanced reactors through the most resource-efficient ways to conduct early-stage nuclear research and development (R&D) activities. One area of exploration is R&D on advanced nuclear reactor designs for hybrid nuclear/renewable uses. A commercially-owned reactor of this nature would have the potential of leveraging state-of-the-art, advanced commercial nuclear platforms in a cost-effective manner.

The commercial development and deployment of advanced nuclear reactor technology is a complex and resource-intensive undertaking. The Department recognizes this and is committed to helping ensure U.S. nuclear industry technology developers and related industry stakeholders have effective access to the necessary infrastructure and capabilities to move innovative nuclear energy technologies toward commercialization. The Gateway for Accelerated Innovation in Nuclear (GAIN) is establishing effective private-public partnerships to leverage technology advancements and focus federal investments on priority early-stage research and capability needs that are intended to result in the acceleration of game-changing nuclear energy technologies. Recognizing the key role played by the NRC as an independent regulator, DOE and the NRC entered into a Memorandum of Understanding on GAIN, where the NRC is responsible for providing to DOE accurate, current information and training on the NRC's regulatory and licensing processes, which DOE can then share, as appropriate, with prospective applicants for new or advanced reactor designs.

Finally, the Department's Advanced Reactor Technology (ART) program collaborates with industry to identify and conduct early-stage, essential research to reduce technical risk associated with advanced reactor technologies and systems, with the goal of supporting industry's demonstration of advanced reactor concepts within the next 10 to 15 years. In addition, the Nuclear Energy Enabling Technologies (NEET) program provides funding opportunities and U.S. industry access to unique government research facilities to address key challenges affecting nuclear reactor and fuel cycle development. There is a focus on crosscutting reactor materials, advanced methods for manufacturing, and new instrumentation and sensor technologies. By focusing on the development of innovative advanced reactors and leveraging private-public partnerships and our world-class national laboratory system, we can support a strong domestic industry now and into the future.

U.S. Nuclear Fuel Cycle Technology

The U.S. pioneered the development of what we know as the civilian nuclear fuel cycle. Despite its near monopolistic beginnings, there is no enrichment capability using U.S. technology operating in the world today. The U.S. no longer has an operating U.S.-owned (or U.S.-technology-based) enrichment facility or fast spectrum test reactor. While the Department still maintains world-class nuclear fuel cycle capabilities, we continue to make improvements that can help strengthen our nation's nuclear fuel cycle technologies.

We recently took an important step toward revitalizing our fuel cycle R&D capabilities when INL resumed operations at the Transient Reactor Test Facility (TREAT), which had been shut down since 1994. TREAT is designed specifically to test nuclear reactor fuels and materials under extreme conditions. It can produce sudden bursts of energy that are more than five times more powerful than a commercial power plant—allowing scientists to examine fuel performance. INL will take another important step in the operation of TREAT this year, performing the first new transient experiments in the United States in decades. This capability is an important asset to nuclear scientists and engineers as they work to increase the safety and performance of current and future nuclear reactors.

The Department is also conducting research and development activities that would be necessary for the development of a versatile fast test reactor. While a decision whether or not to deploy an advanced fast spectrum test reactor has not been made, such a reactor would accelerate innovation in advanced fuels and materials for U.S. vendors and pave the path to U.S. global leadership in advanced nuclear R&D by reestablishing this capability.

Many advanced reactor concepts and the potential DOE versatile fast test reactor would need high-assay low-enriched uranium (LEU) for fuel development and reactor operation. High-assay LEU is uranium that is enriched to more than 5% U-235 but less than 20% U-235. No existing commercial enrichment capability produces uranium that is enriched above the 5% U-235 level used by commercial light water nuclear power plants. While current enrichment plants could be modified to produce high-assay LEU, it is unlikely that a commercial high-assay LEU capability will be developed without further indication of progress toward deployment by advanced reactor vendors.

As part of the Department's R&D efforts to support development of innovative reactor designs in the United States, NE is collaborating with industry groups to refine estimates of near-term R&D needs of advanced reactor designers, which includes consideration of high-assay LEU needs, quantities, timing, and forms. NE is also working with the National Nuclear Security Administration to better understand options for enrichment capability and other approaches that could support both U.S. advanced reactor and potential DOE test reactor high-assay LEU needs. DOE is also participating fully in the White House-led nuclear policy review directed by the

President. The review will examine issues including U.S. nuclear energy enrichment capabilities and needs.

Reestablishing U.S. Global Nuclear Energy Leadership

The health and vitality of the U.S. nuclear energy sector is increasingly dependent on a healthy and robust U.S. nuclear export market, including our U.S. nuclear reactor vendors, fuel fabricators, and related nuclear products and services. Maintaining strong U.S. nuclear energy exports and global nuclear energy commercial leadership supports U.S. jobs and manufacturing benefits, our nation's ability to address our global nuclear nonproliferation priorities and interests, our ability to contribute to global nuclear safety, and broader U.S. strategic interests.

In 2016 the U.S. Department of Commerce estimated the global civil nuclear market to be valued between $500 and $740 billion over the next 10 years and to have the potential to generate more than $100 billion in U.S. exports and thousands of new jobs.[3] When these large nuclear reactor deals are secured, they represent long-term strategic relationships that could extend for up to 100 years.

The global market represents a tremendous opportunity to enhance our nation's economic prosperity, but without a reenergized domestic supply chain our companies will likely lose out to international state-owned competitors. When U.S. nuclear companies successfully compete in foreign markets, we often see win-wins for U.S. jobs, the economy, and nuclear sector health, as well as energy security for our nation and our allies. The Department's decades-long work in Ukraine is a prime example. As a result of Ukraine seeking U.S. help to diversify its nuclear energy fuel supply and spent nuclear fuel storage, which was completely dependent on monopoly supply arrangements with Russia, innovative U.S. private-public partnering resulted in a U.S. supplier providing approximately half of all of Ukraine's nuclear fuel supply for its 15 nuclear reactors., Another global U.S. nuclear company is poised to complete Ukraine's national spent nuclear fuel storage site in 2019. This will greatly alleviate Ukraine's concern over Russia taking back most of its spent nuclear fuel. This is just one example of U.S. nuclear companies providing both economic and strategic energy security to the U.S. and our international allies.

Conclusion

The Administration is fully committed to nuclear energy as a vital component of our nation's energy system. I firmly believe that with sustained, focused and innovative approaches—working closely and thoughtfully together with key U.S. stakeholders, and Congress and this Committee—we can indeed begin to revive, revitalize, and expand our nation's nuclear energy sector and restore our global nuclear energy leadership. By leveraging private-public partnerships and our national laboratory system, we can support the development of a new class of U.S. advanced nuclear reactors; an innovative and responsive nuclear energy supply chain;

[3] https://www.trade.gov/topmarkets/pdf/Civil_Nuclear_Executive_Summary.pdf

and advanced nuclear energy fuel cycle technologies, positioning the U.S. for dominance in the 21st century. By taking these actions, we can help ensure that future generations continue to benefit, as we have, from this emission free, reliable, and secure power source for our nation.

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

Mr. UPTON. Thank you.

Mr. Atkins is Associate Deputy Administrator for Global Material Security at the National Nuclear Security Administration. Welcome to you.

STATEMENT OF ART ATKINS

Mr. ATKINS. Thank you. Chairman Upton, Chairman Walden, Ranking Member Rush, and members of the committee, thank you for the opportunity to represent the Department of Energy's National Nuclear Security Administration and discuss its important role in national security. We truly appreciate your interest in NNSA's critical missions and your continued support of its projects and its people.

NNSA is charged with three important and enduring national security missions:

First, maintaining the safety, security, reliability, and effectiveness of the nuclear weapons stockpile;

Second, preventing, countering, and responding to global nuclear threats, and;

Third, providing naval nuclear propulsion to the U.S. Navy's fleet of aircraft carriers and submarines.

At the same time, NNSA recognizes the important role played by civil nuclear energy, both in the United States and abroad, and the connectivity that exists with our national security missions.

For instance, the science and engineering performed by our labs, plants, and sites underpins our critical defense in nonproliferation missions, and the advances in these interdisciplinary efforts yield concrete benefits to the civil nuclear industry, and vice versa.

While the burgeoning international market provides a significant commercial opportunity for the U.S. nuclear industry, the export of U.S. nuclear technology still poses significant nuclear nonproliferation concerns. Therefore, it must be carefully managed.

NNSA is committed to striking the appropriate balance between facilitating legitimate commerce, while also controlling proliferation of weapons-usable material, equipment, technology, and expertise. In implementing NNSA's mission, we ensure that not only is the United States abiding by the highest nonproliferation standards in nuclear exports, but that those standards are also matched by our global partners and global suppliers.

There are two primary mechanisms we implement to achieve these standards. The first, 123 Agreements. These establish the legal framework for U.S. companies to export nuclear reactors, nuclear fuel, and equipment to foreign companies and governments.

NNSA plays an important role in the conclusion of 123 Agreements. We provide, on behalf of DOE, technical assistance to the State Department, which leads negotiations on new 123 Agreements.

Additionally, the Secretary of Energy has the legal authority to authorize proposed exports of unclassified U.S. nuclear technology and assistance. This authority is implemented under 10 C.F.R. Part 810 regulation, which NNSA is responsible for administering.

In response to feedback from U.S. industry and other stakeholders, we have taken a number of steps to simplify and update the Part 810 regulation, and have implemented significant im-

provements in the process for reviewing export applications. These efforts have already reduced average processing time from more than 18 months to approximately 12 months. And our goal is to reduce this review time even further.

However, some challenges remain outside of NNSA's control. For instance, the lengthiest part of the Part 810 review process is the effort to obtain the required government-to-government nonproliferation assurance. This is handled by the State Department. This process can often take 6 months or longer.

The U.S. Government works closely with partner countries to obtain these assurance, but industry also has a pivotal role to play. We encourage U.S. exporters to discuss the importance of these assurances with their customers who, in turn, can highlight the issue with their government counterparts.

Equally as important, NNSA also bears responsibility for managing our Nation's stockpile of uranium, most of which was produced during the Cold War. The department requires a reliable supply of enriched uranium to accomplish important defense and nondefense needs. In order to meet the requirements for enriched uranium, the department currently relies on downwinding campaigns. The department downwinds excess highly enriched uranium, including material that is surplus for defense needs, to create low-enriched uranium suitable for power reactors, research reactors, and medical isotope production.

Longer term, NNSA's Defense Programs is working to reestablish a domestic uranium enrichment capability to ensure the supply of low-enriched uranium fuel for tritium production, a need that cannot be met by commercial industry. We are exploring unified strategies in which a domestic uranium enrichment capability could also meet departmental and commercial needs for high-assay LEU and HEU for naval propulsion.

To conclude, NNSA recognizes that the effective implementation of our mission is strengthened by strong partnerhips with industry. NNSA needs these strong industry partners to resolve the critical national security issues that we face.

Again I want to thank you for your support for our programs and your time. And I look forward to answering any questions that you may have.

[The statement of Mr. Atkins follows:]

Statement of Art Atkins
Assistant Deputy Administrator for Global Material Security
Office of Defense Nuclear Nonproliferation
National Nuclear Security Administration
U.S. Department of Energy
Before the
Subcommittee on Energy
House Committee on Energy & Commerce

February 6, 2018

Chairman Upton, Ranking Member Rush, and Members of the Subcommittee, thank you for the opportunity to discuss the Department of Energy's (DOE) National Nuclear Security Administration's (NNSA) important role in national security. NNSA is charged with important and enduring missions critical to the national security of the United States: maintaining the safety, security, reliability, and effectiveness of the nuclear weapons stockpile; preventing, countering, and responding to global nuclear threats; and providing naval nuclear propulsion to the U.S. Navy's fleet of aircraft carriers and submarines. At the same time, DOE/NNSA recognizes the important role played by civil nuclear energy, both in the United States and abroad. NNSA is making strides to ensure that the nuclear industry stays strong in a challenging environment, and listening to industry concerns is a critical component in furthering our progress.

NNSA's Nonproliferation Responsibilities

In his speech at DOE this past June, the President called for a comprehensive review of nuclear energy policy that will help find new ways to revive, revitalize, and expand this crucial industry. In parallel, the Administration is committed to preventing the global proliferation of nuclear weapons programs. In support of the President's objectives, NNSA is committed to maintaining a balance between the promotion of legitimate nuclear commerce and the national security imperative of controlling the proliferation of weapons usable material, equipment, technology, and expertise. NNSA's nuclear nonproliferation programs play a critical role in helping to ensure that nuclear exports are enabled in accordance with the highest nonproliferation standards. Increasing this global reach is among the highest priorities for NNSA. Through our support of the negotiation of 123 Agreements, export licensing, and multilateral export control regimes such as the Nuclear Suppliers Group, we ensure that U.S. nonproliferation standards are mirrored by our partners and other suppliers globally. Further, NNSA is committed to working with domestic and foreign partners to minimize the global use of highly enriched uranium (HEU) to reduce the risk that terrorists can acquire HEU for use in an improvised nuclear device.

123 Agreements and Administrative Arrangements

Working with the Department of State (DOS), the Nuclear Regulatory Commission (NRC), DOE's Office of Nuclear Energy (NE), and other departments and agencies, NNSA plays a leading role in efforts to conclude peaceful nuclear cooperation agreements with foreign governments. Often referred to as "123 Agreements," such Agreements establish the legal

framework for U.S. companies to export nuclear power reactor fuel, nuclear reactors, and other important pieces of equipment to foreign companies and governments. As such, entry into force of 123 Agreements helps to achieve the Administration's twin goals of facilitating the expansion of the U.S. civil nuclear energy sector to create more U.S. jobs and more exports, while at the same time, helping to ensure that global civil nuclear energy development takes place in accordance with the highest nonproliferation standards.

NNSA works with NE to achieve these reinforcing goals by providing technical support to the DOS in the negotiation of all 123 Agreements. In this context, NNSA experts help ensure that the terms of all 123 Agreements contain the strongest possible nonproliferation conditions and best practices. For NNSA, 123 Agreements can also be mechanisms to facilitate nuclear nonproliferation cooperation in the area of safeguards, export controls, and physical protection, to name a few.

At present, the United States has 23 such agreements in force that govern peaceful nuclear cooperation with 48 countries, the International Atomic Energy Agency and the governing authorities on Taiwan. Most recently, new 123 Agreements with China, the Republic of Korea, and Norway entered into force in October 2015, November 2015, and January 2017, respectively.

10 CFR Part 810 Authorizations

The U.S. Energy Information Administration projects that installed nuclear generating capacity outside the United States will increase by nearly 80% from 2015 to 2050.[1] The growing international market presents an important commercial opportunity for the U.S. nuclear industry, but the export of U.S. nuclear technology also poses nuclear proliferation risks that must be carefully managed. Under the Atomic Energy Act of 1954, as amended (AEA), the Secretary of Energy (the Secretary) has the authority to authorize proposed exports of unclassified U.S. nuclear technology and assistance. This authority is implemented in the 10 CFR Part 810 regulation (Part 810), which DOE/NNSA is responsible for administering.

As the Secretary stated in a December 22 letter to this Subcommittee, the Department is committed to reducing processing times for applications under Part 810 while maintaining strong nonproliferation controls on U.S. nuclear technology. DOE/NNSA and other pertinent U.S. Government agencies have made significant progress in improving the efficiency and transparency of the Part 810 regulatory regime, including through implementation of DOE/NNSA's Part 810 Process Improvement Plan (PIP). Key accomplishments to date include the following:

- The Department published a revision to the Part 810 regulation that, among other benefits, establishes fast track approval processes for a number of activities that previously would have required specific authorization.

[1] U.S. Energy Information Administration, *International Energy Outlook 2017*, Table: World Installed Nuclear Generating Capacity by Region and Country. (https://www.eia.gov/outlooks/aeo/data/browser/#/?id=23-IEO2017&sourcekey=0)

- The Department established an electronic submissions portal ("e810") that is operational and available for industry use. This website was a long-standing request from industry groups and has been available to exporters since January 2017. The e810 website reduces the paperwork burden for industry and increases transparency by allowing the applicant to view where their request is in the reviewing process.

- DOE established a single point of contact for all exporters, standardized internal documents, and clarified internal review processes.

As a result of these and other changes, the average processing time for specific authorization requests, amendments, and renewal requests under Part 810 has dropped from a high of more than 18 months to approximately 12 months. The Secretary has provided this Subcommittee with a specific timeline for implementing further improvements, including expanding the functionality of the e810 system, establishing formal deadlines for DOE/NNSA internal reviews, and creating compliance policies that encourage exporters to self-identify issues and violations. NNSA is working to ensure these improvements are implemented in a timely manner.

However, the lengthiest part of the Part 810 review process remains largely outside of DOE/NNSA control. Concurrence of DOS and review by the NRC and Departments of Defense and Commerce, and for certain cases, the Office of the Director of National Intelligence (ODNI), are required by statute. DOS does not concur until they have received the required government-to-government nonproliferation assurances from the country that would receive the technology. This process can often take six months or longer. While the U.S. Government works closely with partner countries to obtain assurances, industry also has an important role to play. We encourage U.S. exporters to emphasize the issue of nonproliferation assurances with their customers, who in turn can highlight the issue with their government counterparts. Industry taking initiative on this issue could help reduce Part 810 application processing times by several months or more.

A second major challenge in expediting the Part 810 process is the requirements of the Fiscal Year 2016 National Defense Authorization Act (NDAA), which added a heightened level of review for proposed technology exports to China and Russia.

HEU Minimization and Advanced Reactor Fuel Development

NNSA's Office of Material Management and Minimization (M3), through its Reactor Conversion Program, works in the United States and around the world to convert research reactors and medical isotope production facilities from the use of HEU to low enriched uranium (LEU). These efforts are a key element in the United States' policy to minimize the use of HEU in civilian applications worldwide by reducing, and where possible eliminating, the demand for HEU at civilian reactors and medical isotope production facilities. Conversion of a facility eliminates the need for HEU at that facility, and also reduces the overall amount of HEU in transit, where it is most vulnerable. This contributes to U.S. national security by greatly reducing the risk that terrorists can acquire HEU for use in an improvised nuclear device. The new LEU fuel designs used for conversion may, in turn, serve as the basis for industry to design future civilian research reactors with increased capabilities, further moving away from the need

for HEU fuel. To date, NNSA has converted or verified the shutdown of 101 research reactors and isotope production facilities worldwide.

NNSA's Role in Uranium Management

Uranium Management for Defense and Non-Defense Uses

The Department is preparing an Excess Uranium Management Plan addressing management of its uranium inventory that is excess and not dedicated to national security missions. This interdepartmental effort has been coordinated by NE and is expected to be released in the near future. In addition, NNSA produces a biannual report to Congress, the Unencumbered Enriched Uranium Management Plan Through 2065 that includes plans for managing tritium and enriched uranium resources to meet national security and defense requirements.

Uranium Requirements

DOE/NNSA requires a reliable supply of Enriched Uranium to accomplish its defense and non-defense related missions. For NNSA, HEU is needed to maintain the nuclear weapons stockpile, in support of Mutual Defense Agreements, and for naval propulsion programs. The nearest term defense need is for LEU required to support production of tritium, which is needed for the nuclear weapons stockpile.

NNSA's Office of Defense Programs (DP) is working to reestablish a Domestic Uranium Enrichment (DUE) capability in time to supply LEU for tritium production. DP has identified HEU from the Department's inventory that can be down-blended to provide LEU for tritium production through approximately 2038. Because longstanding U.S. policy and international agreements require LEU used for defense purposes be unencumbered by U.S. or foreign peaceful use commitments, NNSA must rely on this existing uranium inventory to meet the tritium requirement until an enrichment capability can be reestablished.

NNSA's M3 Office manages uranium for non-defense needs including High-Assay LEU (HA LEU, above 5% and less than 20% 235U) fuel for research reactors and medical isotope production, and LEU fuel for the American Assured Fuel Supply. The Department is exploring unified strategies in which a DUE capability could achieve HA-LEU requirements.

Because the Department has multiple needs for uranium, any decisions made on an enrichment capability need to consider all the requirements in order to avoid duplicative efforts.

Conclusion

NNSA is continually working with nuclear industry in recognition of the vital importance that industry plays in supporting national security as well as commerce. NNSA needs strong industry partners to address critical national security challenges, and these challenges require industry to resolve them. The success of NNSA's nonproliferation and uranium management responsibilities are only possible with strong and reliable commercial partners. Thank you for your time.

Mr. UPTON. Thank you.

Next we have James Owendoff, Principal Deputy Assistant Secretary at the Office of Environmental Management, Department of Energy. Welcome again.

STATEMENT OF JAMES OWENDOFF

Mr. OWENDOFF. Chairman Upton, Chairman Walden, Ranking Member Rush, and distinguished members of this subcommittee, I appreciate the opportunity to appear before you today to discuss the Department of Energy's Environmental Management Program.

The Federal Government's nuclear weapons production programs have made significant contributions to our Nation's defense for decades, helping end World War II and the Cold War. In addition, Government-sponsored nuclear energy research also made significant contributions to domestic energy growth and prosperity. The legacy of these programs is a massive amount of radioactive and chemical waste and contaminated facilities at sites across the country. It is the mission of DOE's Office of Environmental Management to clean up or remediate legacy waste and facilities.

This legacy includes 90 million gallons of radioactive liquid waste stored in aging underground tanks.

This legacy also includes 5,000 contaminated facilities, 700,000 tons of depleted uranium, millions of cubic meters of contaminated soil, billions of gallons of contaminated water, spent nuclear fuel, and other nuclear materials.

EM must execute its mission as safely, efficiently, and cost-effectively as possible. This involves constructing new infrastructure, like waste storage facilities and waste treatment plants. This mission also involves the management and retrieval of liquid waste, as well as the decommissioning and demolition of deteriorating facilities that ultimately reduce maintenance and monitoring costs.

EM's first priority is worker safety, as well as protection of the public health and the environment. These are essential components of our cleanup objectives. EM will continue to discharge its responsibilities by conducting cleanup within a "Safe Performance of Work." This culture integrates protection of the environmental, safety, and protection of worker and public health into all work activities.

Taking many variables into account, such as risk reduction and compliance agreements, EM has the following priorities: radioactive tank waste stabilization, treatment, and disposal; spent nuclear fuel receipt, storage, and disposition; special nuclear material consolidation, stabilization, and disposition; transuranic and mixed/low-level waste treatment and disposal; soil and groundwater remediation; and excess facilities deactivation and decommissioning.

Across these programmatic areas it is important to note that approximately half goes to maintaining our facilities across the complex in a safe, operational-ready stance. This includes activities such as facility infrastructure maintenance and complex-wide safeguards and security, and cybersecurity activities. The scope of these activities covers security of special nuclear materials and safety of high-level radioactive waste and spent fuel, along with the maintenance of thousands of square feet of deteriorating nuclear processing facilities awaiting eventual future demolition.

The nature and length of the EM mission, coupled with the sheer technological complexity of cleanup means that we always face challenges—some anticipated, others unexpected. These obstacles certainly warrant our careful attention, but EM also has proven its ability to meet tangible results.

When we began the program in 1989, EM was responsible for a total of 107 sites, covering 3,100 square miles, that area, larger than Rhode Island and Delaware combined. During early years we focused on characterizing waste. Since then, EM has accomplished cleanup and closure of major sites in Colorado, Ohio, Missouri, and Florida; decommissioning of a gaseous diffusion plant in Tennessee; vitrification of more than 4,000 canisters of high-level waste in South Carolina; and removal of all the plutonium metal and oxides from Washington State.

That is, ensuring there is an essential safe work environment at all of our sites is our highest priority. As we work to best position EM for success now and into the future, we also continue to pursue robust technology development, and infrastructure investments that ensure safe and uninterrupted operations.

EM's progress means safe, cleaner sites in the communities that hosted defense nuclear activities for decades. This kind of progress is not possible without our workforce, Members of Congress, regulators, community leaders, and other partners.

Mr. Chairman, I welcome the input of the committee as EM continues work on aggressive, achievable cleanup plans that recognize these difficult technical challenges, while making substantial progress on the many goals we share with you and your constituents.

Thank you for this opportunity.

[The statement of Mr. Owendoff follows:]

Testimony of James Owendoff

Principal Deputy Assistant Secretary for Environmental Management

Before the

House Committee on Energy and Commerce

Subcommittee on Energy

February 6, 2018

Chairman Upton, Ranking Member Rush and distinguished members of the committee, I appreciate the opportunity to appear before you today to discuss the Department of Energy's Environmental Management program.

The federal government's nuclear weapons production programs have made significant contributions to our nation's defense for decades – helping end World War II and the Cold War. In addition, government-sponsored nuclear energy research also made significant contributions to domestic energy growth and prosperity. The legacy of these programs is a massive amount of radioactive and chemical waste and contaminated facilities at sites across the country. It is the mission of DOE's Office of Environmental Management (EM) to clean up or remediate this legacy waste.

EM Overview

This legacy includes 90 million of gallons of radioactive liquid waste stored in aging underground tanks. That's enough to completely fill the Capitol Rotunda nearly 10 times.

This legacy also includes five thousand contaminated facilities, 700,000 tons of depleted uranium, millions of cubic meters of contaminated soil, billions of gallons of contaminated water, spent nuclear fuel and other nuclear materials.

EM must execute its mission as safely, efficiently and cost-effectively as possible. This involves constructing new infrastructure like waste storage facilities and waste treatment plants. This mission also involves the management and retrieval of liquid tank waste as well as the decommissioning and demolition of deteriorating facilities that ultimately reduce maintenance and monitoring costs.

EM's first priority is worker safety, as well as protection of the public health and the environment. These are essential components of our cleanup objectives. EM will continue to discharge its responsibilities by conducting cleanup within a "Safe Performance of Work" culture that integrates protection of the environmental, safety, and protection of worker and public health into all work activities.

Taking many variables into account, such as risk reduction and compliance agreements, EM has the following priorities:

- Radioactive tank waste stabilization, treatment, and disposal;
- Spent nuclear fuel receipt, storage, and disposition;
- Special nuclear material consolidation, stabilization, and disposition;
- Transuranic and mixed/low-level waste treatment and disposal;
- Soil and groundwater remediation; and,
- Excess facilities deactivation and decommissioning.

Approximately 90 percent of the EM budget is contracted out, largely on a competitive basis. This work directly employs more than 25,000 Americans.

EM Funding

In Fiscal Year 2018, approximately 37 percent of EM's budget request of $6.5 billion went toward tackling our largest environmental challenge: radioactive tank waste. Facility deactivation and decommissioning accounted for 18 percent, and transuranic and solid waste treatment and disposal accounted for 13 percent. Special nuclear materials disposition and spent nuclear fuel management accounted for approximately 8 percent, and soil and groundwater remediation accounted for approximately 7 percent. Site Services accounted for 17 percent.

Across these programmatic areas, it is important to note that approximately $3.1 billion, or 48 percent, goes towards maintaining our facilities across the complex in a safe operational ready stance. This includes activities such as facility infrastructure maintenance and complex-wide safeguards and security and cyber security activities. The scope of these activities covers security of special nuclear materials and safety of high-level radioactive waste and spent nuclear fuel, along with maintenance of thousands of square feet of deteriorating nuclear processing facilities awaiting eventual future demolition.

Mr. Chairman, I recognize and appreciate the funding Congress provides for the EM program each year. This federal investment, while necessarily substantial, is a smart one – helping to protect public safety and the environment.

Cleanup Progress

The nature and length of the EM mission, coupled with the sheer technological complexity of cleanup means that we will always face challenges – some anticipated and others unexpected. These obstacles certainly warrant our careful attention, but EM also has a proven ability to achieve tangible results.

When the program began in 1989, EM was responsible for a total of 107 sites covering 3,100 square miles. That's an area larger than Rhode Island and Delaware combined. During early years, work focused on characterizing waste. Since then, EM has accomplished 1) cleanup and closure of major sites in Colorado, Ohio, Missouri and Florida; 2) decommissioning of a gaseous diffusion enrichment plant in Tennessee; 3) vitrification of more than 4,000 canisters of high-

level waste in South Carolina; and) removal of all the plutonium metal and oxides from Washington state.

Today, EM has 16 sites remaining, with an active cleanup footprint of less than 300 square miles. These 16 sites are home to some of our toughest and most complex challenges.

The best value does not mean taking short cuts and it does not always mean choosing the cheapest option. It means getting the job done as safely, efficiently and cost-effectively as possible. It requires a sustainable, risk-informed approach centered on reducing the greatest amount of risk with the resources available, while maximizing opportunities to shorten schedules and lower lifecycle costs.

That is why I have focused on a greater sense of urgency to EM's decision-making process. This approach means more emphasis on engaging with regulators, stakeholders, and communities in making timely decisions which will enhance safety, shorten schedules, increase transparency, and reduce costs – achieving the best value for all taxpayers, while at the same time, protecting our workers, members of the public in the communities surrounding our sites, and the environment.

2017 Accomplishments

While some cleanup projects will extend decades, stable steady progress is being made right now. In 2017, the EM workforce achieved the resumption of transuranic waste shipments to the Waste Isolation Pilot Plant, enabling continued cleanup progress at several sites across the country.

We also completed cleanup activities at Hanford's 618-10 burial ground; demolition of one of the last remaining buildings at the Separations Process Research Unit in New York state; and the safe treatment of remediated nitrate salt drums at the Los Alamos National Laboratory. At Savannah River, workers successfully completed construction of the latest Saltstone Disposal Unit, which is integral to the tank waste cleanup mission. At the Portsmouth site, we are continuing work to deactivate the former enrichment plant's massive process buildings to prepare them for eventual demolition. At the Paducah site, we have optimized a system to control and mitigate the migration of groundwater contamination on the east side of the site ahead of schedule and under budget.

Our successes have been recognized by the Project Management Institute (PMI). Our work to complete waste retrieval activities at the AY-102 double-shell tank at Hanford was awarded PMI's Project of the Year award. In addition, PMI also issued awards for efforts to upgrade a ventilation system at one of Hanford's tank farms and for work to close one of the underground waste tanks at the Savannah River Site. I am proud that the PMI chose to recognize the important work underway to address one of our largest environmental challenges — radioactive tank waste. These awards are a recognition of the dedicated and talented workforce we have at the Hanford and Savannah River sites, and across the entire EM program, and illustrate how the EM program is working to serve as a good steward of taxpayer resources. I am committed to building upon this cleanup momentum, Mr. Chairman.

Achieving Continued Success

Ensuring there is an essential safe work environment at all of our sites is our highest priority. As we work to best position EM for success now and into the future, we will also continue to pursue robust technology development, and infrastructure investments that ensure safe and uninterrupted operations.

The recent Department of Energy reorganization aids these efforts though improved alignment of EM, the Office of Science, and our national labs. By leveraging the expertise of the national lab complex and exploring potential project management and contract approaches used by the Office of Science, we will be better positioned to solve complex challenges, manage costs and ensure the highest level of safety at our sites.

At the end of the day, EM progress means safer, cleaner sites in the communities that hosted defense nuclear activities for decades. This kind of progress is not possible without our workforce, Members of Congress, regulators, cleanup community leaders and other partners.

Mr. Chairman, I welcome the input of the Committee as EM continues work on aggressive achievable cleanup plans that recognize the difficult technical challenges, while making substantial progress on the many goals we share with you and your constituents.

Thank you for the opportunity to appear before you today and I look forward to your questions.

Mr. UPTON. Thank you.

Last on this panel we are joined by Mr. McCree, Executive Director of Operations from the NRC. Welcome to you, sir.

STATEMENT OF VICTOR M. MCCREE

Mr. MCCREE. Thank you. Good morning, Chairman Upton, Ranking Member Rush, and distinguished members of the subcommittee. I appear before you today representing the staff of the Nuclear Regulatory Commission. I am pleased to have this opportunity to meet with you to discuss the steps that we have taken to ensure the NRC's readiness to fulfill our mission in light of advancements in nuclear technologies being contemplated by the nuclear industry. The NRC is actively working with stakeholders, including the Department of Energy, to establish shared expectations and develop strategies to prepare for future reviews.

We are also enhancing our processes to execute our safety and security mission in a manner that reflects our Principles of Good Regulation. Today I will briefly highlight several of our efforts.

Regarding new reactors, in March of last year the NRC docketed the first application for a small modular reactor design certification submitted by NuScale Power. And the overall regulatory review of the design is progressing on the established schedule.

In May of 2016, the NRC received an application from the Tennessee Valley Authority, or TVA, for an early site permit at the Clinch River Nuclear Site in Tennessee to evaluate the suitability for a potential new small modular reactor. This review is also, this review is also progressing on schedule.

With respect to future advanced reactor designs, the NRC staff has developed a multi-part strategy to prepare for the review of nonlight water reactor technologies. This strategy has three objectives: enhancing technical readiness; optimizing regulatory readiness; and enhancing communication. We have made significant progress in fulfilling these objectives.

Five developers of nonlight water reactor designs have expressed their intent to begin regulatory interactions with the NRC. And we have already begun formal pre-application interactions with Oklo, Incorporated, on its compact fast reactor design. We anticipate starting additional pre-application reviews this year and next fiscal year, in 2019, and beginning one or more advanced reactor application reviews in the next 2 to 4 years.

Regarding our effectiveness and efficiency initiatives, in June 2014, the NRC began an initiative, referred to as Project Aim, to enhance the agency's ability to plan and executive its mission in a more effective and efficient manner. Although we have achieved a significant milestone last year by completing the major deliverables for each of the 19 discrete tasks, and realizing approximately $48 million in reductions, we are committed to continuing actions to improve our effectiveness, efficiency, and agility.

In fact, this month the NRC staff started an initiative to further transform our regulatory approach to better handle potential new and novel technology, such as accident tolerant fuel and advanced nonlight water reactors.

In the area of human resources, the NRC developed a Strategic Workforce Plan that is focused on having the right people with the

right skills and competencies at the right time and place to achieve the agency's safety and security mission. We are continuing to refine this plan to ensure the NRC's workforce planning efforts are timely and responsive to changes in workload, while the agency retains and develops the skills needed to support our mission.

As for fees, the NRC understands the importance of a predictable, transparent, clear, and understandable fee structure. To this end, the NRC is overhauling its fee billing process to offer greater transparency, using several methods, including testing the use of flat fees; revising how billable work is tracked and reported; and starting next month, identifying each unique activity charge and the name of the person who performed the work on the invoices.

With respect to other domestic and international activities, in cooperation with DOE, the nuclear industry is researching advanced fuel designs that are expected to exhibit improved safety margins under both normal and postulated accident conditions, when compared to fuel types that are used today. Several vendors are exploring candidate designs, which are collectively referred to as accident tolerant fuel, or ATF as you heard earlier.

In response, the NRC will soon finalize a comprehensive plan to ensure that we are prepared to effectively and efficiently review ATF designs. Our regulatory interaction with the DOE in preparing our project plan has allowed us to explore opportunities to leverage experimental and computational work already conducted by the department.

As for our international activities, the NRC serves as the licensing authority for proposed exports and imports of pf commercial nuclear equipment and materials, and is committed to maintaining robust partnerships with our regulatory counterparts worldwide. These interactions allow the NRC to share best practices, shape the content and scope of technical publications, participate in peer reviews, and access research facilities not available in the U.S.

In closing, the NRC continues to focus on fulfilling our safety and security mission in a more transparent, effective, and efficient manner. Chairman Upton, Ranking Member Rush, and distinguished members of the subcommittee, I thank you for the opportunity to appear before you today, and would be happy to respond to your questions. Thank you.

[The statement of Mr. McCree follows:]

STATEMENT OF VICTOR M. McCREE
EXECUTIVE DIRECTOR FOR OPERATIONS
U.S. NUCLEAR REGULATORY COMMISSION
BEFORE THE
HOUSE COMMITTEE ON ENERGY AND COMMERCE
SUBCOMMITTEE ON ENERGY
FEBRUARY 6, 2018

Good morning, Chairman Upton, Ranking Member Rush, and distinguished members of the Subcommittee. I appear before you today representing the staff of the Nuclear Regulatory Commission (NRC). I am pleased to have this opportunity to meet with you to discuss the steps that we have taken to ensure the NRC's readiness to fulfill our mission in light of advancements in nuclear technologies that are being contemplated by the nuclear industry. I assure you that the NRC is actively working with stakeholders, including the Department of Energy (DOE), to establish shared expectations and develop strategies to prepare for future reviews. NRC is also enhancing its processes so that we can execute our safety and security mission in a manner that reflects our Principles of Good Regulation (Independence, Clarity, Openness, Reliability, and Efficiency). The NRC has developed, and continues to develop, improvements in our regulatory approach that promote efficiency, effectiveness, and agility, and which will benefit our interactions with licensees, applicants, and interested members of the public. Today I will highlight several of our efforts in that regard.

New Reactors

The NRC's new reactors program leads our efforts to establish the appropriate policy framework and regulatory approach for the siting, licensing, and construction oversight of new nuclear power reactors, including small modular reactors (SMR) and non-light water reactors (non-

LWR). In March of last year, the NRC docketed the first application for a SMR design certification submitted by NuScale Power. The staff's strategy for completing this review within the projected 42 months includes the use of technical audits early in the review schedule, alignment of the request for additional information process with the required regulatory findings, and resolution of challenging technical and regulatory issues as soon as they are identified. To date, the staff has identified nearly two dozen technical issues that are unique to the NuScale SMR design and the staff has developed a review plan for each of these issues. At this time, the overall regulatory review is progressing on the established schedule.

In May of 2016, the NRC received an application from the Tennessee Valley Authority (TVA) for an early site permit, which if approved, would find the site suitable for potential new SMRs at the Clinch River Nuclear Site in Tennessee. The staff's environmental and technical review is progressing on schedule. We have been notified that we may receive additional applications from TVA and Utah Associated Municipal Power Systems for combined licenses in the next few years.

With respect to future advanced reactor designs being contemplated, the NRC staff has developed a multi-part strategy to prepare for the review of non-LWR technologies. In December of 2016, the NRC staff issued this strategy, entitled, "NRC Vision and Strategy: Safely Achieving Effective and Efficient Non-Light Water Reactor Mission Readiness." Our strategy has three objectives: enhancing technical readiness; optimizing regulatory readiness; and optimizing communication. To achieve these objectives, we have identified specific activities in the near-term (within five years), mid-term (five to 10 years), and long-term (beyond 10 years) timeframes. We have made significant progress in activities related to all of the near-term strategies. As an independent safety regulator, the NRC cannot participate in DOE's policy-setting and promotional activities but the NRC and DOE have worked cooperatively within

the bounds of our respective mandates for decades to prepare for the licensing of non-LWR technologies. We have also made progress to prepare for potential near-term applications. Based on stakeholder feedback, the NRC will use risk-informed and performance-based approaches to resolve key policy issues to the extent possible.

A total of five non-LWR developers have expressed their intent to begin regulatory interactions with the NRC. In fact, we began formal pre-application interactions with Oklo, Inc. in November 2016 regarding its compact fast reactor design. We are implementing a flexible and staged regulatory review process to engage with Oklo to align the NRC's activities with the developer's pace of activity. In addition, the agency is implementing a "small core team" review approach to support a more cost-effective evaluation of non-LWR design applications. The core review team concept provides stability and consistency to the developer while ensuring efficient use of available NRC resources. We anticipate starting additional pre-application reviews in fiscal year 2018 and 2019, and beginning one or more advanced reactor application reviews in the next two to four years. The NRC is committed to setting clear expectations for applicants regarding the content and quality of applications. As a part of this effort, we enhanced our "request for additional information" (RAI) process to ensure clarity of regulatory requirements and informational needs and to ensure that both technical and project management staff review and approve an RAI before it is issued to the applicant or licensee.

Effectiveness, Efficiency, and Agility Initiatives

In June 2014, the NRC established Project Aim to enhance the agency's ability to plan and execute its mission in a more effective, efficient, and agile manner. During 2017, Project Aim achieved a significant milestone by completing the major deliverables for each of the 19 discrete Project Aim tasks. These efforts addressed the NRC's need to improve efficiency and flexibility

to right-size the agency, while retaining employees with the appropriate skills to accomplish its mission and streamline processes. Notably, this effort enabled us to realize approximately $48 million in reductions, including 185 FTE in resource savings in FY 2017 and FY 2018.

The NRC continues to institutionalize the actions related to Project Aim, which will continue to improve our effectiveness, efficiency, and agility going forward. The NRC also is pursuing additional activities such as standardizing and centralizing support staff functions of NRC headquarters and regional offices and institutionalizing a common prioritization process to prepare the agency to evaluate emerging work more readily. We are also implementing an enhanced strategic workforce planning process to improve workforce management. Although these activities were not originally part of Project Aim, they demonstrate the NRC's continuing commitment to effectiveness, efficiency, and agility. Finally, the NRC staff recently started an initiative to transform our regulatory approach to better handle potential new and novel technologies, such as accident tolerant fuel and advanced non-LWRs.

Strategic Workforce Planning

The NRC developed a Strategic Workforce Plan that is focused on having the right people, with the right skills and competencies, at the right time and place to achieve the agency's safety and security mission. We are continuing to refine this plan to ensure that the NRC's workforce planning efforts are timely and responsive to changes in workload, while the agency retains and develops the skills needed to support our mission. This year the NRC is piloting a new strategic workforce planning process in three offices. The new process requires us to set agency-wide human capital goals -- including goals related to overall workforce size and skills composition -- which extend beyond the two-year budget cycle. It represents a structured,

repeatable, and comprehensive approach that can be built upon each year and allows us to leverage and align with other existing NRC processes, such as budget formulation, performance management, human resource management, and strategic planning. After this year's pilot, we expect to use the results of the new process to expand strategic workforce planning agency-wide.

Fees

The NRC understands the importance of a predictable and transparent fee structure, including the need for it to be clear and understandable. To this end, the NRC is overhauling its fee billing to offer greater transparency. We are also testing methods, such as flat fees, to make fees more predictable and transparent.

The NRC has analyzed its fee-setting process to improve the transparency, equitability, and timeliness of communications with our licensees and stakeholders. We recently developed a comprehensive list of essential improvements to the agency's fee website and invoicing. Last year, we also included a specific reference in our FY18 Congressional Budget Justification to more clearly explain the NRC's budget and fees, describe our international activities in more detail, and present a more streamlined schedule for the development of fees. We also posted cost estimates for licensing and inspection actions on the NRC's public website.

To further improve fee transparency, the NRC has and continues to engage stakeholders to better understand their interests associated with how information is presented on invoices and reports. Based on these engagements, the NRC initiated several projects to revise how billable work is tracked and reported. Starting next month, invoices will show each unique activity charge and the name of a staff member or contractor who performed the work. The NRC

continues to work with stakeholders to identify and implement improvements to ensure transparency and accuracy of charges for the billable work.

Other Domestic and International Activities

In cooperation with the Department of Energy, the nuclear industry is researching advanced fuel designs that are expected to exhibit improved safety margins under both normal and postulated accident conditions, when compared to the fuel types that are in use today. Several vendors are exploring candidate designs, which are collectively referred to as accident tolerant fuel, or ATF.

In response, the NRC has developed a comprehensive plan to ensure that we are prepared to effectively and efficiently review ATF designs. The plan addresses ATF-related issues from "cradle-to-grave," including the design, testing, fabrication, shipping, operation, and storage of ATF. To support this work, we have identified infrastructure needs, including staff training and enhancements of computer codes. The draft plan is scheduled to be available to the public later this month for comment. The staff intends to finalize the plan by April 2018.

The NRC staff has had extensive engagement with DOE, as well as industry groups, in preparing the ATF project plan. The interaction with DOE allows NRC to explore opportunities to leverage experimental and computational work already conducted by DOE. We have also engaged international organizations. For example, the NRC staff recently met with representatives from the Organisation for Economic Cooperation and Development's Nuclear Energy Agency (OECD/NEA) to discuss how the international community can help advance innovation in the nuclear industry with concepts such as ATF.

The NRC is committed to maintaining robust partnerships with regulatory counterparts worldwide. In addition to OECD/NEA, the NRC works with other multinational organizations, such as the International Atomic Energy Agency. The NRC also works bilaterally with regulators in other countries through cooperation and research agreements. These interactions allow the NRC to share best practices on safety- and security-related regulatory matters with representatives from a large number of countries; shape the content and scope of international technical publications; participate in international peer reviews of foreign regulatory programs; and ensure that international standards, recommendations, and guidance are consistent with applicable U.S. laws and regulations. In addition, joint research projects give the NRC access to research facilities not available in the United States. These efforts are critically important as the world becomes more interconnected and interest grows in the use of nuclear technologies. In addition, by statutory mandate, Congress made the NRC the licensing authority for proposed exports and imports of commercial nuclear equipment and materials; the NRC's export- and import-licensing regulations are found in 10 CFR Part 110. Thus, the NRC has a range of responsibilities involving international activities, including both cooperative and licensing responsibilities.

Closing

In closing, the NRC continues to focus on efforts to be a more transparent, effective, and efficient regulator while achieving our important safety and security mission. Chairman Upton, Ranking Member Rush, and distinguished Members of the Subcommittee, this concludes my written testimony. I thank you for the opportunity to appear before you. Thank you also for your support of the vital mission of the NRC. I would be pleased to respond to your questions. Thank you.

Mr. UPTON. Thank you all for your testimony. And I know you made a very strong case for maintaining the U.S. leadership position, not only here—obviously—in the United States, but also worldwide in so many different ways.

I have to say that many of us, just about all of us here support an all-of-the-above energy strategy, and that includes safe nuclear power, something that we indeed care about. And for a host of reasons we have seen a number of major nuclear gener—electric generators frozen or beginning now to decline as that number is reduced, as a number of different facilities have announced that they are going to be shutting down.

But you also make the point, as the second panel, that our leadership is needed, particularly on defense. I was, I was fortunate to be at the dedication, the christening of the U.S.S. Ford, the new class of aircraft carriers this last year, a nuclear-powered aircraft carrier. Know lots of folks who serve on our nuclear-powered submarines with the obvious reasons why they are efficient. So the need for trained personnel in the nuclear engineering field is enormous here in the U.S., but worldwide.

And as the number of major facilities, electric generating facilities are frozen or beginning to decline, I think many of us are looking at the prospects of smaller generators, smaller units to be approved. This has been in the mix for some time, a number of years. And I would guess that probably, Mr. McGinnis and Mr. McCree, you are probably the—where exactly are we in terms of seeing some of those promising designs be approved? And what is your guess as to the timeline, if it is approved, that we would actually begin to see these smaller generating units actually be brought into the commercial sector to serve the Nation? Mr. McGinnis?

Mr. MCGINNIS. Thank you for the question, Mr. Chairman. And I certainly defer to my colleague Mr. McCree to add.

But right now I agree, we are in an extremely challenging moment in time. Many in the industry and in my office's view actually see our Nation at an inflection point with regards to the, to the future of our nuclear fleet. In fact, I would say we are at a tipping point.

Our ability to bring in new reactors in the pipeline is key. We have an historic number of premature shutdowns of plants that many would not have ever predicted 4 or 5 years ago, fully amortized assets, multibillion-dollar low operating and management costs, yet we are seeing that today in some of the districts of Members here today.

So it is a great challenge. We have a pipeline that once had about 27 units back in 2007 092008, working its way through the NRC. We have a grand total of one construction and operation license going through with Florida Power and Light. And we have one advanced SMR design. That advanced SMR design, as we mentioned, is NuScale. I think it is potentially significantly game changing. There are a number of other U.S. small modular and other advanced designs.

Frankly, I would say the United States is still unequivocally the leader in the design development of advanced reactors, bar none. We are challenged in the deployment, that is for sure. But with re-

gards to the advanced reactors, we are leading. And it is an exciting time to figure it out.

The NuScale design reflecting the strong support and investment, frankly, from Congress. Almost $200 million we have invested in technically partnering with NuScale. It has the promise of being the first advanced SMR reactor entering the fleet in our country. 2026 is the timeline for Idaho National Lab. And UAMPS is the municipal utility looking at it.

And great compliments to the NRC, they are in fact, as the chairman mentioned, really conducting an historic review of our Nation's first advanced reactor.

A couple of things that this NuScale reactor brings in my view is game changing: one is financeability. As opposed to an $8 billion unit for a gigawatt larger before financing, you are looking at a unit that may cost only about a billion to a billion-and-a-half to put that base plant, with 350 to 450 million per unit adding to it, allowing the utility to take bites at a time.

Mr. UPTON. I know my time has expired. But, Mr. McCree, do you just want to comment, do you verify what Mr. McGinnis has said in terms of the timeline that we may be on?

Mr. MCCREE. Yes, Chairman. Thank you for the question.

With regard to the timeline, as I alluded to in my testimony, we docketed the NuScale application in March of last year and informed them of a 42-month review schedule, which if continued to move at the pace that they are moving, would support a final safety evaluation for design certification in September of 2020.

The review is proceeding on schedule. We are 70 percent through the Phase 1 of a 6-phase review. And we are working very closely with the applicant NuScale to address the issues that have been revealed thus far.

Mr. UPTON. Thank you.

Mr. Rush.

Mr. RUSH. I certainly want to thank you, Mr. Chairman.

Mr. Atkins, in the April 2017 report from the GAO, the GAO concluded that the estimates provided by the NNSA of the funding necessary to carry out the NRC's modernization agenda sometimes, sometimes exceeded the President's budget proposal by millions of dollars. GAO also found that the cost of some major modernization programs, including nuclear weapon refurbishment, could also be severely underestimated.

One recommendation that the GAO made was for the NNSA to include a cost-benefit analysis of its modernization program in future versions of its annual plan on stockpile stewardship.

What position does the NNSA take on both the problems identified by GAO and the recommended solutions? Are you confident that the agency can respectfully perform its duties with its current level of funding?

Mr. ATKINS. Thank you for your question, sir.

The department and the NNSA recognizes that it is of vital importance to recapitalize and modernize our aging infrastructure. This is something that NNSA is very committed to. And it is true, over time the resources have not kept pace with the need for modernization that we have seen to ensure the facilities that are nec-

essary to maintain, a safe, reliable, and effective stockpile are maintained.

We have increased our budget request since 2015 to work on the backlog of deferred maintenance. And in '16 and '17 we were able to actually stop the increase in deferred maintenance. So it is something that we continue to work on and we will continue to endeavor to improve.

As far as the GAO's recommendation, we take all of the recommendations that the GAO has provided very seriously. And there is a commitment to incorporate a cost-benefit into that, into that, sir.

Mr. RUSH. Mr. Owendoff, they say the 2017 GAO study also found that DOE has charges in addressing its environmental oversight and the amount of funding needed to invest all of its cleanup responsibility. Specifically GAO noted that the cost estimate for DOE's proposal for separate defense and commercial nuclear waste repositories excluded the cost and timeframe for site selection and site characterization. This omission could cost the agency millions more than the DOE-reported environmental liabilities.

Has DOE implemented any of the 28 recommendations that GAO proposed in order to reduce the long-term costs, as well as the environmental risks more quickly?

Secondly, what is the timeline for enacting all of these recommendations so that the taxpayers' dollars are being utilized more efficiently?

Mr. OWENDOFF. Thank you for the question, Mr. Rush. Certainly, as I mentioned, over half of our budget goes towards maintaining a safe condition with the radioactive material, special nuclear materials at our facilities. So with the balance of the funds we utilize those in the highest risk areas. As I mentioned, that principally is radioactive liquid waste and spent fuel, to put in place facilities that can, in the case of tank waste, bring that into glass, vitrified in glass. We think we have been very successful in that program.

Certainly there are going to be first of a kind, one of a kind challenges that we have that are not faced, certainly, in the commercial industry or that we have to build. One of those is a waste treatment plant at Hanford. That has been a challenge for us. But I think on the flip side, if you look at our closure and cleanup of Rocky Flats, we did that within the money that we estimated. You can go to Rocky Flats now and it's preserved that you can walk across.

This is a challenging business, sir. And we take it seriously. And we are working each and every day at how we can be more cost effective.

Mr. RUSH. I yield back, Mr. Chairman.

Mr. UPTON. The gentleman's time has expired. The Chair recognizes the chairman of the full committee Mr. Walden.

Mr. WALDEN. I thank the gentleman. And, again, thank you all for your assistance in our efforts on these issues.

Mr. McCree, as I mentioned in my opening statement, and as we have discussed a bit before the committee, the NRC's recently determining that NuScale's design for a small modular reactor would not need what is known as a Class 1E power requirements for off-

site electricity. This class of power is a regulatory standard set for design of safety-related nuclear power plant electricity systems.

What's the impact of this determination with respect to potential changes for regulatory and licensing requirements?

Mr. MCCREE. Thank you, Congressman, for the question.

What this reflects is our focus on design functionality, the functionality of the design that will be later demonstrated and validated by the applicant and/or the COL, as opposed to greater design detail. It's a philosophical but substantive change that I believe will contribute to more efficient but just as effective reviews in this important area.

Mr. WALDEN. So if this goes all the way through the process and is approved, what will this actually mean for the power sector?

Mr. MCCREE. Well, I would defer to my colleague from the DOE. Our focus, of course, as the independent safety regulators——

Mr. WALDEN. Right.

Mr. MCCREE [continuing]. Our role is to assure that this application is safe and that it can be certified and later built if there was a utility that wants to do that. But, again, I would defer to my colleague from the DOE.

Mr. WALDEN. Would you like to respond to that?

Mr. MCGINNIS. Thank you very much. Yes, I would.

It would mean a tremendous amount. We don't use the word "game changer" lightly. The wall that has faced utilities in the form of financing, up front capital, cannot be overstated. Notwithstanding the other game changing aspects of small modular reactors such as NuScale, we are talking about highly flexible, 12 different 15 megawatt electric units, all of which is designed to be operated at different levels.

So you are offering great opportunity, flexibility for a utility to have it serve as load following, to have it serve, pair it up with other hybrid sources of generation. And also from a financing perspective, as I said, not having to put $8 billion up front and not have any generation from that for many, many years, they are only putting down a small subset.

I think what the implication is is potentially dramatically opening up the market, a market that would never really be materialized with large reactors, as valuable as large reactors still are. We just simply have utilities that don't have the financial wherewithal and also are very, I would say very excited about the design attributes.

Mr. WALDEN. And when you talk about this, can you give me a perspective that relates to integrating renewables onto the grid using this type of nuclear power? Does that give you more flexibility because of the modular nature?

Mr. MCGINNIS. Indeed. The flexibility is exactly why we are now looking and doing R&D on hybrid generation where we are looking at—in fact you will hear from Dr. Peters I would think with regards to Idaho. That is where we are doing cutting edge work. We are literally looking at pairing an advanced small modular reactor with the wind turbine, with the solar plant. The benefits of both are, can be very significant.

Mr. WALDEN. And can they ramp up and ramp down——

Mr. MCGINNIS. Yes.

Mr. WALDEN [continuing]. Like, say, a gas turbine plant does?

Mr. MCGINNIS. Right.

Mr. WALDEN. You would be able to do that with nuclear?

Mr. MCGINNIS. Indeed. Not only do you have, one reason why is you have 12 different units. And the intent, the design of course is going through the NRC now for validation——

Mr. WALDEN. Right.

Mr. MCGINNIS [continuing]. From a safety perspective, but the intent is to offer the operator significant versatility in having different load following or power generation throughout the day. And so that can be—that is a power combination with intermittence and bringing in the emissions-free baseload generation. It is quite exciting in my view.

Mr. WALDEN. Which is what this would be, emissions-free——

Mr. MCGINNIS. Yes.

Mr. WALDEN [continuing]. Nuclear?

Mr. MCGINNIS. Indeed. Absolutely.

Mr. WALDEN. I will restrain myself. But this committee has voted 49 to 4 to also resolve the long-term nuclear waste storage issue. And the extent to which those who seek to move forward with additional nuclear power can assist our committee in its efforts to get this to the President's desk, we would be most appreciative.

With that, I would yield back, Mr. Chairman.

Mr. UPTON. The gentleman yields back.

The Chair would note that votes on the House floor are taking place. The second bells have rung. We have got at least three votes here that are queued up. So, we are going to go vote. It probably will be at least a half hour, and we will resume with questioning on the Democratic side.

With that, we stand in recess.

[Recess.]

Mr. UPTON. We will resume. Sorry for the delay, but we had a number of votes on the floor. And we will resume with Mr. McNerney from California for 5 minutes. The gentleman is recognized.

Mr. MCNERNEY. I thank the Chair. I rushed over here with my friend Mr. Shimkus to make sure I didn't hold up the hearing any today.

Mr. McGinnis, you had a lot of interesting topics that you kind of went over. One of them was accident resistant fuels. Can you kind of describe what that is?

Mr. MCGINNIS. Thank you for that question. Indeed, accident tolerant fuels is, really represents a class of advanced fuels that are being developed. There are three commercially led designs that are being where we are technically partnering with these three consortia. We selected them through a competitive process. And it includes one led by GE, one led by Westinghouse, and one led by what was known as AREVA.

These three designs are being developed to be able to go in the current fleet of reactors and brings increased safety and economic benefits. Potentially there is great promise. Utilities are very interested in it. In fact, we are going to see a major milestone this year. We are going to see the first test pins, and also relatedly, test assemblies going into a U.S. operating reactor to begin testing this new fuel.

There are three different types, but essentially all three offer improved cladding that can have greater heat tolerance, and also improvement in economics.

So, those are moving forward. By end of 2019 we expect all three of these designs to have their initial test pins operating in reactors. We are looking at about 2025, hopefully even sooner, to have the first official fuel reloads going in if things get proven out to go into fleet. So these are, frankly, seen as game changers by many of the utility operators and owners of the, of the nuclear reactor fleet.

Mr. MCNERNEY. Well, SMRs are—to change the subject—SMRs are a big talk and maybe game changers, as we have discussed. The load following characteristics sound pretty good. I have a hard time picturing how you are going to get nuclear reactors to follow fast loads, but I will wait to be shown that. I will remain skeptical.

And we talked about an SMR design being approved by the NRC. What about SMRs overseas, what are the—what is happening overseas? Mr. Atkins, you are probably the right one to answer that question.

Mr. ATKINS. Pardon me. Thank you for your question, but actually I believe this is probably——

Mr. MCNERNEY. OK.

Mr. ATKINS [continuing]. More of a question for Mr. McGinnis.

Mr. MCGINNIS. Thank you again. In the past, for the past 11 years, until recently being put in this position, I led the international nuclear work for the Department of Energy, which included advocacy for our U.S. nuclear exporters. And I can tell you firsthand, there are numerous countries, nuclear markets around the world that are watching very closely the progress of these U.S. SMR designs.

And they are highly interested in these SMR designs, in particular the U.S. SMR designs, as indicated. We really are the leaders, bar none, in the design development. So one thing that would happen is you would—if we prove out the advanced SMRs in the U.S., this could open up an entire market globally for countries whose grids are just too small for a gigawatt or larger, but don't have the capital to be able to finance.

Mr. MCNERNEY. So would we be producing them and selling them, or would other countries take over our designs and produce them and sell them in our place?

Mr. MCGINNIS. Ultimately, if a company has non-Government money in it, non-Federal dollars, it is going to be their call. Obviously, with tech transfer and other nonproliferation and NRC oversight for any exports. But I can tell you that when it comes to, in the Department of Energy, Office of Nuclear Energy, dollars that are put towards technically partnering, developing IP, joint development of an SMR, for example, we are definitely going to have a say in our cooperative agreements. And we are going to, frankly, insist that we see these, these reactors serve as an export product, not just migrating overseas.

I can tell you that for NuScale, for example, it is intended to be factory produced. And the intent is absolutely to produce them in the United States. And they have already done a study that looked at the supply chain which essentially, in my view, validated the

ability to be able to produce all the major components in the United States then export.

Mr. MCNERNEY. I was going to ask Mr. Owendoff about nuclear waste. But I think I am going to have to let Mr. Shimkus take that one.

Thank you. I yield back.

Mr. UPTON. It is teed up. Mr. Olson.

Mr. OLSON. I thank the Chair.

And welcome to our four witnesses. I am sorry for the vote cycle between your first appearance and second one.

Nuclear power is very big back home in Texas 22. The South Texas Project Plant is about 100 miles south of my district, based in Texas. Opened in 1979. Been up and running now for almost close to 40 years.

Hurricane Harvey direct hit on that reactor, those, those two reactors. Not one hiccup. Power flowing, nothing whatsoever happened because that Hurricane hit it dead on. That is impressive. That is why I will thank you for that.

My questions for you, Mr. Atkins and Mr. McGinnis, by law any nuclear material that is used for atomic energy must be mined and enriched here in America. And while current projection indicates that this is not a problem in the future, the declining uranium industry and mining could make this a problem down the road.

How are DOE and NNSA considering these long-term material needs given the short-term outlook for domestic nuclear fuel?

Mr. McGinnis, Mr. Atkins, who wants to start off?

Mr. ATKINS. Well, I can certainly address that question as it relates to the use of uranium for the national defense mission. And that is, that is all uranium needs to be U.S. flagged, as well as produced with only U.S. origin technology. So, we cannot use uranium that has been processed with foreign technology for our weapons program.

Mr. OLSON. Mr. McGinnis.

Mr. MCGINNIS. Thank you again. I would like to just reinforce that the nuclear energy sector in this country is seen by this administration as a national security issue. These are—the role of nuclear energy plays a key role in our Nation's energy security and broader.

I would say that clearly extends to the health and viability of our Nation's nuclear fuel supply sector. And that certainly extends to the uranium mining sector. We want to do everything we can to support a market that provides the opportunities for the uranium miners in the United States to prosper and compete, particularly against state-owned enterprises that are coming in, whether it is Kazakhstan or others.

It is a highly competitive market. And as you likely well know, our Nation's American-owned uranium mining sector is in a very, very challenging moment.

Mr. OLSON. Yes, sir. You read my mind, too, sir. As you mentioned, President Trump put out the National Security Strategy of the United States of America. He issued that in December of this past year. And it states, and I quote, "The United States will promote policies and incentives that return the key national security industries to American shores."

And at the same time, the United States can no longer build a nuclear reactor using only U.S.-made parts and U.S.-owned technology which, as you mentioned, is required by law. Is it critical, to the whole panel, we make our technology and equipment here in America with American ownership? And how should we view a "global" marketplace?

Mr. McGinnis, first shot.

Mr. MCGINNIS. First I want to say that the White House is conducting a nuclear policy review per the direction of the President, and certainly is looking at the full breadth or our Nation's nuclear energy sector, again, for the purpose of revitalizing and expanding our nuclear sector, and that includes the fuel supply.

I can tell you that in my view, not just the national security side, from an energy security side I think it is very important that we have a healthy, robust U.S. nuclear supply sector. And in the export market it is particularly important that our leading companies that sell reactors and other services overseas they are, that they are in a position to be able to partner with U.S. nuclear fuel suppliers to pair with the reactors.

Mr. OLSON. The disaster in India, we built the reactor and went to—I see you are kind of shaking your head down there. Mr. Atkins, your comments about a global nuclear marketplace?

Mr. ATKINS. Well, I think it certainly is important fo the defense mission that there is a strong and competitive domestic nuclear industry. There are clearly benefits on both sides. For the defense material, it really needs to come as a solution for our additional needs for uranium, really needs to come from the Government programs.

We are, as I have mentioned, we are pursuing a domestic enrichment capability that will meet our needs for tritium production by the tritium need date of 2038 to 2041. That is a high priority for the department. But we are also looking at how that capability can also serve other needs, including commercial needs, such as needs for ISA uranium for research reaction, research reactors and medical isotope production, as well as a future need into the 2040s for HEU for naval propulsion.

Mr. OLSON. Thank you, sir.

I saw the chairman has his finger on the trigger there to shut me off. So, Mr. Owendoff and Mr. McCree, please answer that question for the record.

And, Mr. Chairman, I yield back by saying everybody in this room should know it has been 98 days since my Houston Astros have become the world champions. With all due respect to Mr. Doyle, that is 96 days more than your Eagles have been champions.

So I yield back.

Mr. DOYLE. I am not an Eagles fan. I am a Pittsburgh Steelers fan. Let us get that straight.

Mr. UPTON. Mr. Green.

Mr. GREEN. Thank you, Mr. Chairman. I want to thank you and the ranking member for holding the hearing today.

As Hurricane Harvey hit our districts in South Texas, the South Texas Project and Nuclear Plant based in Bay City was hit, too. Despite how rough the hurricane was, workers weathered the

storm at the controls and kept the lights on for over two million people in the Houston area.

Workers at the plant managed to convince a local grocery store manager to open up to replenish supplies, and ran to Walmart to buy $2,000 worth of underwear, clean socks, and other essentials for plant workers who could not get back to their flooded homes, and worked in rotational shifts throughout the multi-day storm. I have no doubt that the loss of the power would have occurred without this, and would have led to even a more tragic loss of life and destruction in the storm's path.

Nuclear also often gets a bad rap, especially when it comes to natural disasters. South Texas project as recently as 2011 was going to expand to build two new reactors on site. After Fukushima disaster, funding evaporated. And I look forward to talking with our witnesses today about the importance of nuclear energy and what role it is to play in the grid of the future.

Mr. McGinnis, in your testimony you talk about the upcoming civil nuclear review. What are some of the general ideas we can expect to see when it comes to ways to revise and expand nuclear power?

Mr. MCGINNIS. Thank you very much. In multiple ways concurrent and not waiting until a nuclear policy review is completely done, we have a challenging time in our nuclear sector. As indicated, it is at an inflection, if not tipping point. I think to the great compliment of the White House we have been told clearly at the Department of Energy, take actions now as far as ways by which we can support reviving and revitalizing and expanding the nuclear sector.

So, with regards to the current fleet, with regards to South Texas Power Plant, it is a critical, vital asset that we can rely on 24/7, rain, sleet, or snow. So, we are very, very proud of the workers, of the dedication of that nuclear power plant during the most important time to provide power to the residents. Very proud of that.

And that only, in my view, serves to reinforce how important it is with our all-of-the-above strategy that we support a continued vibrant nuclear sector to complement the other generating sources in our electricity grid mix.

Mr. GREEN. Well, and coming from Texas it is, you know, with the natural gas so cheap, and if you just economically look at it, but that power plant provides about 20 percent of the power in our area. And we could always use additional stationary power that would be good for 40 to 50 years.

How close are we seeing small modular reactors as a mainstream possibility? And how could that revolutionize the nuclear industry?

Mr. MCGINNIS. Thank you. Very close, in my view, sir.

As indicated, NuScale represents probably the most mature, from a deployment perspective, of those advanced light water reactor small modular reactors. That is one reason why we have invested in a technical partnership with them.

2026 is, again, an important target date. As indicated in my testimony, in my remarks, we are facing, in my view, a cliff sooner than we thought with regards to the, the drop in our fleet of reactors at 20 percent. And we are facing now a very possibility, real possibility of having a dramatic reduction from 20 percent dramati-

cally down by the end of the 2020s. So it is very important that we see these new advanced SMRs coming in the pipeline and coming into market by the late 2020s. 2026 is the right time.

I want to also mention microreactors. Those have tremendous promise. They are smaller generation, 2 to even as high as 30 megawatts electric, but they are very exciting, very promising. And there are, in fact, a couple of them; one in particular that we are communicating with that has plans of potentially deploying its first microreactor by 2021 or 2022 in the United States.

Mr. GREEN. OK. Can you talk, can you talk a little bit about the non-LWR technologies are different from typical reactors? And how is the application process different for these reactors?

Mr. MCGINNIS. Yes, indeed. We are actually funding, partnering with a number of nonlight water advanced reactor companies in the United States that are really leading the world in advanced technologies. The applications go well beyond electricity generation.

We are talking about gas-cooled high-temperature reactors that offer applications for petrochemical, for hydrogen production, and other hybrid generation. We have other designs such as molten salt. We have TerraPower with Southern developed. TerraPower is a company partly owned by Bill Gates. They are working on a molten salt design that has very promising nonelectric application. Certainly sodium-cooled fast reactors, we have deep experience in that.

So, essentially those are game changing. Once they—and hopefully they do get proven out, and then suddenly we will have a much broader opportunity to apply the nuclear reactors to nonelectric applications.

Mr. GREEN. I yield back what time I don't have.

Mr. OLSON [presiding]. The gentleman yields back. The Chair now calls upon the heartbeat of Ennis, Texas, the vice chairman of the full committee, Mr. Barton, for 5 minutes.

Mr. BARTON. I am sure that some people in Ennis would dispute that. But I appreciate it.

Anyway, I am not sure who to ask these questions to because I am going to go a little bit off the purpose of the hearing. Mr. McGinnis, or Deputy Principal Secretary McGinnis, I guess is the highest ranker. So I am going to go with you. But if the others think it is your question, feel free to step in.

Secretary McGinnis, can you tell me how many dollars ratepayers have paid into the high-level nuclear waste disposal fund since its inception?

Mr. MCGINNIS. I want to give you the exact number, so I have to get back with you on that. But certainly it is very substantial. And the Nuclear Waste Fund is in the, I believe, $30 billion range, but that includes interest.

Mr. BARTON. My number is $35 billion. But $30 billion is a big number. So that is good.

Can you tell us how many of those dollars have actually been spent for high-level nuclear waste disposal? Again, I don't need the exact number, just a general number.

Mr. MCGINNIS. I will definitely have to get back with you because I don't want to give an inaccurate number. I can tell you that

the Office of Nuclear Energy right now has a very, very minimal number, in the single digits in millions, maybe.

Mr. BARTON. Yes, it is not 35. It is well below 30 to 35 billion. No matter how you do the accounting, it is a small number.

Mr. MCGINNIS. Yes.

Mr. BARTON. You could even say zero and it wouldn't be too far off the mark.

Is the department aware that this subcommittee and the full committee passed a bill to break the impasse on that? And it passed the full committee 49 to 4, and it would allow for interim storage. It would allow for spending for a permanent waste depository. It would allow for the licensing process to go forward for a yes or no answer at Yucca Mountain.

That bill has not been scheduled for floor time yet. And it hasn't gone to the floor because the appropriators have, in their infinite wisdom, spent the $35 billion that was deposited in the Waste Fund, for other purposes. And that may or may not have been a good thing to do at the time. But the fact remains that the bill that passed out of this committee is a long-term permanent solution, bipartisan. And we are now at an impasse with the appropriators because they claim they don't have any money to fund high-level waste disposal, and don't want to agree to a long-term funding profile.

Is the department aware of that problem?

Mr. MCGINNIS. We are aware of the legislation. And I would like to, respectfully, just emphasize that we submitted $120 million not only to resume the license application, but also for the initiation of a robust interim storage program.

Mr. BARTON. Well, you know, the expert on this particular issue is Congressman Shimkus on our side. So but I want to ask could you use your good offices to encourage the department, the Trump administration to help come up with a solution on funding on a long-term basis so we can get this bill to the floor and then to the other body, the other body being the Senate.

I have been here since '85. I was in the department in 1982 when the High Level Nuclear Waste Disposal Act was passed. And I would like to still be in Congress when we actually fund it. And as your current Secretary said famously back in Texas, let's get on down the road.

So, can you encourage the department and the Trump administration to help us find a solution to this funding issue, please?

Mr. MCGINNIS. I and my colleague at the Department of Energy will do our very best. And also as the Secretary said, it is very important that we stop kicking the can down the road.

Mr. BARTON. All right, thank you. And with that, I yield back, Mr. Chairman.

Mr. OLSON. The gentleman yields back.

The Chair now calls upon a fan of Terry Bradshaw, not Ron Jaworski, Mr. Doyle, for 5 minutes.

Mr. DOYLE. Thank you, Mr. Chairman.

It is clear to me that the nuclear energy industry is critical to our country. It provides us reliable baseload power with no carbon emissions. It provides thousands of good jobs around the country. And it's a vital component of our national security.

And I share the opinion of many analysts and energy experts who believe that we can't lose this source of energy if we have any hope of meeting our Paris emission targets. It is clear that we need to do more to bolster this ailing industry, so I am glad we are having this hearing today. And that would include holding a formal hearing on H.R. 1320, which I worked on with Representative Kinzinger. And I would like to thank him for his leadership on this issue. And I hope this committee can hold a legislative hearing on it soon.

Mr. Atkins, I want to ask you about the 123 Agreements. Your testimony highlights the role that your agency has in these agreements. And given the existing market issues for nuclear power here domestically, it seems like international markets will be critical for maintaining a strong nuclear industry in the United States.

I just want to know, do you feel that there is adequate cooperation and communication between the range of Federal agencies required to draft these types of agreements?

Mr. ATKINS. Thank you for that question. You know, we, our position is that the U.S. still has the best technology available. And we want to facilitate access to global markets. We do work very closely with the Department of State and other agencies that are involved with 1—the negotiation of 123 Agreements. And we believe that this relationship is very productive.

We most recently have negotiated, finished negotiations with Mexico in 2016. And that agreement is currently in the White House for final review.

And we are in the process of negotiating with the United Kingdom, too, on a new 123 Agreement for peaceful nuclear cooperation with them that would replace the existing agreement as they pull out of the European atomic energy community.

So there is a lot going on in this space. And we, we do invest quite a bit of time and effort. And we are confident that we have the right team to push this forward.

Mr. DOYLE. Yes. And just following up, many of these 123 Agreements and standards were drafted at a time of American dominance in the nuclear sector. And as you know now, the field has many more international players. How does NNSA view these developments in consideration with the existing 123 Agreement process?

Mr. ATKINS. I think we, we continue to be committed to, to see, you know, these 123 Agreements go forward with the, the best nonproliferation standards that are possible. But I think that there is an attitude of realism, and that we, we have to balance the importance of ensuring that our industry is able to compete and not withheld from these markets.

So, so there is certainly consideration given to changes in the environment, and we adjust our policy accordingly.

Mr. DOYLE. Thank you.

Mr. McCree, the current NRC funding structure requires fee payments from existing or operational plants that make up about 90 percent of the NRC budget. With the dramatic increase of premature retirements, are you concerned about the sustainability of this existing structure for your agency's budget?

Mr. MCCREE. So, thanks for the question. As I indicated in my testimony, we are committed to ensuring that our fees are, and our fee process is clear; that the fees are fair; and that the process is transparent. And to that end, regarding potential shutdowns of operating nuclear power plants, one of the first things that we do is adjust our budget as the plant goes into decommissioning to reflect the lower amount of work that we anticipate as a plant goes from an operating status into a decommissioning environment.

That is essential and that helps to minimize the burden, if you would, of the costs that would convey to the rest of the industry.

We are also engaging in additional activities, again from a fee fairness standpoint, that I believe would give additional balance in the area. So, we are interested of course in, again, making sure that there is clarity, and fairness, and transparency. I wouldn't characterize it as a concern.

Mr. DOYLE. Mr. McGinnis, I was encouraged to read your strong support for the nuclear industry. As you explain in your testimony, it provides 60 percent of the Nation's emissions-free electricity. However, when you look at the fiscal year 2018 budget request we received, it features a $283 million cut from fiscal year 2016 levels. The request went from just under a billion down to 730 million.

So, while I appreciate the emphasis the department has placed on early stage R&D, and your openness to advanced nuclear, your testimony and the budget request seem contradictory. Should we anticipate a revised request in this year's budget request?

Mr. MCGINNIS. Thank you very much. It would be premature to speak about the request. That is going to be rolled out next week. Hopefully, you will see some positive aspects of that in our budget request.

But having worked in the Office of Nuclear Energy for 11 years, I can say one thing emphatically, and that is there have been many, many bright, capable leaders in the Office of Nuclear Energy and industry that have attempted to support the nuclear sector in a manner that is going to change from this downward trajectory, this tipping point, back to an upward growth.

And, frankly, we have not succeeded. We are witnessing an historic downward trend right now. Whatever we are doing, it is not enough.

So I would just like to respectfully say what I have done in my office is taken that to heart and asked ourselves not just a function of additional funds, but what are the things we are missing? What are the things that we can be doing, at least on the Federal side?

We can make our facilities, Idaho National Lab, advanced test facilities that companies could never hope to pay for and build themselves, make it more user friendly. We have another approach where we are—we have a funding opportunity announcement with industry. We have already announced it. And we are getting strong responses.

The intent for that is to get away from the Federal Government or DOE, Office of Nuclear Energy, trying to pre-judge what the most important space for the Department of Energy to be in in partnering with the nuclear companies, and let them propose to us where the specific highest impact areas are.

So I am excited about some things that we are doing that are even beyond just the function of the actual level of budget, which I think is necessary. We need a robust budget.

Mr. DOYLE. I see our chairman has been hitting his gavel for quite some time. So I thank you, Mr. Chairman.

Mr. MCGINNIS. Thank you.

Mr. DOYLE. I yield back.

Mr. OLSON. The gentleman yields back. The Chair now calls upon the chairman of the Environment Subcommittee, Mr. Shimkus, for 5 minutes.

Mr. SHIMKUS. Thank you, Mr. Chairman. I appreciate Joe Barton's comments, so I am going to get—I want to prove that I am not a Johnny One Note on closing the nuclear fuel cycle and I'm going to go with some different areas.

Ostendorff for sure will appreciate this from a simple infantryman. So we mine uranium, we process it into yellow cake, we convert it into UF6. That is what happens, and we would like for it to be happening in Metropolis, Illinois. We enrich it to U–235. And then we use it for fuel, civilian reactor fuel. We use it for our Navy fleet. And we use it for our weapons.

So my question goes on the bartering process which kind of undercuts this process and I believe really hurts the chain, the fuel chain development, and threatens it at the most. So, Mr. Owendoff, what is the administration doing to help move funding for its important cleanup missions to be fully appropriated by Congress?

Mr. OWENDOFF. Sir, thank you for the question. Certainly barter has been an important part of the cleanup at the Portsmouth site. Last year, in May of 2017, the Secretary reduced the amount that we would barter from 1,600 metric tons a year to 1,200 metric tons a year. He is ——

Mr. SHIMKUS. So let me just go. Is the administration doing anything to move this to an appropriations process to help fund these cleanups versus its bartering process? That is the basic question.

Mr. OWENDOFF. Sure. We did that last year, sir, in 2017.

Mr. SHIMKUS. Well, you are diminishing it.

Mr. OWENDOFF. Yes, sir.

Mr. SHIMKUS. The question is are you moving it, are you asking to move it to an appropriations process away from a bartering process?

Mr. OWENDOFF. I believe that we have, we have done that. It is——

Mr. SHIMKUS. Why don't you just come and talk to me about the issue.

Mr. OWENDOFF. Yes, sir.

Mr. SHIMKUS. Obviously it is important.

Mr. OWENDOFF. Sure.

Mr. SHIMKUS. Mr. McGinnis, can you provide an update on the status of DOE's revision of its uranium management plan?

Mr. MCGINNIS. Yes, indeed. In fact, we are towards the tail end of revising the uranium management plan. And we intend to then put it out into the Federal Register notice for public input.

And, again, one of the things that I worked in my early years in the Office of Nuclear Energy was the initial development of the uranium management plan back in 2008 or so. I believe it has been

very valuable in showing transparency and the full sweep of nuclear transfers that the Department of Energy is engaged in.

Mr. SHIMKUS. Let me follow up on a comment you made about a concern about possible state actors undercutting our production in the future. We have got this administrative review going on to figure out what happened in December with the suspension of the agreement on uranium from the Russian Federation. There are many of us who are concerned that, just like any trade issue, if it is unfair trade, if it is subsidized by a government entity might be good for lower prices but not good for the U.S. manufacturing sector. And that is what we are talking about, manufacturing fuel for this.

Can you, will you provide an update on the expected timing of this review and DOE's role as part, your role in this process?

Mr. MCGINNIS. Thank you very much. The Department of Commerce is the lead for the Suspension Agreement and the oversight and enforcement of that agreement. There is a second action that was recently submitted to Department of Commerce by the Uranium Miners' Assoc—or uranium miners who are petitioning a separate but ultimately possibly related issue from a sector issue.

We work very closely with the Department of Commerce. In fact, we met with them yesterday on these very issues. So they look to the Department of Energy as experts to provide important——

Mr. SHIMKUS. OK, let me—and I don't—just because of time, we will talk with the Department of Commerce and follow up on that.

Mr. Atkins, does the NNSA have any issues involved in this discussion with Department of Commerce on this agreement and the review?

Mr. ATKINS. We, given that the Department of Commerce has the lead, we certainly are working closely with them to ensure that the national security interests are represented in the investigation, certainly.

Mr. SHIMKUS. What does that mean in English?

Mr. ATKINS. It means we are working with the Department of Commerce. They are in the lead on considering the petition, and we are representing what are the implications for the national security issue.

Mr. SHIMKUS. Let me finish with Mr. McGinnis.

I have also been involved with Eastern European issues. And obviously NUCON Power being built, and the Russians building. And we are not building. What happens to our lead if other countries aren't looking for us to help build nuclear power plants?

Mr. MCGINNIS. Thank you for the question. A lot happens, both in the export and also the national security space. In my view—and I will defer to Mr. Atkins to elaborate—but again, as having led the international export support for nuclear energy for 11 years, I have worked very closely with the Russian exporters, with the Chinese exporters, and others. And when they win these reactor deals, there is no U.S. content in these reactors, period.

So, the contracts that are written that directly, most determinatively lay out an agreement on the control of the materials is being determined by that supplier. And it is not American companies in these cases.

Mr. SHIMKUS. Let me help my chairman out. Thank you.

Mr. OLSON. The gentleman yields back. The Chair now calls upon the gentlelady from Florida, Ms. Castro, for 5 minutes—Castor.

Ms. CASTOR. Thank you, Mr. Chairman. Thank you to the witnesses for being here today.

The United States has been the leader for decades in nuclear research and in commercial nuclear power deployment. But I have to tell you that folks on the west coast of Florida view nuclear power and its future with a very skeptical eye. And it stems from the fact a few years ago the legislature passed a utility-backed law for advanced nuclear recovery fees. And one utility commenced to open a new nuclear power plant and also fix one of the older ones.

The fix went awry. And the other plant was never constructed. And yet, the ratepayers were on the hook for almost $3 billion, and not one kilowatt hour of energy was produced. And they are still paying those fees.

So I would like to know, Mr. McGinnis, what, what do you say to them? They, they see very high capital costs. They understand the issue of nuclear waste. They understand the natural gas revolution, the low cost of natural gas, the low cost of demand management, the low cost of clean energy and renewables. I think they understand the importance of a diverse energy portfolio and to have carbon-free energy sources.

But net/net, boy, this has not been a good deal for folks in my neck of the woods. What do you say to them about the future of nuclear power?

Mr. MCGINNIS. Thank you very much. Respectfully, we have 99 reactors operating around the country, as we know; nearly 500,000 jobs directly and indirectly support that very important, high-paying industry. We do see a very, very important role of nuclear.

With regards to specific commercial projects in specific States, ultimately these are issues that are determined and driven largely by the companies, by the regulators, by the States. And we respect that. Certainly we want to see healthy, viable plants, construction start and see-through, and return that investment to the ratepayers. That is what we want to do.

But to the extent to which the Department of Energy can play a role, we are working in our wheelhouse, which is research and development, and we are working with companies, utilities or for the purpose of developing technologies that can support better economics, more efficiency, with strong safety. We are doing our best in our arena. And we certainly want to see healthy, successful nuclear projects, just like the all-of-the-above with other energy projects in this country.

Ms. CASTOR. Do any of the other witnesses have a comment and what you would say to ratepayers that, you know, trying to convince them that, yes, this is important for the United States Congress to prioritize nuclear energy over other investments?

[No response.]

Ms. CASTOR. OK. Mr. McGinnis, some of the other witnesses in their testimony have said that the Department of Energy, while it is positive that they have $30 million on the street for early stage R&D in the development of small modular reactors, that really the

Department of Energy is interested in this but not truly invested in the future. How do you answer that?

Mr. MCGINNIS. Thank you very much. I think when you hear some of the other witnesses, including the Director of the Idaho National Lab, I think you will hear a compelling reinforcement of how we are not just interested, we are fully invested. We live and breathe the health and viability of our nuclear sector in my office; I can tell you at the laboratories where they are doing work for us.

So we think, and we are doing——

Ms. CASTOR. So the laboratories do an outstanding job. I mean this is probably one of the great points of pride for the United States of America, everything that is happening in the national laboratories. What is going on with commercialization, though, and deployment? I think that is probably the criticism.

Mr. MCGINNIS. Yes. And one of the things we must do is look in the mirror and see our weaknesses, not just our strengths. Our strengths are advanced reactor designs, bar none the most efficient fleet operated in the world; best regulatory body. But what we have to work on is deployment. We have, obviously, gone for decades without building a reactor until we see what is happening in Vogtle.

We have much to look back and see what we can do to improve. We have a lot to work on in the space where we can actually take research and development, make our laboratory capabilities accessible to the utilities, such as advanced tolerant fuel—accident tolerant fuels. That could be a significant impact on the economics.

But what we are trying to do is take our laboratory capabilities, which the—which my office largely significantly funds, and make those capabilities available to industry as they move forward.

Ms. CASTOR. Yield back.

Mr. OLSON. Time has expired. The Chair will now call upon the gentleman from Ohio, Mr. Latta, for 5 minutes.

Mr. LATTA. Thank you very much, Mr. Chairman. And thank you very much for our witnesses for being here. And before I get to my questions I would also like to begin by repeating what the witnesses' comments about the importance of nuclear power.

I have been in support of nuclear power because I believe it is important for our energy mix and our national security. I also believe it is important that we take the entire supply chain, including the communities that support nuclear power plants into account. I want to think about how nuclear power impacts our energy and security.

We must continue to work to ensure that the U.S. remains on the forefront of nuclear innovation, and this has to involve a discussion of our current fleet, as well as the future of nuclear in this country.

And if I can start with you, Mr. McCree. In December, the NRC released a report titled "A Regulatory Review Roadmap for Non-Light Water Reactors," which provided a list of options available for NRC to review both pre-application and formal applications for advanced nuclear technologies. I appreciate NRC's leadership to work through some of the policy challenges associated with licensing of advanced nuclear designs.

Mr. McCree, what do you view as the most critical issues to resolve as part of your regulatory review of nonlight water reactor efforts to provide some certainty to the stakeholders?

Mr. MCCREE. Congressman, thank you for the question. The document that you reference, the Regulatory Review Roadmap, is actually one of the seven items—seven activities, rather, that we explicitly identified in our, as part of our new term strategy to address the three objectives that I mentioned in my opening remarks: optimizing our regulatory infrastructure; our technical infrastructure; and our communications.

It outlines literally a roadmap, an approach from the research and development through the conceptual and preliminary, and then the final stages of design and development for an advanced nonlight water reactor, with an approach that, that is more flexible, that is staged. That is terminology that both the industry, the DOE, and the NRC understand to provide greater predictability, efficiency, transparency on what comes next; when and how to engage the regulator in these advanced nonlight water reactor designs.

That is a key step. There are other important deliverables in the near term, including identifying the design criteria, if you would, the current fleet of plants where most were developed using a general design criteria in our regulations. We need to adapt and identify design criteria that support nonlight water reactor designs.

The DOE developed a document, Principal Design Criteria, and we have used that to create a draft of design criteria for these same reactor designs. So that, and other activities are explicitly identified in our plan as we are moving forward.

Mr. LATTA. When we look at that plan, and with the initiative, what do you think is going to be the most challenging part for the NRC as you move forward?

Mr. MCCREE. Well, again, I am hesitant to identify one that is most challenging. I think all are achievable. And we developed the interfaces with the DOE and with the industry, with the applicants, to work through a full range of issues.

There are policy matters that we will engage the Commission on, one of which already is from the emergency preparedness perspective, we have already issued the regulatory basis for that. There are other issues associated with the siting and with security that need to be engaged, again, from a policy perspective.

Again, all are achievable activities, and we are just applying continued effort to progress on them.

Mr. LATTA. OK. Let me follow up with one other question if I may with you. The NRC under existing statute must recover approximately 90 percent of its fees from licenses. NRC currently bills its licensees or applicants about $263 per hour, which is a high burden on companies seeking to develop new nuclear technologies.

The Advanced Nuclear Technology Development Act, which I authored, authorized limited funding outside of the fee base for the development of certain generic regulatory activity to help facilitate new technologies. And there will be a witness on the second panel today that proposed reforming the fee structure for new reactors.

Has NRC explored reforms to its fee structure to allow more predictability in its fee collection to help assure we nurture the domestic nuclear innovators and with some flexibility along with that?

Mr. MCCREE. So as I indicated in my opening remarks, we are certainly interested in our fees, our fee structure being clear, more transparent and fair. And that would apply to advanced nonlight water reactor vendor applicants as well. So they will benefit from the improvements that we make in this area as well.

Mr. LATTA. Well, thank you very much.

And, Mr. Chairman, my time has expired. I yield back.

Mr. OLSON. The gentleman yields back. The Chair now calls upon the gentleman from the Empire State, Mr. Tonko, for 5 minutes.

Mr. TONKO. Thank you, Mr. Chair. And thank you all for being here.

Mr. Owendoff, you mentioned the Separations Process Research Unit, their cleanup—which is in my district—in your testimony. SPRU demonstrates how difficult, long and, indeed, expensive these cleanups can be. I appreciate the office's attention to the site, but I know there are many of these sites from the 1940s and 1950s around the country that also need funding and remediation.

Similarly, the majority's memo mentioned Congressman Reed's bill on the West Valley Demonstration Project. I support this approach, and hope this is something the committee can more fully consider in the future. But I would also like to stress that this should be done in regular order. I hope the majority might be interested in examining that issue further.

The work being done to research and develop advanced nuclear technologies, such as small modular reactors, is incredibly important. We need new nuclear reactor designs that produce cost-competitive electricity safely. It is critical for making major reductions in greenhouse gas emissions. But this cannot be done without Federal R&D funding. DOE research dollars are at the heart of the United States' global energy competitiveness.

Mr. McGinnis, can you describe, please, the relationship between the DOE, the national labs, and the private sector in developing nuclear energy research priorities?

Mr. MCGINNIS. Thank you very much. The relationship is very strong. We work, obviously we—the majority of our funds that we apply to our research and development go to our national labs, such as Idaho National Lab, Oak Ridge National Lab, and others. We are pushing the envelope, trying to be more innovative.

So we are really putting a value on having all the leaders—industry, even the universities, national labs—coming together and working together to go at some of the technical barriers that are preventing or keeping us back from realizing the new innovative technologies in our market.

We also work very closely, again, with the NRC. They have such a key role. And a lot of the technical issues we are attempting to dispatch will directly, in my view, help and benefit the NRC as they go through these reviews as well.

Mr. TONKO. Thank you. And I mentioned the relationship amongst the agency labs and the private sector. What role have the

labs, the national labs, played in the development of advanced nuclear reactors?

Mr. MCGINNIS. Vital roles. Idaho National Lab is a founder in advanced test react—in advanced reactors. They have, I believe, built over the years 57 or so reactors. And now they are also home to one of our lead test capabilities in the advanced test reactor, and just resuming the transient test reactor, which both of those are unique capabilities for our country.

Mr. TONKO. Thank you.

And our national labs are critical to not only nuclear but all energy innovation. So I would once again urge that the President's budget request reflects this and preserves DOE's energy innovation budget. It is absolutely critical.

I also want to highlight the importance of maintaining a robust, domestic nuclear enterprise from manufacturing, to supply chain, to human infrastructure. Mr. McGinnis or Mr. Atkins, do either of you want to comment on the importance that preserving these capabilities goes to both our national security interests as well as the future of the United States' nuclear energy industry?

Mr. ATKINS. From the nuclear security side of things we clearly see an interplay between the domestic civil side and the national defense side. As has been discussed a number of times, there are fewer and fewer operational nuclear facilities in the United States, and certainly our domestic and our ability to have an effective nuclear security program is really reliant on people that have hands-on experience in the nuclear field. And so, having a vital domestic nuclear industry helps us to provide those opportunities for people that may in fact at some point in their careers come back to the—come to the national defense side.

So, you know, in terms of innovations on both sides, we hope to see some push and pull from this as well. We think that this is a symbiotic relationship that needs to continue.

Mr. TONKO. And Mr. McGinnis.

Mr. MCGINNIS. Thank you very much. The fact is, reality is we have lost a lot of our manufacturing capability. We want to take what we are still world class at, advanced modeling and simulation, additive manufacturing, and other innovative approaches we are seeing in the labs and also in industry, take that and what we are calling leapfrogging. We want to leapfrog back into the leadership of manufacturing.

There are promising areas such as modeling and simulation, additive manufacturing, even 3–D printing. Very exciting. We have facilities in the northeast and others commercially where we are partnering with them.

So I think we have a real impact opportunity in that arena.

Mr. TONKO. Thank you. And with that, Mr. Chair, I yield back.

Mr. OLSON. The gentleman's time has expired. And the Chair calls upon the gentleman from the Commonwealth of Virginia, Mr. Griffith, for 5 minutes.

Mr. GRIFFITH. Thank you very much, Mr. Chairman.

Mr. McCree, some nuclear technology companies are looking to the Canadian or British nuclear regulatory bodies to help advance a regulatory model for advanced reactors. What lessons can be learned from looking at fellow regulatory bodies? And is there a

role for the NRC to partner with those governments to provide a standard roadmap amongst our allied countries?

Mr. MCCREE. Congressman, thank you for your question. Regarding partnerships, as I alluded to at a high level in my opening remarks, we at the NRC have a very robust relationship with our international regulatory counterparts. You mentioned the Canadians, and particularly the Canadian Nuclear Safety Commission is our regulatory counterpart. I am very familiar, actually, with their—with my counterpart there. We serve on several committees together, and have engaged as recently as August. I was in Ottawa engaging in conversation with several other regulators and the Nuclear Energy Agency about cooperation on small modular reactor, in the area of small modular reactors, which I believe can bear fruit.

Of course, there would need to be, as we have concluded, a common, some commonality in the types of reactor designs that are being reviewed respectively for us to have some mutual and synergistic sharing. I see that happening. I know the Commission is, of course, interested in that as well.

With the recent announcement by NuScale of potential pursuit of vendor design review by the Canadians, there is certainly that opportunity perhaps in the near term with NuScale. And, again, I believe it would be synergistic. We won't just learn from them. I would venture to say that there is great opportunity for them to learn from us as well.

Mr. GRIFFITH. I appreciate that. Thank you very much.

Also, when was the last time that the NRC operated with a full complement of Commissioners, do you know?

Mr. MCCREE. Congressman, I have to take that for the record.

Mr. GRIFFITH. No, I understand.

Mr. MCCREE. I believe it is—I wouldn't speculate, but I believe it has been well over a year ago that we had a full Commission.

Mr. GRIFFITH. And it is better if you have a full Commission, isn't it?

Mr. MCCREE. I certainly enjoy the Commission that we have today and have actually served in the agency long enough to have seen the full Commission work very well. And when we were less than a full Commission we were similarly effective. But, again, I believe we would look forward to having a full Commission.

Mr. GRIFFITH. Is there an incentive to have five? I think you are operating currently with three.

Mr. Ostendorff, you served as an NRC Commissioner in varying compositions. Is a full slate of five a little bit better than three? Are five minds better than three?

I won't go to Mr. Ostendorff, put him on the spot this time.

Mr. OSTENDORFF. Let me help you out. I was there as a Commissioner from 2010 to 2016. I think the last time there were five Commissioners there was in 2014.

And I can speak, from a diversity of view and collaboration, we are always better off with five Commissioners than three.

Mr. GRIFFITH. I appreciate that. Thank you. I do appreciate that as well.

Now, I will shift down with what little time I have remaining to Mr. McGinnis. You talked earlier in some of the questions to—that

Mr. Shimkus asked, we talked about the impacts of having to import our uranium, et cetera. What is DOE doing? I got all that you are working with the Commerce Department. What is DOE doing with trying to make sure that we make mining of uranium in the United States safe?

Because just outside of my district there is a big rock of uranium that the State of Virginia has been hesitant, for safety reasons, to allow the mining of. So what are we doing from DOE's perspective to make that better?

Mr. MCGINNIS. Thank you very much. The Office of Nuclear Energy at the Department of Energy really does focus on research development within the fuel cycle. It does include front-end extraction issues.

With regards to regulatory oversight, that would be beyond my office. Always stand ready to provide input, but certainly those are, those are issues, responsibilities that fall under other agencies and other programs.

Certainly can take that for the record and get you more information, if you would like.

Mr. GRIFFITH. I would appreciate that very much. I think the folks over in Pennsylvania County would appreciate it, too, because there is a big asset sitting there that rightfully they are concerned about mining. But at the same time, it is estimate 7 to 8 years ago was it is a $12 billion rock sitting there. Might be nice to get to it.

I yield back, Mr. Chairman.

Mr. OLSON. The gentleman yields back. The Chair reminds all Members there is no panel jumping.

The Chair now calls——

Mr. GRIFFITH. In all fairness, Mr. Chairman, that was my fault. I can't blame that on them.

Mr. OLSON. The Chair now calls upon the gentleman from Ohio, Mr. Johnson, for 5 minutes.

Mr. JOHNSON. Thank you, Mr. Chairman, I appreciate it.

You know, I have been drafting legislation to improve the efficiency of the approval process for what is known as the Part 810 authorization. And I am eager to introduce it once we get it finalized.

At our recent subcommittee hearing with both—with senior DOE leadership, both Deputy Secretary Brouilette, and then NNSA Administrator Klotz, assured me that U.S. civilian nuclear industry engagement in the global market is priority for this administration. Information we have received from DOE, as well as recent reports from the Nuclear Innovation Alliance, detail longer review times for certain projects, and additional delays within the inter-agency approval process.

So, Mr. Atkins, let me ask you about a couple of specific issues related to this. The previous administration's DOE reversed a long-standing policy which allowed the Secretary to delegate signature authority for certain authorizations as a result of a more strict interpretation of the Atomic Energy Act. Do you know if the current administration is looking at changing that policy?

Mr. ATKINS. Sir, at this time the general counsel has continued to stand by their interpretation of the Atomic Energy Act, that the Secretary of Energy cannot delegate that.

Mr. JOHNSON. That wasn't my question.

Mr. ATKINS. We are not considering.

Mr. JOHNSON. OK. So you are saying that you are going to, right now you are going to stay with the interpretation of the previous administration? You are not looking at reviewing or changing that?

Mr. ATKINS. We are always looking to review ways to increase the speed of reviews. But my understanding is that we are not looking at delegating that authority.

Mr. JOHNSON. OK. Would the administration consider a statutory clarification to be helpful in this regard?

Mr. ATKINS. The understanding is that it would require a legislative change to change that, and that we would certainly be interested in working with Congress on that.

Mr. JOHNSON. OK. Under the Bush administration I understand that the Energy Secretary would receive the authorization package from DOE staff, which the Secretary could approve contingent on receiving the necessary assurances from the State Department that are required under the Part 10—810 rules. However, now, currently DOE waits on the entire approval package in a sequential manner, which has increased the length of time for companies seeking DOE signoff.

Will DOE consider returning to the more efficient process by which the Secretary can sign off on an authorization ending the sign-off by the State Department?

Mr. ATKINS. I think that the short answer, I will give you the short answer here: yes. I think we are willing to reconsider that and are reconsidering that. The long review time is really this international nonproliferation assurance requirement that we have. But we are willing to do whatever we can to shave whatever time that—time off the review that we can.

Mr. JOHNSON. OK. I will look forward to working with you on that.

Acting Assistant Secretary of Nuclear Energy Mr. McGinnis, as noted in the 2018 Nuclear Posture Review, the U.S. has no ability to enrich uranium with domestic technology for either national security or commercial purposes. What steps is DOE taking to restore domestic enrichment capability for our Nation?

Mr. MCGINNIS. Thank you very much. Very important question. And my colleague Mr. Atkins can talk to the national security side, which is a very, very important driver for looking at reconstituting or establishing enrichment capacity for our country.

From a nuclear energy perspective, I can tell you that the issue of whether or not we—there should be other actions taken to support reestablishing American-owned commercial enrichment, those issues are also being looked at. It is part and parcel of the nuclear policy review that is being conducted as well right now.

But I do think you might find it useful to hear, on the national security side, what is driving the examination of possible enrichment capacity or planned enrichment capacity for national security reasons.

Mr. JOHNSON. Mr. Atkins.

Mr. ATKINS. This really comes back to the requirement for tritium production for the national defense needs. Really, there is no commercial alternative at this point, given that, one, there is no commercial enrichment capability domestically, and also the prevalence of foreign, the use of foreign technology in the field.

So really the department is, through its Defense Programs Office, is committed to pursuing a domestic enrichment capability for this requirement. We have a series of downblending campaigns that they are ongoing now to meet the immediate need. But we will run out of, the projection is we will run out of enriched uranium at the 2038 time frame. So we have a series of efforts ongoing right now to consider the alternatives for technologies to meet such a need.

Mr. JOHNSON. Have you looked at any of the studies that DOE has already done in the previous administration for what the possibilities are?

Mr. ATKINS. I can't speak to that, sir, but I could certainly get back to you.

Mr. JOHNSON. OK.

Mr. ATKINS. Thank you.

Mr. JOHNSON. Mr. Chairman, I yield back.

Mr. OLSON. The gentleman yields back. The Chair now calls upon the gentleman from the Land of Lincoln, Mr. Kinzinger, for 5 minutes.

Mr. KINZINGER. Right. Thank you, Mr. Chairman. And thank you all for spending time with us and being here.

My district in Illinois has four nuclear power plants, eight reactors, and five, actually, spent fuel storage sites. We all know it provides, nuclear power provides reliable, carbon-free electricity around the clock, even when it is negative 15, like it was at the beginning of the year in Illinois. Nuclear power not only provides good jobs and clean energy, but also represents an opportunity for continued U.S. leadership around the globe. From helping our allies to operating their plants safely—to operate their plants safely, or having the expertise needed to lead on nonproliferation issues, nuclear power is vital to our Nation and to our national security.

I would like to thank my colleague Representative Doyle, who truly recognizes the importance of these issues, and has worked tirelessly with me on H.R. 1320, the NUKE Act. I truly believe this bipartisan bill is a step in the right direction to help our existing fleet, and also the next generation of nuclear technology.

We will start with Mr. McGinnis and then Mr. McCree. But, first, Mr. McGinnis. The Atomic Energy Act prohibits foreign ownership, control, and domination of U.S. commercial nuclear interests and nuclear plants. In 2016, the NRC budget hearing before this committee, then Chairman Burns said that this prohibition is something that is worth taking a look at. The provision in my bill would do just that by having the GAO report on the feasibility and implications of repealing this provision.

So, Mr. McGinnis, since the Atomic Energy Act was signed into law the U.S. Government has established processes to review national security interests in key sectors, such as the Committee on Foreign Investment in the United States. Would it make sense for Congress to consider alternative policies to review foreign investment in our nuclear facilities?

Mr. MCGINNIS. Thank you very much. Certainly, the CFIUS process you talked about is extremely important. We greatly care and we very closely watch and monitor foreign investments in nuclear generating assets and companies.

With regards to whether or not there should be additional actions taken, I would have to get back with you on that.

Mr. KINZINGER. But is it worth taking a look at?

Mr. MCGINNIS. I will certainly get back with you and offer you any suggestions on that.

Mr. KINZINGER. So you can't tell me if it is worth taking a look at? That is all I am asking.

Mr. MCGINNIS. Certainly worth—we welcome Congress' strong monitoring of the situation——

Mr. KINZINGER. Right.

Mr. MCGINNIS [continuing]. In supporting a robust nuclear industry.

Mr. KINZINGER. I got it. Good work.

Mr. McCree, in an increasingly global market is this restriction worth taking a look at? And if so, what do you think would be the potential impacts?

Mr. MCCREE. Congressman, thank you for your question. I would offer that the Commission has not taken a position on the proposed legislation and I, so I would not—it would be inappropriate for me to speak for the Commission.

Mr. KINZINGER. All right. Another provision in H.R. 1320 requests GAO study the impact of eliminating what is known as a mandatory hearing for uncontested licensing procedures. Removing this requirement would allow the Commission, if no affected person requests a hearing, to issue a construction permit and operating license, or an amendment to those permits and licenses without holding a hearing. The NRC has previously informed Congress that it believes amending the Atomic Energy Act to eliminate the mandatory uncontested hearing on combined license and early site permitting applications could enhance the efficiency of NRC operations.

Mr. McCree, if this requirement were removed, it is my understanding that the Commission would be required to provide public notice of the opportunity to request a hearing. Is that correct?

Mr. MCCREE. Congressman, I believe you are quoting correctly from previous testimony by members of the Commission. So I would acknowledge that.

I am not aware of any Commission request for similar legislation or similar elimination of the mandatory hearing recently, however. So I would again defer to the Commission on that.

Mr. KINZINGER. OK. In the licensing review process, what are the public comment opportunities beside the mandatory hearing? Can you elaborate on these?

Mr. MCCREE. I would need to get back to you for the record on that.

Mr. KINZINGER. I hope you do.

Well, that was quick, I guess, Mr. Chairman. So 52 seconds I yield back.

Mr. OLSON. The gentleman yields back. The Chair now calls upon a fellow Texan, Mr. Flores, for 5 minutes.

Mr. FLORES. Well, thank you, Mr. Chairman. And I appreciate the panel for today's informative discussion.

I believe there is great potential when we look at the opportunities for small modular reactors, and also with innovative next gen designs that have been developed thus far. And am excited about what can come beyond that.

There are a bunch of challenges in front of us that need to be addressed before we—in order to provide a successful pathway for these new technologies to come to fruition. One issue in particular relates to the availability of what is known as high-assay, low-enriched uranium. This specific material, uranium, enriched at higher levels than what is available in the current commercial market, may offer more flexibility and more efficient electricity generation than what we have available today.

There is a recent industry survey of 16 leading U.S. advanced reactor technology developers, found that the lack of access to high-assay LEU ranks at the top of policy concerns that require resolution to move forward with these projects. Just a few weeks ago in front of this subcommittee, DOE Under Secretary Menezes confirmed DOE's interest in addressing this concern.

So my question is to you, Mr. McGinnis. Are you familiar with this barrier to advanced nuclear innovators?

Mr. MCGINNIS. Thank you, Congressman. Yes, I am.

Mr. FLORES. Can you offer any thoughts about how this can be addressed?

Mr. MCGINNIS. I can tell you from the nuclear energy sector in particular, those who are working to develop our Nation's next class of advanced reactors, many of those reactor designs will require higher levels of enrichment, as you have indicated, high-assay LEU, which is another way of saying 16, 17, or 18 percent enrichment as opposed to the 4.5 or so percent that our fleet uses now.

We do believe it is a very important issue. It is a supply chain issue. It is an energy security supply issue. And it extends to also the NNSA's space as well as our advanced reactor deployment plans.

Mr. FLORES. In light of that, I assume that the NRC is looking at the policy challenges associated with the material. Is that correct, Mr. McCree?

Mr. MCCREE. Mr. Flores, thank you for your question. And at this point we don't see what would represent policy issues. There are a number of technical issues. Mr. McGinnis mentioned some of them. It even goes to the criticality analyses, neutronics that would be represented in the core. From a transport packaging perspective there are issues. And even in the fuel cycle, you know, what enrichment capabilities exist. Would there be a need for new facilities or an amendment to a license at an existing facility, and et cetera?

So there are a number of issues like that associated with the supply chain that would need to be addressed. But that is more than a technical issue rather than a policy issue.

Mr. FLORES. Mr. McGinnis, would a DOE program to manage this material similar to how DOE provides fuel for research reactors be an option?

Mr. MCGINNIS. To be clear on your question, you are referring to high-assay LEU with research reactors?

Mr. FLORES. Yes, that is correct.

Mr. MCGINNIS. Yes, that is very important supply chain issue as well.

Mr. FLORES. Would that be an option to use for these advanced generation nuclear reactors?

Mr. MCGINNIS. Well, I would rephrase it to say, from my view research reactors, a number of them, have high enrichment fuel requirements as well.

Mr. FLORES. Right.

Mr. MCGINNIS. Higher level. And they will need a supply chain. There is no commercially available higher enriched level available now. And we will have to come to terms with that.

Mr. FLORES. OK. To the extent that Congress wants to take a look at this, I am assuming your office would be willing to work with us to try to develop policy solutions?

Mr. MCGINNIS. Yes, certainly.

Mr. FLORES. Mr. Owendoff, I have 58 seconds left. West Valley Demonstration Project was a commercial demonstration reprocessing technology, but it ceased operation about 40 years ago. The department is still overseeing the decommissioning and decontamination work at the site; is that correct?

Mr. OWENDOFF. Yes, it is, Congressman.

Mr. FLORES. The last time that the project was authorized was in 1982. Would DOE support legislation to reauthorize this project?

Mr. OWENDOFF. I think we have provided technical advice in the past. And we will continue to work with you, Congressman.

Mr. FLORES. What other issues would need to be addressed if we—at West, at the West Valley site?

Mr. OWENDOFF. I think it is a complex issue. So if we can, for the record, work with your office, sir.

Mr. FLORES. OK. You can do that supplementally after the hearing.

Mr. OWENDOFF. Yes, sir.

Mr. FLORES. OK, thank you very much. I yield back.

Mr. OWENDOFF. Yes, sir.

Mr. OLSON. The gentleman yields back. The Chair sees no Member seek to ask questions, so on behalf of the committee, thank you to the first panel. I will remind our Members they have 10 legislative days to submit questions for the record and, to all the panelists, you have 10 days to reply to those questions.

Thank you, thank you, thank you. You are dismissed.

Panel two, you are up. And be advised that a vote is coming up sometime next 45 minutes, so please be expeditious. Thank you.

You all have had your water. Are you ready to rock and roll? OK, the second panel is starting.

Our first speaker with an opening 5-minute statement will be Bill Ostendorff. He has been on the first panel, but he is also Distinguished Visiting Professor of National Security at the United States Naval Academy. Go Navy. You have 5 minutes, sir.

STATEMENTS OF WILLIAM C. OSTENDORFF, DISTINGUISHED VISITING PROFESSOR OF NATIONAL SECURITY STUDIES, U.S. NAVAL ACADEMY; MARK PETERS, PH.D., DIRECTOR, IDAHO NATIONAL LABORATORY; MARIA G. KORSNICK, PRESIDENT AND CHIEF EXECUTIVE OFFICER, NUCLEAR ENERGY INSTITUTE; DAVID C. TRIMBLE, DIRECTOR, NATURAL RESOURCES AND ENVIRONMENT, GOVERNMENT ACCOUNTABILITY OFFICE; AND ASHLEY E. FINAN, PH.D., POLICY DIRECTOR, NUCLEAR INNOVATION ALLIANCE

STATEMENT OF WILLIAM C. OSTENDORFF

Mr. OSTENDORFF. Thank you, Mr. Chairman. I must acknowledge my friend Congressman Shimkus here, and congratulate him on the Army-Navy victory back in December. I would be remiss in not doing so.

I thank you for the chance to be here today. While I an currently a professor of National Security Studies at the Naval Academy I am not here on behalf of the Navy. Rather, I am here to speak of my experience in submarines, in the nuclear weapons programs and the NRC.

I would like to offer a few thoughts on the national security imperatives of what I call the U.S. nuclear enterprise. By nuclear enterprise, I simply refer to three significant programs:

First, the Nation's nuclear weapons program, the Manhattan Project; second, the Navy's nuclear propulsion program under Naval Reactors; and third, the Nation's commercial nuclear industry.

Let me share my own experience in all three legs of the enterprise, spanning four decades.

After graduating from the Naval Academy, I entered Admiral Rickover's Nuclear Navy. I embarked upon a naval career that spanned 26 years, with 16 years of sea duty on six submarines. I carried both strategic and tactical nuclear weapons on three of these submarines. I was also privileged to command a Los Angeles class attack submarine, the USS *Norfolk*, for 3 years, during which time we drove that submarine 100,000 miles. That submarine and its reactor plant were engineering marvels, and the crews professional and highly motivated.

After retiring from the Navy and working for the House Armed Services Committee, I was confirmed by the Senate to serve as Principal Deputy Administrator at NNSA, overseeing the 30,000-plus people in the nuclear weapons complex. Later, in 2010, I was confirmed to serve as a Commissioner of the NRC, where I served from 2010 to 2016.

My 40 years in submarines, nuclear weapons, and commercial reactors has ingrained in me the vital role of human capital in the nuclear enterprise.

Nuclear is different. This work is hard, it is challenging, it requires the best trained engineers and scientists. But without that nuclear-related work to actually perform, those unique human capabilities atrophy at an alarming speed. And as that reactor technology work decreases in the United States, so does the ability and opportunity for the United States to influence nuclear safety and security worldwide.

Are there national security consequences to a declining commercial nuclear industry? Absolutely.

Let us first look domestically.

A prerequisite for national security is energy security. Nuclear energy provides carbon-free, reliable baseload generation. It would be unwise for our Federal Government to sit by and watch the current industry decline continue, for at some point that decline becomes irreversible. It is naive to think we could revive the nuclear industry at some future point if it lies dormant for even just a generation.

Economically, the nuclear industry provides well-paying jobs, supporting local communities across the country.

Let's look at human capital for a brief moment. Many of the current nuclear plant operators at commercial plants started out in the Nuclear Navy. Will the prospects of reduced opportunity for employment in the commercial industry have a negative impact no the Nuclear Navy's ability to recruit? I do not have any data to share, but I think the answer may be yes.

What about the impact of a declining industry on undergraduate and graduate programs in nuclear engineering?

What about the ongoing partnerships between community colleges and the nuclear plants that hire their graduates with associates degrees?

I now turn to the impacts in the international arena. The ability of the U.S. to lead in nuclear safety, security, and nonproliferation efforts is significantly lessened as commercial activity erodes. To engage internationally, the United States must participate. I saw this firsthand as a Commissioner in the aftermath of the 2011 reactor accident at Fukushima in Japan. The U.S. was a key leader worldwide in post-accident nuclear safety regulation.

I also saw this when speaking on best practices for both physical and cybersecurity for the IAEA in Vienna in 2015. Many countries look to the U.S. for regulatory lessons learned—whether safety or security—because of the reputation and size of our program.

When I was sworn in as a Commissioner at the NRC in 2010, the New Reactor staff was reviewing license applications for 26 reactors. Today, that NRC staff is reviewing just two designs. While construction of the two AP 1000 units is in progress at the Vogtle site, no others are being built in the U.S. today.

As our nuclear industry shrinks, our nuclear voice is not as loud as it once was internationally.

Who fills that void? Russia currently dominates the export market for nuclear fuel and reactor technology. China is embarked on an aggressive domestic nuclear construction program and is poised to move out internationally.

It would be a natural development for Russia and China to control the nuclear export market and to aspire to key leadership roles at the IAEA and other international nuclear forums.

Finally, the traditional U.S. leadership role in nuclear nonproliferation is clearly threatened by this alarming trend.

In closing, it is a fact that our nuclear industry is in decline. There are clear, significant national security consequences at stake. This matter is urgent. I applaud the committee for bringing attention to this vitally important topic.

I look forward to your questions.
[The statement of Mr. Östendorff follows:]

William C. Ostendorff

House Energy and Commerce Committee February 6, 2018

Chairman Upton, Ranking Member Rush and members of the subcommittee-thank you for the invitation to appear today. While I am currently a Professor of National Security Studies at the United States Naval Academy, I am not here on behalf of the Navy today. Rather, I am here to speak of my experiences in submarines, in the nuclear weapons program and at the NRC.

I would like to offer a few thoughts on the national security imperatives of the US "nuclear enterprise". By "nuclear enterprise", I simply refer to three significant programs. First, the nation's nuclear weapons program. Second, the Navy's nuclear propulsion program under Naval Reactors. And third, the nation's commercial nuclear industry. Let me share my own experience in all three legs of the nuclear enterprise spanning four decades.

After graduating from the Naval Academy, I entered Admiral Rickover's nuclear navy. I embarked upon a naval career that spanned 26 years with 16 years of sea duty on six submarines. I carried both strategic and tactical nuclear weapons on three of these submarines. I was privileged to command a Los Angeles nuclear attack submarine for three years during which time we drove that submarine 100,000 miles. That submarine and its reactor plant were engineering marvels and the crews professional and highly motivated.

After retiring from the Navy and working for the House Armed Services Committee, I was confirmed by the Senate to serve as Principal Deputy Administrator at NNSA, overseeing the 30,000 plus people in the nuclear weapons complex.

In 2010 I was confirmed to serve as an NRC Commissioner where I served until my term ended in the summer of 2016.

My forty years in submarines, nuclear weapons, and commercial reactors has engrained in me the vital role of human capital in the "nuclear enterprise."

Nuclear is different. This work is hard, challenging, and requires the best trained engineers and scientists. But, without that nuclear related work to actually perform, those unique human capabilities atrophy at an alarming speed. And as that reactor technology work decreases, so does the ability and opportunity for the United States to influence nuclear safety and security worldwide.

Are there national security consequences to a declining commercial nuclear industry? Absolutely.

Let us first look domestically.

A prerequisite for national security is energy security. Nuclear energy provides carbon free, reliable baseload generation. It would be unwise for our federal government to sit by and watch the current nuclear industry decline continue. For at some point, that decline becomes irreversible. It is naive to think we could revive the human capital expertise that underpins the core of this industry in 100 or 200 years.

Economically, the nuclear industry provides well-paying jobs supporting local communities across the country.

Let's look at human capital. Many of the current nuclear plant operators at commercial plants started out in the Nuclear Navy. Will the prospects of reduced opportunity for employment in the commercial industry have a negative impact on the Nuclear Navy's ability to recruit? I do not have any data to share but think the answer may be yes.

What about the impact of a declining industry on undergraduate and graduate programs in nuclear engineering? What about the ongoing partnerships between community colleges and the nuclear plants that hire their graduates with associates degrees?

I now turn to impacts in the international arena. The ability of the US to lead in nuclear safety, security and nonproliferation efforts is significantly lessened as commercial activity erodes. To engage internationally, the US must participate. I saw this firsthand as a Commissioner in the aftermath of the 2011 reactor accident at Fukushima in Japan. The US was a key leader worldwide in post-accident nuclear safety regulation. I also saw this when speaking on best practices for physical and cybersecurity to an international audience at the International Atomic Energy Agency or IAEA in Vienna in 2015. Many countries look to the US for regulatory lessons learned -whether safety or security-because of the reputation and size of our program.

When I was sworn in as an NRC Commissioner in 2010, the New Reactor staff was reviewing license applications for 26 reactors. Today, that NRC staff is reviewing just two designs. While construction of the two AP 1000 units is in progress at the Vogtle plant, no others are being built today in the US.

As our nuclear industry shrinks, our nuclear voice is not as loud as it once was internationally.

Who fills that void? Russia currently dominates the export market for nuclear fuel and reactor technology. China is embarked on an aggressive domestic nuclear construction program and is poised to move out internationally.

It would be a natural development for Russia and China to control the nuclear export market and aspire to key leadership roles at the IAEA and other international nuclear forums.

Finally, the traditional US leadership role in nuclear non-proliferation is clearly threatened by this alarming trend.

It is a fact that our nuclear industry is in decline. There are clear, significant national security consequences at stake. I applaud the Committee for bringing attention to this vitally important topic.

I look forward to your questions.

Mr. OLSON. Thank you, Mr. Ostendorff. And thank you so much for your service in our Navy. And people in the audience should know he was a driver. They are boats, not ships. I flew a plane that hunted them, a P–3 Orion. We could find those Soviets, but could never find them unless they wanted to let us find them. So thank you for that as well.

The next panelist is Dr. Peters from the Idaho National Laboratory. Dr. Peters, you have 5 minutes.

STATEMENT OF MARK PETERS

Dr. PETERS. Thank you, Mr. Chairman. I want to thank you, Chairman Upton, and Ranking Member Rush, for the opportunity to be here with you today. And also thank all the members of the committee for joining us.

My name is Mark Peters, and I am the Director of Idaho National Laboratory. INL is the Nation's lead nuclear energy research and development laboratory, the place where 52 original nuclear reactors were designed, constructed, and operated.

It is our mission to provide the research, development, and demonstration foundation to extend the lives of the current operating fleet, develop the next generation of nuclear reactors, and provide integrated nuclear fuel cycle solutions.

As we have already heard, nuclear energy is a vital component of America's energy system. And, in particular, advanced nuclear energy technologies provide an opportunity for the U.S. to meet future electricity demands while benefitting our economy, our environment, and our national security.

The United States remains in a position of strength. However, the future is not guaranteed. We are at a critical junction, a turning point as I like to say. Decisions made today will determine if the U.S. continues to lead the world in civil nuclear energy, innovation, and production.

I remain optimistic about the future of nuclear energy because of the science and innovation coming out of our national laboratories, universities, and the private sector. We have the finest research, development, and demonstration facilities, the most developed capabilities, and the best minds.

I am also optimistic because of our history. America has always risen to the challenge. Before us is a grand opportunity to maintain and enhance our leadership going forward, while ensuring U.S. nonproliferation and safety approaches continue to be the world's standards.

When the U.S. domestic nuclear energy industry languishes, our international leadership role suffers. Russia and China are aggressively expanding their nuclear capabilities. These nations, with their state-sponsored nuclear industries, enjoy tremendous advantages over the private sector in the U.S., and understand the decades-long influence that results from building a nuclear power plant in another country.

We also should not forget the benefits that U.S. nuclear energy brings to economic development. A healthy domestic industry allows for a robust export market and international influence. So national security and economic opportunity are powerful motivators

to maintain and eventually build upon our advantages. So, how do we accomplish this?

First, by making sure we sustain our current nuclear reactor fleet. INL is working with utilities to modernize control rooms and work to provide the basis to extend the life of power plants beyond 60 years. We have transitioned the Light-Water Reactor Sustainability Program from one concerned primarily with licensing to include helping utilities reduce operating costs.

But if we are to maintain that advantage, we must set up private-public partnerships to develop and deploy the next generation of nuclear reactors.

Our national labs are ideal places to do the research and development and then actually partner with industry to demonstrate these new technologies. Our current example is the emergence of light-water small modular reactors, as we have already heard multiple times this morning. It is great news for the American nuclear energy industry, and the Nation as a whole, that the NuScale small modular reactor continues to work its way through the NRC process.

We have been involved at INL with NuScale from the beginning, providing technical support and guidance. And as you heard this morning, NuScale's first SMR is planned for the INL Site, in partnership with Utah Associated Municipal Power Systems' utility consortium in the West. We will also be working with them on the Joint Use Modular Plant program that would allow the laboratory to actually use the first few modules in the 2026 time frame to actually develop and demonstrate advanced energy system processes, in collaboration with NuScale and UAMPS.

As you have already heard, SMRs are a game changer. They are smaller, safer, cheaper to build, easier to license, and a window into a lucrative and an influential export market to go forward.

We are also working on advanced reactor designs, including coolants beyond light water reactor, cooled reactors. And as mentioned this morning, this will allow us to not only produce electricity, but also penetrate other markets with nuclear processes, for example, the manufacturing and transportation sector.

We are also excited to be working with the private sector to develop and demonstrate small, very small reactors, microreactor technologies. I think they have the possibilities of powering remote communities and military bases around the world.

Key to all this is maintaining the research infrastructure of places like Idaho National Laboratory, Argonne National Laboratory, and Oak Ridge National Laboratory going forward, like the Advanced Test Reactor, like the Transient Test Reactor, and like the Materials and Fuels Complex at INL.

We are also embarking on a development, design and deployment of a Versatile Fast Neutron Source that we would like to have in place within a decade that would further our U.S. leadership and provide that important infrastructure.

So, let us remain the world leader and a tone setter by developing a sound civil nuclear energy policy. I put to you that our national labs and universities give us a tremendous technical advantage over our competitors across the globe. Let us approach the great opportunity with urgency, and a collective desire to achieve

results and excitement to attract the net generation of nuclear scientists and engineers to our field. For the good of our economy, our environment, and our national security, let us embrace this challenge.

I am happy to answer questions.

[The statement of Dr. Peters follows:]

TESTIMONY OF

DR. MARK PETERS, LABORATORY DIRECTOR

IDAHO NATIONAL LABORATORY

BEFORE THE

U.S. HOUSE COMMITTEE ON ENERGY AND COMMERCE

SUBCOMMITTEE ON ENERGY

"DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure."

2123 Rayburn House Office Building

FEBRUARY 6, 2018

Dr. Mark Peters, Idaho National Laboratory Director

U.S. House Committee on Energy and Commerce, Subcommittee on Energy

"DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure."

Good morning. I want to thank Chairman Upton, Ranking Member Rush, and Vice Chairman Olson for scheduling this important hearing and for the opportunity to participate. I would also like to thank all of the members of the committee for being here today.

My name is Mark Peters. I am the director of Idaho National Laboratory (INL). INL is the nation's lead nuclear energy research and development laboratory, the place where 52 original nuclear reactors were designed, constructed, and operated.

It is our mission to provide the research, development, and demonstration foundation to extend the lives of the current operating reactor fleet, develop the next generation of nuclear reactors, and provide integrated nuclear fuel cycle solutions.

Nuclear energy is a vital component of America's energy system. It reliably produces nearly 20 percent of our electricity, has a remarkable safety record, and is clean, secure, and resilient. Advanced nuclear energy technologies provide an opportunity for the U.S. to meet future electricity demands while benefiting our economy, environment, and national security.

The United States invented nuclear energy technologies for peaceful uses, and we are the world's largest producer, accounting for more than 30 percent of worldwide generation of nuclear electricity. The U.S. remains in a position of strength. The future, however, is not guaranteed.

A variety of factors – high capital costs of nuclear technologies, the long time frame between licensing to construction to operation, subsidies for other forms of electricity generation, the low cost of natural gas, and our inability to provide a permanent solution to nuclear waste and used nuclear fuel management – has led to an erosion of the role of nuclear energy in the domestic energy system and of our international nuclear leadership.

Meanwhile, countries around the world are constructing new plants. As we struggle to maintain our domestic fleet and international presence, Russia and China are accelerating nuclear power plant builds in their own nations and across the globe. To this point, Russia and China are involved in 78 percent of new reactors being built around the world. Russia and China are catching up, and threatening our historic and hard-earned advantage in commercial nuclear energy production and international leadership in the civil nuclear energy sector. If we continue along this path, our 30 percent market share could be drastically reduced by 2050.

We are at a critical juncture, a turning point. Decisions made today will determine if the U.S. continues to lead the world in civil nuclear energy innovation and production, or if we are destined to fall back into the pack.

Still, I remain optimistic. I remain optimistic because of the science and innovation coming out of our national laboratories, universities, and the private sector, companies such as NuScale Power, Oklo, and TerraPower, just to name a few. We have the finest research, development, and demonstration facilities, the most developed capabilities, and the best minds. I remain optimistic because of our history. America has a historic role in inventing and commercializing many energy technologies in use around the world, from the lightbulb to the nuclear reactor. I remain optimistic because the historic partnership between the federal government and industry has laid the foundation for our successes. We know what it will take because we have done it before. And I remain optimistic because the stakes are so high. Continued erosion of America's commercial nuclear energy industry and not taking advantage of our nuclear energy science and innovation advantage threatens our economy, environment, and national security.

America has always risen to the challenge. We can – and should – view this moment not with apprehension, but excitement. Before us is a grand opportunity to preserve our global nuclear energy leadership position and employ our advantages to usher in a new era of prosperity, security, reliability, and safety in the U.S. and across the globe.

Think of that for a moment. Because the U.S. created the commercial nuclear energy industry, the vast majority of reactors around the world are based on American technologies. Our

nonproliferation and safety approaches are the world's standards. That's comforting because our Nuclear Regulatory Commission – working with an industry that has a demonstrated record of learning from its mistakes and implementing meaningful changes – is the gold standard. One need only look at decades of safe, secure, and reliable electricity generation by the U.S. commercial nuclear fleet to understand how well-run this industry is.

But when the U.S. domestic nuclear energy industry languishes, our international leadership role diminishes. Losing the capability to influence how nuclear energy is used globally threatens our ability to prevent the spread of nuclear materials that can be used for malicious purposes.

Russia and China are aggressively expanding their nuclear capabilities. Those nations, with their state-sponsored nuclear industries, enjoy tremendous advantages over the private sector in the U.S., and understand the decades-long influence that results from building a nuclear power plant in another country. Given their track records, I do not believe any of us want the Chinese or Russians setting standards for safety and nonproliferation in developing nations. Our continued world leadership role should be seen not just as a national security issue, but also as a moral obligation. Countries developing commercial nuclear power need the United States as a partner to ensure safe and secure expansion of nuclear energy across the globe.

The benefits to our nation's economic competitiveness are also vitally important. We know how important the U.S. nuclear energy industry is to the national economy, and those communities fortunate enough to host power plants. The nuclear energy industry creates more than 100,000 direct jobs with excellent salaries and benefits, and more than 400,000 indirect jobs – a roughly $60 billion annual contributor to the U.S. gross domestic product. A healthy domestic industry allows for a robust export market; billions of dollars available to U.S. firms who supply equipment and expertise to that growing body of nations eager to power their futures with clean, safe, and reliable nuclear energy.

National security and economic opportunity. These are powerful motivators to maintain, and eventually build upon, our advantages. So, how do we accomplish this?

First, by making sure we sustain our current nuclear reactor fleet, which supplies nearly 20 percent of this nation's electricity and 60 percent of its carbon-free electricity. The performance of our fleet is nothing short of remarkable. Nuclear energy has proven itself, in the bitter cold and in the midst of devastating hurricanes, to be this country's most reliable and resilient form of energy production. That reliability and resilience deserve consideration. Nuclear power's contribution to grid stability and performance are undeniable, and so I applaud Energy Secretary Rick Perry's effort to properly value resilient and reliable energy sources, including nuclear energy. As Secretary Perry wrote in his letter to the Federal Energy Regulatory Commission (FERC): "America's greatness depends on a reliable, resilient electric grid powered by an 'All of the Above' mix of generation resources."

The Secretary's proposed rule largely concerned our current fleet, the maintenance of which is vital, and part of Idaho National Laboratory's core mission. As part of this effort, INL is working with utilities to modernize control rooms based on decades-old technologies. That includes digital instrumentation and controls. The Laboratory also is supporting utilities in the license renewal process, in the area of material aging and degradation. This effort has helped three utilities determine they will seek "Subsequent Licensing Renewal," which extends the life of a power plant beyond 60 years. Finally, we have transitioned INL's Light Water Reactor Sustainability (LWRS) Program from one concerned primarily with licensing to include helping utilities reduce operating costs. We realized that plants who get relicensed will struggle to continue operating if they are not economically sustainable. That is a snapshot of what we are doing to extend the lives of the current fleet.

But if we are to maintain our historic advantages, we must enable the private-public partnerships necessary to develop and deploy the next generation of nuclear reactors. As the nation's lead nuclear research and development laboratory, INL is at the forefront of this effort, a proud partner with other national labs, our colleges and universities, and an industry eager to embrace innovation. New reactor technologies will no doubt improve the world if they make it into the commercial mainstream, but those first steps, as has been this nation's electricity

generation history, must be guided by federally-funded research and development and robust private-public partnerships.

Building a first-of-its-kind reactor is expensive and risky. Our national laboratories are ideal places to do the research and development and partner with industry to demonstrate new technologies. A current example is the emergence of light-water small modular reactors (SMRs). It's great news for the American nuclear energy industry, and the nation as a whole, that the NuScale Power SMR continues to work its way through the NRC process.

INL has been involved with NuScale Power from the beginning, providing technical support and guidance. And NuScale's first SMR is planned for the INL Site. A public-private partnership has been vital to the project's success, and will continue after the SMR begins producing electricity for the Utah Associated Municipal Power Systems (UAMPS) in 2026. Eventually, up to two of NuScale's 12 50-megawatt modules might also be dedicated to research and development. The Joint Use Modular Plant (JUMP) program would allow INL to use the modules to develop and demonstrate other energy system processes, such as thermal energy storage and hydrogen production. Working with our industry partners, we will examine how we can use energy differently in the future, and create more integrated systems. Also, through JUMP, we would demonstrate safe, secure, and resilient micro-grid systems.

INL and our partner national laboratories are excited to continue to partner with U.S. companies to accelerate innovation on SMRs, working not only with NuScale and UAMPS, but also Oak Ridge National Laboratory and the Tennessee Valley Authority. SMRs are a potential game-changer for the U.S. nuclear industry – smaller, safer, cheaper to build, easier to license, and a window into a lucrative and influential export market.

INL also is working on advanced reactor designs, including high-temperature gas reactors cooled by molten salt or helium gas, liquid metal reactors cooled by sodium, and reactors that feature liquid fuel dissolved in fissile and fertile materials with molten salt coolant. These advanced technologies will not only further the role of nuclear energy in the production of clean, reliable, resilient, and affordable electricity, but also take advantage of other attributes,

like nuclear process heat, to transform the transportation and manufacturing sectors. This will require continued research and development investments and robust private-public partnerships.

In the next few years, for example, we are excited to work with the private sector to develop and demonstrate microreactor technologies. Think of the possibilities: powering remote communities and military bases around the world, as well as the ability to react quickly to natural disasters such as the hurricane that devastated Puerto Rico's electricity generation system, and rebuild systems that are more reliable and resilient to future threats.

Key to these advanced reactor technologies, INL and our partner laboratories are working to develop advanced nuclear fuels and new cladding materials to operate at higher temperatures, extract more energy from the fuel, tolerate a wider range of operating and abnormal conditions, and reduce waste generation. Developing new materials and fuels for nuclear energy systems requires world-leading test reactors and post-irradiation examination and fuel science capabilities, like the Advanced Test Reactor (ATR) and Transient Test Reactor (TREAT) at INL, High Flux Isotope Reactor (HFIR) at ORNL, and Materials and Fuels Complex (MFC) at INL. To further U.S. leadership in the science and technology of advanced nuclear energy systems, we are also embarking on the development and design of a Versatile Fast Neutron Source (VFNS) within a decade. The irradiation capabilities of the VFNS will foster further innovations by our industry for many decades to come.

This R&D is vital. But so is achieving results. Accelerating innovation and getting ideas into the marketplace is a necessary part of realizing nuclear energy's enormous potential and maintaining the United States' historic leadership. That is why DOE established the Gateway for Accelerated Innovation in Nuclear (GAIN) program. This collaborative effort between the private sector, INL, Oak Ridge National Laboratory, and Argonne National Laboratory provides the nuclear community with access to the technical, regulatory, and financial support necessary to move innovative nuclear energy technologies toward commercialization. GAIN provides an opportunity for the private and public sectors to share expertise, reduce barriers, successfully

develop innovative technologies, and make sure our nation continues to benefit from nuclear energy.

Finally, as the nation's lead nuclear R&D laboratory, INL has a responsibility to propose options for the nation to safely and securely manage nuclear waste and used nuclear fuel. This involves developing technical solutions for used fuel storage, transport, and disposal as part of the current open (direct disposal) fuel cycle. A further objective is to improve resource utilization, maximize energy generation, reduce waste, and limit the risk of proliferation, as part of potential future advanced fuel cycles.

Research and development is key to rebuilding our domestic commercial nuclear industry and maintaining our national security and international civil nuclear energy leadership. But we must act now. This will require a combination of elements: the facilities and capabilities of our national laboratories, the energy and ideas emanating from the scientists and engineers at our universities and national laboratories, and a sound civil nuclear energy policy.

Let us remain the world leader and tone setter. Our national labs and universities give us a tremendous technical advantage over our competitors across the globe. Let us approach this great opportunity with urgency, and a collective desire to achieve results. And, from the perspective of the nation's lead nuclear R&D laboratory and in the spirit that created 52 nuclear reactors at INL and launched an industry that has helped power U.S. prosperity, we will continue to partner with industry to innovate. We at INL are committed to seeing these tasks through to a successful conclusion. We are at a turning point for clean, safe and reliable nuclear energy. For the good of our economy, our environment, and our national security, let us embrace this challenge.

I am happy to answer any questions you may have.

Mr. OLSON. Thank you, Dr. Peters.

Our next speaker is Ms. Maria Korsnick. And she is the President and CEO of the Nuclear Energy Institute. Ma'am, you have 5 minutes for your opening statement.

STATEMENT OF MARIA G. KORSNICK

Ms. KORSNICK. I appreciate the opportunity to testify before you to highlight the state of America's nuclear industry today

Nuclear power runs 24 hours a day, 7 days a week; provides almost 20 percent of America's electricity. These plants are hardened facilities that are protected from physical and cyber threats, helping to ensure the resiliency of our electricity system in the face of potential disruptions.

The 99 reactors that we have in our nuclear fleet today represent 60 percent of the clean electricity in our country. Our Nation's nuclear industry, however, is at a crossroads, and we urgently need tangible signals from Congress that it values nuclear power. And this is not a partisan issue. I see Members on both sides of the dias who either have lost nuclear plants in their States and local communities, or may soon experience this unfortunate event.

And you are not alone. America is in danger of losing dozens of her nuclear reactors in the next 10 years. To put this in perspective, units that have recently closed, and those who have announced specific plans to close would produce 90 million megawatt hours of clean energy. That is enough electricity to power 8.4 million homes each year. And this is a conservative estimate, as there are additional plants who have not provided a firm date but are clearly at risk, like the Ohio plants.

But it doesn't have to be this way. Nuclear power's contributions to this country deserve to be recognized. And this committee has the power to make that reality. A single nuclear plant creates hundreds of jobs and millions of dollars in revenue for rural towns and cities. And it produced unmatched amounts of carbon-free clean air electricity. And, as recently illustrated, it has the ability to withstand extreme weather events and continue to produce low-cost electricity, a major factor in ensuring the resiliency of our grid.

And for these reasons and more, we need to value nuclear power and work together to find a way to keep these essential plants online.

There are really four areas that need attention.

First is fair compensation.

Second is the fuel cycle. And that means the front end, the mining and enrichment piece; and the back end, a workable used fuel program.

Third is reforming the NRC. That involves both the fee structure and streamlining licensing of new technologies.

And fourth is exporting our technology. We need to level the playing field for our nuclear firms to compete against foreign governments.

My written testimony includes a number of legislative actions that would advance the prospects for nuclear energy to meet our Nation's needs. I commend Chairman Upton for hosting a series of hearings on the electricity markets. And I cannot stress enough the importance of ensuring appropriate market compensation for the

attributes of nuclear power. Market reforms are essential to the viability of the U.S. fleet. Simply put, we need your help to ensure that FERC and its associated RTOs and ISOs fully value the benefits provided by our plants.

I would also encourage the committee to consider innovative approaches, such as making it easier for Federal agencies to enter into power purchase agreements with new and existing reactors.

I thank this committee for taking action on used fuel legislation. And I do hope we can work to ensure House passage of that legislation in the near future, and another bipartisan piece of legislation led by Congressmen Kinzinger and Doyle to address the much-needed NRC fee reform. We do appreciate these efforts, and hope we can get them to the President's desk this year.

There is exciting innovation in the nuclear industry. It is happening across the company from reactor startups to the cutting edge research being conducted at our national labs, as you have heard. And this gives me hope. But if America, the country with the most reactors in the world, sits back and lets our fleet atrophy, that important innovation will die off as well. And we cannot let that happen.

Right now, of the 58 reactors under construction worldwide, only two are being built here in the United States. And even those projects are in jeopardy pending congressional action on the Nuclear Production Tax Credit. Comparatively, Russia is building seven reactors, and China 19. We are in imminent danger of ceding our global leadership in technology, that we invented, to the Russians and the Chinese.

Failure to lead the next wave of global nuclear construction means a significantly diminished ability to promote U.S. safety standards, nonproliferation behaviors, and security norms around the world. Simply put, U.S. influence grows when we have a strong civil nuclear industry.

Nuclear power has always answered the call of this Nation. It has powered our homes, our businesses, and our navy. It is allowing for space exploration and visits to Mars. It has helped fund schools and essential services in local communities across this country. Today the nuclear industry is here to ask America's leaders to answer our call. Please work with us to make sure this American technology does not become a ghost of our past. Your help and your active support is urgently needed.

Thank you. And I look forward to answering your questions.

[The statement of Ms. Korsnick follows:]

Summary of Testimony for Maria G. Korsnick
President and Chief Executive Officer, Nuclear Energy Institute
Before the Subcommittee on Energy
House Energy and Commerce Committee
February 6, 2018

Innovation in the nuclear industry is happening across the country—from reactor "startups" to the cutting edge research being conducted by our national laboratories. But if America—the country with the most reactors in the world—sits back and lets our fleet die off, then that important innovation will die off as well. The nuclear industry in our country is at a crossroads, and we urgently need tangible signals from Congress that it values nuclear power.

First, ensure nuclear power is fairly compensated. Ensuring nuclear power is fairly compensated is essential to the future of America's nuclear fleet. The Committee should encourage the Federal Energy Regulatory Commission (FERC) to promptly direct the regional transmission organizations (RTOs) to move forward with price reform efforts to recognize the reliability contributions of baseload resources. The Committee also should encourage the Department of Energy (DOE) to support FERC and RTOs efforts to identify grid resilience risks associated with fuel-security issues (*e.g.*, reliance on "just-in-time" natural-gas deliveries).

Second, reform the federal used fuel management program. The House should pass H.R. 3053, the Nuclear Waste Policy Amendments Act of 2017. But in moving the bill forward, it is important that bill's funding reforms not be weakened. Doing so would harm the durability of the federal used fuel program.

Third, reform the Nuclear Regulatory Commission's (NRC) fee structure. Reform of the NRC's fee recovery structure is necessary and overdue. NEI supports the Nuclear Utilization of Keynote Energy Act (H.R. 1320), which would establish a more rational fee recovery process.

Fourth, support the timely deployment of accident tolerant fuels, small modular reactors, and advanced reactors. Congress should: (a) establish deadlines for the NRC to reviews for new fuel types and advanced reactor designs; (b) enhance federal power purchase agreement authorities to provide agencies with the ability to enter into long-term contracts; and (c) extend the placed-in-service date for the nuclear production tax credit.

Fifth, streamline the nuclear export review process and expand nuclear project finance opportunities. To help level the playing for U.S. nuclear firms that compete against foreign governments, continued oversight of DOE's export regulations is needed, as are expanded opportunities to finance nuclear projects through a functioning Export-Import Bank.

Sixth, provide federal funding for decontamination and decommissioning of legacy gaseous diffusion plants. The gaseous diffusion plants were developed for nuclear weapons and national defense programs, and U.S. utilities have already paid twice for their portion of the decontamination and decommissioning of these sites. Congress should fund the decontamination and decommissioning of the gaseous diffusion plants and other legacy defense sites.

Testimony for the Record
Maria G. Korsnick
President and Chief Executive Officer, Nuclear Energy Institute
Before the Subcommittee on Energy
House Energy and Commerce Committee
February 6, 2018

I am Maria Korsnick, President and Chief Executive Officer of the Nuclear Energy Institute (NEI).[1] I appreciate the opportunity to testify on the challenges facing the nuclear industry and what those challenges mean for our nation's security, economy, and environment.

Nuclear power is vital to our electricity system. It provides almost 20 percent of America's electricity. Nuclear plants run 24 hours a day, 7 days a week producing power with unmatched reliability. These are hardened facilities that are protected from physical and cyber threats, helping to ensure we have a resilient electricity system in the face of potential disruptions.

The 99 reactors in our nuclear fleet provide about 60 percent of the clean electricity in our country. Because electricity generation from nuclear energy does not release carbon dioxide and other harmful air pollutants, by maintaining a strong nuclear fleet, the United States will not have to choose between the health of its electric grid and the health of its most vulnerable citizens.

While the domestic nuclear fleet is a central part of our nation's critical infrastructure, this national asset should not be taken for granted. In the last five years, six units that produced 4,100 megawatts of power have closed. Companies that own nuclear plants have announced the scheduled closure of an additional eight units, which provide another 7,100 megawatts of

[1] NEI is responsible for establishing policy on issues affecting the commercial nuclear energy industry. NEI has about 300 members, including companies licensed to operate U.S. commercial nuclear power plants, nuclear plant designers, major architect/engineering firms, fuel cycle facilities, materials licensees, labor organizations, universities, and other organizations involved in the nuclear energy sector.

capacity. Over the course of a year that amounts to over 90 million megawatt-hours of clean generation that will have been lost by the early closure of these units. For comparison, that is more than all of the wind electricity that Texas and California produced in 2016.

The nuclear industry is at a crossroads, and we urgently need tangible signals from Congress that it values nuclear power. I commend the Committee for holding its series of hearings on "Powering America" to explore the state of our electricity markets and the resilience of the electric grid. As I explained in my testimony on October 3, 2017, the failure of the organized markets to value the attributes provided by nuclear generation is undermining the survival of our country's merchant fleet. Ensuring nuclear power is fairly compensated by organized markets is essential to the future of America's nuclear fleet. Comprehensive market reform must correct defects in what is known as "price formation"—essentially the rules that govern how market prices are set. Although PJM Interconnection for example is considering promising price reform efforts to recognize the reliability contributions of baseload resources, these efforts are likely to stall unless the Federal Energy Regulatory Commission (FERC) directs them to move forward. The Committee should encourage FERC to do so.

The organized markets also need to start compensating nuclear generation for its unique set of valuable attributes, including the fact that it is not reliant on "just-in-time" fuel deliveries by virtue of having 18-to-24 months of fuel onsite. Although FERC has directed the regional transmission organizations (RTOs) like PJM to consider these issues in the context of grid resilience, this Committee should encourage the Department of Energy (DOE) to provide FERC and the RTOs with vital information in this process. DOE is well positioned to draw upon its expertise to help establish design basis threats for fuel delivery risks to electric generation, including potential long-term outage risks caused by natural and man-made threats.

I also would like to thank this Committee for its action on used fuel legislation and hope to see the House pass H.R. 3053, the Nuclear Waste Policy Amendments Act of 2017. But in moving the bill forward, it is important that funding reforms not be watered down. Doing so would harm the durability of the federal used fuel program, making it less likely that the taxpayers will ever be unburdened by the government's ever-mounting liability due to its inability to fulfill its obligations.

While the markets and used fuel are significant issues, today I am here to speak about several other important actions Congress can take to preserve our nation's leadership in the nuclear arena and help America's nuclear innovators thrive. Congress should reform the Nuclear Regulatory Commission's (NRC) fee structure and direct the NRC to modernize its regulatory framework to accommodate a range of innovative technologies. Modernizing the NRC's outdated fee structure, regulatory requirements and licensing processes is necessary for the operating fleet and will establish regulatory conditions that can foster deployment of new technologies. Without a strong operating fleet, we will be hard pressed to maintain the physical and intellectual infrastructure necessary to compete in what is now an international market.

On behalf of NEI and its members, I would like to thank this Committee for considering these important issues. I also urge the Committee to set the stage for preserving our operating fleet, and developing and deploying new innovative nuclear reactor technologies.

Reform of the NRC's fee recovery structure is necessary and overdue.

The origins of the NRC's fee structure dates back to the passage of the Omnibus Budget Reconciliation Act of 1990 (OBRA-90). OBRA-90 requires the NRC to recover approximately

90 percent of its budget through fees charged to licensees and applicants.[2] Congress provides the remaining 10 percent of the agency's budget authority through appropriations, which covers the costs for some of the NRC's activities that are not attributable to existing NRC licensees (*e.g.*, international assistance activities). This arrangement requires the industry to pay for "fees-for-services" at a current rate of $263 per hour. The industry also is charged annual fees, which are apportioned among licensee classes to cover the remainder of the agency's budget. These annual fees require that industry pay for many activities that provide no direct benefit to licensees.

Congress attempted to address these fairness and equity issues in the FY 2001 Energy and Water Development Appropriations Act but, by the late 2000s, significant problems with the NRC's fee recovery framework began to surface. Each year since then, in response to the NRC's proposed fee rule, NEI has raised concerns related to the level of fees to be collected and the issues caused by the fee structure. NEI has consistently emphasized the industry's concerns regarding significant increases in overhead costs, large increases in the NRC's budgets, and the failure to account for premature plant closures.

The NRC has largely responded to these comments by indicating that its "hands are tied" by the current statutory framework. Thus, congressional action is needed to make the fundamental changes to the NRC's fee recovery structure that are long overdue. Simply put, the NRC is not on course to accomplish that change absent a congressional mandate.

H.R. 1320, Nuclear Utilization of Keynote Energy Act, co-sponsored by Congressmen Kinzinger and Doyle would provide such a mandate. Notably, similar fee reform legislation is pending in the Senate after it was approved by the Environment and Public Works Committee by a bipartisan 18-3 vote (S. 512, Nuclear Energy Innovation and Modernization Act). H.R. 1320

[2] This fee-recovery requirement excludes amounts appropriated for waste incidental to reprocessing, generic homeland security activities, and inspector general services for the Defense Nuclear Facilities Safety Board, as well as any amounts appropriated from the Nuclear Waste Fund.

would establish a more rational fee recovery process that also will ensure that the agency continues to be sufficiently funded to effectively carry out its mission to protect public health, safety, and security. The bill would help bring the NRC's spending on corporate support in line with other federal agencies by limiting corporate support costs to no more than 30 percent of the agency's budget authority, beginning in FY 2020 and FY 2021. The percentage cap on corporate support is to be reduced by 1 percent every two years until reaching 28 percent in FY 2024. This improved efficiency should translate to lower annual fees for licensees.

Complementing the limit on corporate support, the bill would cap annual fees for operating power reactors at the FY 2016 level (adjusted to reflect changes in the Consumer Price Index). The misalignment between the NRC's budget and its workload has recently resulted in an annual fee structure that penalizes reactor licensees that continue to operate for another licensee's decision to discontinue operation. The cap on annual fees should mitigate the potential for excessive fees, which will be particularly important if the NRC does not adequately adjust its budget to reflect the declining workload with fewer operating reactors and increase its efficiency.

It is important to understand that a cap on annual fees would not adversely affect safety. The cap in the bill is set at the 2016 fee rule level—among the highest in the NRC's history. This assures that the NRC would have significant resources to carry out its safety and security mission. The annual fee cap also does not affect "fee-for-service" activities, which the NRC recovers separately. The NRC will continue to recover fees necessary to support the NRC resident inspector program, force-on-force exercises, security plan reviews, and emerging issues that may require NRC resources to perform additional safety or security inspections at specific facilities. The cap on annual fees would not constrain the NRC's resources in a way that would compromise the agency's safety and security mission, and it appropriately provides for a waiver

of the cap in the case of unforeseen and unlikely circumstances.

The bill also would provide relief based on equitable considerations. For example, it appropriately prevents the NRC from recovering fees for activities that are not attributable to an existing NRC licensee or class of licensees. Additionally, the bill provides for federal funding for the development of regulatory infrastructure for advanced reactor licensing.

The NRC's regulatory processes should be modernized and streamlined to support timely deployment of accident tolerant fuels and other innovations.

Current operating plants, units now under construction, and plants of the future all must be able to rely on a safety-focused, efficient, and technically-expert regulator. It is eminently reasonable for the industry as well as our nation's energy consumers to expect a regulatory process with those attributes. To keep pace with the pace of technological innovation, the NRC's untimely, somewhat outdated, and unnecessarily costly regulatory regime needs updating.

In an ideal world, NRC would use realistic information in its decision-making, resources would be allocated based on risk information, and such information would be used to efficiently resolve issues with very low safety significance. In this world, the NRC would encourage the use and incorporation of new, advanced technologies that increase safety margins, such as digital controls, advanced process monitoring, and advanced fuels.

What we see instead are significant barriers to progress. These include the inconsistent use of risk-informed thinking in regulation, insufficient attention to realism in risk modeling, and a reluctance to embrace transformative changes needed in the areas of digital instrumentation and control, advanced fuels, new reactor licensing, and automated process monitoring.

We are encouraged by the NRC's recent announcement of an effort to transform its processes and culture to address these barriers. This effort, however, is in its infancy and it is unclear what changes are being considered and how much time will be needed to implement the

changes once approved by the Commission. If taken now, congressional action directing regulatory reform can shape these NRC efforts so that they make a meaningful difference. Whether it is an energy bill, standalone legislation, or an infrastructure package, Congress should focus on the following areas for reshaping the regulatory processes.

Encouraging the deployment of accident tolerant fuel. Collaborating with DOE, the U.S. nuclear industry is developing highly advanced accident tolerant fuels (ATF), which offer improved performance and have the potential to provide significant additional safety margin to protect the public and environment. Initial evaluations also project cost savings due to improved fuel cycle economics, reduced operational and maintenance costs, and enhanced ability for reactor maneuvering and potential load-following flexibility. ATF thus has the potential to improve the economic competiveness of the existing fleet of nuclear reactors. The effort to develop ATF designs is accelerating as the value of these technologies becomes more apparent.

In the next week or so, the first ATF lead-test rods will be loaded at Hatch Nuclear Plant in Georgia. Even more advanced designs also will be tested in the coming years. In total, four technologies are moving to commercialization. The industry's goal is to enable initial deployment of ATF into commercial reactors in the early to mid-2020s.

To meet this timetable, industry and the NRC will have to improve the processes for bringing new fuels to market—an endeavor that in the past has typically taken a decade or longer. On the industry side this will involve greater reliance on advanced computer modeling techniques and a closer collaboration with the scientific community in the DOE complex. Efforts are well underway in this regard and industry very much appreciates the strong support these efforts have received from Congress. The $55 million in funding and accompanying direction to DOE in the Senate's latest appropriations proposal is exemplary, and the recent successful restart

of DOE's Transient Reactor Test Facility, which will provide valuable data to inform ATF development, is evidence that funding in this area is money well spent.

On the NRC front, agency staff recently issued a draft project plan for ATF licensing. We look forward to continuing to work with NRC to reshape its regulatory framework in a way that recognizes, and enables in a timely manner, advanced safety assurance capabilities. But congressional action would help to pave the way for a more modern regulatory approach. Because investment in nuclear energy infrastructure is inhibited by uncertain timelines for regulatory reviews and a lack of transparency into project management, Congress should put reasonable time limits for reviews to encourage efficiency. Legislation is needed to establish a deadline for the NRC to review new reactor designs or new fuel types. A two-year deadline would be reasonable.

Such action by Congress would help support advanced innovations such as the new reactor concepts now under development. The fundamental rethinking of the makeup and configuration of nuclear fuel embodied in the ATF efforts may be just the beginning. Rapid innovation is driving a revolution in energy technology, as is evident in the natural gas, solar, and wind industries. But for our nation to continue to benefit from the inherent advantages of nuclear energy—a small environmental footprint combined with advantages of scale and reliability—we need the nuclear industry to be part of that innovation revolution.

Accelerating licensing and deployment of advanced nuclear reactor technologies. NEI supports a nuclear future that includes additional large light water reactors (LWRs) and advanced reactors, including water-cooled small modular reactors (SMRs) and non-light water reactors. Evolutionary LWR designs already are commercially available, with the two AP1000 units under construction at the Vogtle site in Georgia. Advanced water-cooled SMRs are expected to be

available by the mid-2020s and advanced non-LWRs are being developed to complement the suite of nuclear generating options available in the future. It is critically important that the U.S. nuclear industry maintains a leadership role in nuclear technology development and contributes to worldwide safety enhancements by continuing to design and build new nuclear plants.

One hundred miles outside of Atlanta, Georgia, over 6,000 workers are currently building our country's first advanced nuclear power facilities. When construction began on the two units, it was with the understanding that once in operation, the facility would be eligible to receive the nuclear production tax credit. Unfortunately, the reactors are currently set to come online just after the eligibility date for receiving the tax credit that Congress has already included in its budget. I was very pleased that the House addressed this issue by passing stand-alone legislation last summer and also included an identical provision in its version of tax reform. But the final version of tax reform failed to include this critical clean energy provision. Extending the current placed-in-service date for the nuclear production tax credit is essential to the project's success. I humbly ask every member on this Committee for any assistance you can offer in encouraging passage of bipartisan legislation to extend the placed-in-service deadline in a timely manner. The United States must show the international community that we can still build the world's most advanced nuclear reactors in order to remain a global leader in the commercial nuclear industry.

Beyond the United States, many countries are looking to a rapid expansion of nuclear generation to address their growing electricity needs. As the United States will need to replace a significant amount of retiring generation beginning in the 2030s, it is imperative that the U.S. industry's technology be available for domestic and international deployment. Advanced nuclear reactor designs have many potential technological advantages—making them particularly appropriate for deployment in developing economies (*e.g.*, passive cooling even in the absence

of an external energy supply; operation at or near atmospheric pressure, which reduces the likelihood of a rapid loss of coolant; extended operations between refueling; consumption of nuclear waste as fuel, thus reducing disposal issues).

Although the U.S. led the world into the age of nuclear energy, we are losing ground to other countries with substantial, state-funded advanced reactor programs. The Russians are operating two commercial liquid-metal fast-reactors and the Chinese are bringing a commercial high-temperature gas pebble-bed reactor online this year. By the time the U.S. has an operational pebble-bed reactor, the Chinese will likely have 10 years of operational experience. This is not a comment about the U.S. developer, but rather a comment about the lack of our government's investment in new technologies. To avoid being left behind, we must focus on regulatory reform, R&D infrastructure, and development and deployment of new technologies. The strategic importance of U.S. nuclear technology development and sales should not be underestimated. Nuclear power plants are enduring national assets that forge a special century-long relationship between the host country and the nation that supplies the reactors and the associated fuel, major components, operations, maintenance, security, and decommissioning services.

The development of U.S. advanced reactor technology is at risk unless we modernize our licensing process. We believe the U.S. government must act promptly to create a streamlined and predictable licensing pathway for advanced reactors. The House already has taken a step in the right direction by passing the Advanced Nuclear Technology Development Act of 2017 (H.R. 590), cosponsored by Congressmen Latta, McNerney, Fleischmann, Doyle, Hudson, and Tonko. NEI supports this bill, which would encourage cooperation between DOE and NRC to develop a regulatory framework for advanced nuclear energy technologies. It also directs the NRC to develop an efficient, risk-informed, technology-neutral framework for advanced reactor

designs. Such a framework would help align the regulatory framework for advanced reactors with their inherent enhanced safety. Modernizing design requirements via a more technology-neutral, performance-based and safety-focused regulatory process would reduce unnecessary regulatory burden, reduce licensing and operating costs, and improve the economic viability of these technologies.

NEI also supports the approach to modernize the NRC licensing process in H.R. 1320, the Nuclear Utilization of Keynote Energy Act. It would help to reverse the trend of excessively long licensing reviews. Compared to its practice decades ago, the NRC requires applications for designs with improved safety features to provide greater detail, which adds time and expense without enhancing safety. Licensing reactors is becoming more time consuming and less certain even as the designs get safer. This "regulatory creep" must be reversed by focusing licensing reviews on areas that are safety-significant and changing practices on the required level of detail in license applications.

We strongly encourage this Committee to give strong consideration to H.R. 1320. In addition, the Committee should support the following policies that would help maintain U.S. technological leadership.

- Enhance federal power purchase agreement (PPA) authorities to provide agencies the ability to enter into long-term PPAs for the life of a nuclear facility: Legislation is needed to ensure that such a PPA's impact to the federal budget is assessed annually instead of the entire PPA value being "scored" in the year the PPA is entered. PPAs should have a mechanism to allow DOE and Department of Defense facilities to compensate SMR and other nuclear plants that supply electricity to national security and mission critical activities. This has the potential to be a win-win for the industry and our government.

- Create a pathway and schedule for commercialization of light water small modular reactors and non-light water reactor technologies: This pathway would include industry cost-shares, with DOE demonstrating the latest advanced manufacturing and construction techniques, and providing incentives for first-movers that deploy these technologies.
- Establish an infrastructure financing program that will allow large, job-creating projects to access capital at preferred rates: Targeted federal support could be used to more efficiently deploy private equity, enabling the pursuit of infrastructure projects that would otherwise have not been feasible. Such a program could be of value in encouraging small modular reactor projects as well as advanced reactor construction.
- Fund and execute its versatile test reactor program with the objective of having a new fast neutron user facility up and running by the end of 2025: The United States currently lacks the fast neutron irradiation testing capability needed to develop advanced nuclear fuels and materials. The only resource currently available to U.S. companies is in Russia. We look forward to working with the House to advance H.R. 431 and H.R. 4378 to authorize a much-needed versatile test reactor.
- Provide a pathway to ensured supply of high-assay low-enriched uranium: Congress should require that DOE develop and submit a plan to provide both near- and long-term sources of fuel with uranium enrichment levels between five and twenty percent to support advanced reactors and advanced fuel designs.
- Ensure that the NRC provides additional flexibility for changes during construction: Utilities and reactor builders need the ability to make changes during construction without prior NRC approval for minor changes. Without new or revised guidance and regulations, current and future plants under construction face increased costs, delays, and

unnecessary regulatory burden. Increased congressional oversight would encourage the NRC to make these necessary changes.

- Reduce burdensome environmental regulations. Although the National Environmental Policy Act (NEPA) does not require trial-type hearings and most agencies conduct NEPA reviews through a notice-and-comment process, the NRC uses this standard procedure but also reconsiders NEPA issues again in an adversarial adjudicatory hearing. Congress should direct NRC to modernize its process and allow the NRC's NEPA documentation to be brought directly to an agency decision-maker, without a burdensome and duplicative adjudicatory process.

The nuclear export review process should be streamlined and nuclear project finance opportunities should be expanded.

The United States developed and commercialized nuclear technologies and through their export allowed millions around the globe to benefit from abundant, clean, and reliable electricity. With the largest operating fleet and world-leading technology, the United States sets the bar for operational and safety practices and has led all other nations in setting nuclear security and non-proliferation norms.

Today, however, the global landscape is rapidly shifting. Russia, and more recently China, have made great strides developing their nuclear industries, both domestically and for the export market. With their expansion, those nations are poised to take leading roles in the establishment of global nuclear norms and standards in the future. Russia, through the state-owned and state-supported company "Rosatom," is building seven new reactors domestically and reports to have $133 billion in foreign orders.[3] Russian-supplied reactors are under construction in Bangladesh, Belarus, India, Slovakia, and China, and there have been announcements of

[3] *See* International Atomic Energy Agency, Power Reactor Information System, *available at* https://www.iaea.org/pris/; Rosatom, Global Presence, available at http://www.rosatom.ru/en/global-presence/.

Russian-supplied nuclear projects in Turkey, Finland, Egypt, and elsewhere. In just the past five years, China has brought more than 20 reactors on line and today has 19 additional plants under construction.[4] China is aggressively becoming a supplier to the global market, including engagement in Argentina and the United Kingdom. Both China and Russia are actively pursuing the current reactor tender in Saudi Arabia.

To reverse this trend, action is urgently needed to level the playing field for U.S. industry. U.S. firms compete not with other companies but with governments, and the head of state is often a key advocate for its national nuclear industry. A whole-of-government approach, informed by strategic thinking about global nuclear energy development and geopolitical relationships, is critical for long-term U.S. success. High-level coordination across the executive branch is vital for achieving this objective. NEI commends the recent efforts led by the DOE and Department of Commerce to advocate for U.S. industry and is encouraged by broader Trump Administration efforts to promote U.S. nuclear exports. But there is much more work to do to level the playing field.

Streamline the nuclear export review process. The nuclear industry thanks this Committee for its beneficial oversight of the 10 C.F.R. Part 810 regulation, which governs the export of unclassified nuclear energy technology. But the lengthy time required by DOE to process a Part 810 specific authorization continues to inflict great harm on the competitiveness of U.S. nuclear exporters. This problem is not new. The time required to process a Part 810 application has ballooned steadily since 1990 to the current average of 400 days. By comparison, other leading nuclear supplier countries require from five weeks to three months for an equivalent export authorization. As national security experts have noted, this widening gap in

[4] *See* International Atomic Energy Agency, Power Reactor Information System, *available at* https://www.iaea.org/pris/.

processing times not only disadvantages U.S. nuclear exporters but also undermines U.S. leadership on global nuclear safety, security, and nonproliferation.

DOE recently demonstrated that processing a Part 810 specific authorization need not make U.S. firms uncompetitive. We applaud that effort and urge the Department to address, in a more systematic manner, the burden that Part 810 imposes on U.S. exports and American jobs. We look forward to working with the Administration and this Committee on reforming Part 810.

Expand opportunities to finance nuclear projects. While U.S. firms are able to provide superior technologies, state-owned competitors can often provide financing options that U.S. firms cannot match. To remedy this, the U.S. Senate needs to ensure the Export-Import Bank of the United States can function. Right now, there are pending nominations to the board of the Export-Import Bank awaiting confirmation, which has lacked a quorum since June 2015. Without a quorum, the Bank cannot approve transactions in excess of $10 million, a woefully insufficient amount when considering a nuclear energy transaction. In addition, we encourage the Administration and Congress to take the follow steps:

- Work with the Export-Import Bank to develop financing tools that are more competitive with financing provided by other countries' export credit-agencies;
- Revise the Overseas Private Investment Corporation's Environmental and Social Policy Statement to remove "the production of or trade in radioactive materials, including nuclear reactors and components thereof" from the list of Categorical Prohibitions;
- Open discussions with the World Bank Group and other Multilateral Development Banks encouraging them to allow financing of civil nuclear energy projects.

The long-term viability of U.S. uranium mines and related infrastructure needs to be strengthened.

A secure and reliable nuclear fuel cycle is a key component to powering our 99 operating reactors. The nuclear fuel cycle is a series of industrial processes that involve transforming mined uranium into nuclear fuel rods for power reactors. Unfortunately, the domestic uranium mining and conversion industries are under significant financial stress due to prolonged, low global market prices. Our domestic uranium mines have had to make difficult choices in laying off staff and suspending operations, including the suspension of operations at the nation's only conversion facility in Illinois. Domestic industries have to compete against international suppliers, some of which are state owned enterprises that can withstand the market's low prices. Congress should act decisively to restore the long-term viability of the nation's uranium mines and related infrastructure. The viability of this infrastructure is not only important to our commercial nuclear fleet, but also is critical for our defense and naval propulsion capabilities. A weakened U.S. nuclear fuel cycle and supply chain diminishes the ability of the U.S. to serve as an effective voice for nuclear nonproliferation and reduces our ability to continue to play a leadership role in shaping the development of nuclear energy in emerging nuclear states.

Federal funding should be provided for decontamination and decommissioning of legacy gaseous diffusion plants.

Gaseous diffusion plants were operated exclusively for nuclear weapons and national defense programs for the first 15 to 20 years of operation before they began to provide commercial enrichment services. Since a significant majority of the production at these sites went to the U.S. government and to foreign utilities, and because the majority of the cleanup costs are directly associated with defense programs, federal funding should be provided for the decontamination and decommissioning of these sites. U.S. utilities already have paid twice for

their portion of the decontamination and decommissioning of these sites—once through original full-cost recovery contracts, which included fees for cleanup that the government collected but did not set aside, and the second time through an annual tax, which was paid in the amount of $2.6 billion. The customers of U.S. utilities should not be singled out yet again to pay to clean up DOE facilities developed for nuclear weapons and national defense programs.

In addition to the decontamination and decommissioning of gaseous diffusion sites, NEI supports DOE in its critical mission to complete the safe cleanup of all legacy sites resulting from decades of nuclear weapons development and government-sponsored nuclear technology research. Adequate funding for DOE is necessary to meet commitments made to affected communities and states. DOE's Office of Environmental Management must be funded to match its anticipated workload. It is critical that DOE work in concert with industry contractors to identify barriers to the effective execution of its objectives: risk reduction and the successful planning, construction, and operation of large, often first-of-a-kind projects and facilities.

Conclusion

On behalf of NEI and its members, I remind the Committee that fairly compensating nuclear plants for the many benefits they deliver is essential, both to ensure we continue to enjoy the benefits of today's reactors and to create the market signals needed to spur investment in a next generation of nuclear power plants. I thank the Committee for its work advancing the Nuclear Waste Policy Act Amendments of 2017 (H.R. 3053) and look forward to its consideration of the Nuclear Utilization of Keynote Energy Act (H.R. 1320). A strong commercial nuclear industry benefits all Americans by helping to supporting energy diversity and the clean air benefits nuclear plants provide. We look forward to working with members of Congress on these issues.

Mr. OLSON. Thank you, Ms. Korsnick.

Mr. Trimble is recognized for 5 minutes as well. He is the Natural Resources and Environment Director at the Government Accountability Office. Five minutes, sir. Thank you.

STATEMENT OF DAVID C. TRIMBLE

Mr. TRIMBLE. Thank you. Chairman Olson, Ranking Member Rush, and members of the subcommittee, the critical missions of the Department of Energy depend on the extraordinary capabilities found at the department and its network of laboratories and production facilities across the country. These capabilities depend on the large and unique capital assets found at these facilities, but also the expertise of the workforce that is a product of years of on-the-job training and experience that exists nowhere else in the world.

These capabilities serve all of DOE missions, including weapons, cleanup, nonproliferation, energy, and science. To successfully execute these missions, DOE must maintain, rebuild, and renew both its physical and human capital. DOE's efforts, however, are hindered by longstanding management challenges that have been well documented in reports by Mies-Augustine, CRENEL, the Academies, and GAO.

The growing fiscal and budgetary pressures facing the Government mean that DOE can no longer afford to poorly manage these billion-dollar programs.

My testimony today will highlight some of the challenges facing DOE, including the affordability of NNSA's nuclear modernization programs, the growing costs of DOE's environmental liabilities, management challenges in the nonproliferation program, and DOE's efforts to improve its management of programs, projects, and contracts.

Regarding weapons, NNSA faces challenges with the affordability of its nuclear modernization programs. Our review of the fiscal year 2017 modernization plan found misalignment between NNSA's plan and projected budgetary resources, which could make it difficult for NNSA to afford its planned portfolio of modernization programs. We found that NNSA's estimates of program costs exceeded the projected budgetary resources included in the President's planned near and long-term modernization budgets.

Regarding environmental cleanup, DOE's growing environmental liabilities demonstrate the need for DOE to improve its oversight and management of its cleanup mission. In 2017, we added the Federal Government's environmental liabilities to our high-risk list. DOE is responsible for about 370 of the 450 billion-dollar total, and DOE's total cleanup liability has been growing.

Over a recent 6-year period, DNN spent $35 billion on cleanup, while its liabilities grew by $90 billion. I should also note that these liability estimates do not include all of DOE's future cleanup responsibilities.

Our recent works have identified opportunities where DOE may be able to save tens of billions of dollars by taking risk-informed approach to treating a portion of this Low Activity Waste at its Hanford site.

Regarding nonproliferation, DNN has not consistently used program management leading practices. We found that DNN's policies do not require programs that establish life cycle estimates or manage their performance against schedule and across baselines. In addition, we found that DNN's R&D results were not being tracked consistently to help evaluate the success of that program.

To successfully meet the challenges facing it, DOE needs to improve its management of its programs, projects, and contracts, areas that have been on GAO's high-risk list for almost three decades. In recent years, DOE has taken some important steps, including requiring the development of cost estimates in accordance with best practices; creating new oversight structures; and ensuring that major projects, designs, and technologies are sufficiently matured before construction.

However, significant challenges remain:

First, DOE still lacks reliable, enterprise-wide cost information. Without this information, meaningful cost analyses across programs, contractors, and sites are not possible. Reliable detailed data are also needed for DOE to manage its risk of fraud.

Second, DOE has not always followed its own requirements. In 2015, we reported that DOE initiated a new project, Low Activity Waste Pretreatment System, to accelerate waste treatment at Hanford. We found this project was selected without full consideration of alternatives, and DOE's cost estimates were not reliable. Additionally, DOE has not consistently applied these recent reforms to its largest cleanup project at the Hanford site.

Third, regarding program management, we found in 2017 that NNSA had established program management requirements for commodities like uranium, plutonium, and tritium. However, these requirements are not being met due to staff shortages.

In closing, let me note that we have several ongoing engagements for this committee examining these management challenges. And we strongly support the oversight efforts of the committee.

Thank you. I would be happy to answer any questions.

[The statement of Mr. Trimble follows:]

United States Government Accountability Office

GAO

Testimony before the Subcommittee on Energy, Committee on Energy and Commerce, House of Representatives

For Release on Delivery
Expected at 10:00 a.m. ET
Tuesday, February 6, 2018

DEPARTMENT OF ENERGY

Continued Actions Needed to Modernize Nuclear Infrastructure and Address Management Challenges

Statement of David C. Trimble, Director
Natural Resources and Environment

GAO-18-374T

GAO Highlights

Highlights of GAO-18-374T, a testimony before the Subcommittee on Energy, Committee on Energy and Commerce, House of Representatives

Why GAO Did This Study

DOE's NNSA is responsible for managing the nuclear weapons stockpile and supporting nuclear nonproliferation efforts. DOE's Office of Environmental Management's mission includes decontaminating and decommissioning facilities that are contaminated from decades of nuclear weapons production.

Over the last few years, GAO has reported on a wide range of challenges facing DOE and NNSA. These challenges contribute to GAO's continuing inclusion of DOE's and NNSA's management of major contracts and projects on the list of agencies and program areas that are at high risk of fraud, waste, abuse, and mismanagement, or are in need of transformation. GAO also recently added the U.S. government's environmental liabilities to this list.

This statement is based on 25 GAO reports issued from April 2011 through January 2018 and discusses (1) challenges related to the affordability of NNSA's nuclear modernization plans; (2) challenges related to DOE's environmental liability; (3) the status of DOE's efforts to improve its management of contracts, projects, and programs; and (4) challenges facing NNSA's nonproliferation programs.

What GAO Recommends

GAO has previously suggested that Congress consider changes to the laws governing environmental cleanup activities. In addition to these suggestions, GAO has made numerous recommendations to DOE to address its management challenges.

View GAO-18-374T. For more information, contact David Trimble at (202) 512-3841 or trimbled@gao.gov.

February 6, 2018

DEPARTMENT OF ENERGY

Continued Actions Needed to Modernize Nuclear Infrastructure and Address Management Challenges

What GAO Found

The Department of Energy's (DOE) National Nuclear Security Administration (NNSA) faces challenges related to the affordability of its nuclear modernization programs. In April 2017, GAO found a misalignment between NNSA's modernization plans and the estimated budgetary resources needed to carry out those plans. Specifically, GAO found that NNSA's estimates of funding needed for its modernization plans sometimes exceeded the budgetary projections included in the President's planned near-term and long-term modernization budgets by billions of dollars. GAO also found that the costs of some major modernization programs—such as for nuclear weapon refurbishments—may also increase and further strain future modernization budgets. GAO recommended in April 2017 that NNSA include an assessment of the affordability of its modernization programs in future versions of its annual plan on stockpile stewardship; NNSA neither agreed nor disagreed with that recommendation.

DOE also faces challenges with addressing its environmental liabilities—the total cost of its cleanup responsibilities. In February 2017, GAO found that DOE was responsible for over 80 percent ($372 billion) of the U.S. government's estimated $450 billion environmental liability. However, this estimate does not reflect all of DOE's cleanup responsibilities. Notably, this estimate does not reflect all of the future cleanup responsibilities that DOE may face. For example, in January 2017, GAO found that the cost estimate for DOE's proposal for separate defense and commercial nuclear waste repositories excluded the costs and time frames for site selection and site characterization, and therefore full costs are likely to be billions of dollars more than DOE's reported environmental liabilities. To effectively address cleanup, GAO has made at least 28 recommendations to DOE and other federal agencies, which could reduce long-term costs as well as environmental risks more quickly. Of these, 13 remain not implemented.

DOE has taken several important steps that demonstrate its commitment to improving contract and project management, but challenges persist. Specifically, DOE's revised project management order, issued in May 2016, made several changes in response to recommendations GAO made in prior years, such as requiring that projects develop cost estimates and analyses of alternatives according to our best practices. However, DOE's recent efforts do not address several areas, such as acquisition planning for major contracts and aspects of program and project management, where the department continues to struggle. GAO has made several recommendations related to these areas, and DOE has generally agreed with and begun to take action on most of them.

Finally, NNSA faces challenges in implementing its nonproliferation programs. For example, in September 2017, GAO found that selected programs in NNSA's Office of Defense Nuclear Nonproliferation (DNN) did not measure performance against schedule and cost baselines, as recommended by program management leading practices because DNN's program management policy did not require programs to measure performance in this way. GAO recommended that DNN revise its policy to require programs to measure performance against cost and schedule baselines. NNSA indicated it plans to take action to revise its policy.

Chairman Upton, Ranking Member Rush, and Members of the Subcommittee:

Thank you for the opportunity to discuss our recent work on some of the pressing management challenges facing the Department of Energy's (DOE) National Nuclear Security Administration (NNSA) and Office of Environmental Management (EM).[1] NNSA is responsible for managing the nation's three nuclear security missions: ensuring a safe, secure, and reliable nuclear deterrent; achieving designated reductions in the nuclear weapons stockpile; and supporting the nation's nuclear nonproliferation efforts. In support of these missions, NNSA's February 2016 budget justification for the Weapons Activities appropriations account included about $49.4 billion for fiscal years 2017 through 2021 to implement its weapons modernization plans. More recently, in November 2017, NNSA issued its *Stockpile Stewardship and Management Plan*, which included about $10.2 billion for weapons activities for fiscal year 2018.

In support of its missions, NNSA implements a range of nonproliferation programs under its Office of Defense Nuclear Nonproliferation.[2] These programs include efforts to secure, consolidate, and dispose of weapons-usable nuclear materials and radiological sources;[3] reduce the risks of nuclear smuggling; enhance international export controls and International Atomic Energy Agency nuclear safeguards;[4] and support research and development of new nonproliferation technologies.

[1]NNSA is a separately organized agency within the Department of Energy. It was created under Title 32 of the National Defense Authorization Act for Fiscal Year 2000, Pub. L. No. 106-65, §§ 3201-3299, 113 Stat. 512, 953-971 (1999) (codified as amended at 50 U.S.C. §§ 2401-2484 (2017)).

[2]DOE defines a program as an organized set of activities directed toward a common purpose or goal in support of an assigned mission area.

[3]Weapons-usable nuclear materials are highly enriched uranium, uranium-233, and any plutonium containing less than 80 percent of the isotope plutonium-238. Such materials are also often referred to as fissile materials or strategic special nuclear materials.

[4]The International Atomic Energy Agency is an independent international organization based in Vienna, Austria, that is affiliated with the United Nations and has the dual mission of promoting the peaceful uses of nuclear energy and verifying that nuclear material subject to safeguards is not diverted to weapons development efforts or other proscribed purposes. Safeguards allow the agency to independently verify that nuclear material and other specified items are not diverted by, among other things, inspecting all facilities and locations containing nuclear material declared by countries to verify its peaceful use.

EM is responsible for decontaminating and decommissioning nuclear facilities and sites that are contaminated from decades of nuclear weapons production and nuclear energy research. In February 2017, we reported that, since its inception in 1989, EM has spent over $164 billion on cleanup efforts, which include retrieving, treating, and disposing of nuclear waste.[5]

Both NNSA and EM face critical challenges in fulfilling their missions. Since the end of the Cold War, key portions of the nuclear security enterprise's weapons production infrastructure have become outdated, prompting congressional and executive branch decision makers to call on DOE to develop plans to modernize this infrastructure.[6] The Department of Defense's (DOD) 2010 Nuclear Posture Review identified long-term modernization goals and requirements, including sustaining a safe, secure, and effective nuclear arsenal through increasing investments to rebuild and modernize the nation's nuclear infrastructure, some of which dates back to the 1940s.[7] In January 2017, the President directed the Secretary of Defense to initiate a new Nuclear Posture Review to ensure that the U.S. nuclear deterrent is modern, robust, flexible, resilient, ready, and appropriately tailored to deter 21st-century threats and reassure our allies. This review was released in February 2018.[8]

As NNSA works to modernize the nuclear security enterprise, EM must address the legacy of 70 years of nuclear weapons production and energy research by DOE and its predecessor agencies. These activities generated large amounts of radioactive waste, spent nuclear fuel, excess plutonium and uranium, and contaminated soil and groundwater. They also contaminated thousands of sites and facilities, including land, buildings, and other structures and their systems and equipment. Various federal laws, agreements with states, and court decisions require the federal government to clean up environmental hazards at federal sites

[5]GAO, *High-Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others*, GAO-17-317 (Washington, D.C.: Feb. 15, 2017).

[6]The end of the Cold War caused a dramatic shift in how the United States approaches nuclear weapons. Instead of designing, testing, and producing new nuclear weapons, U.S. strategy shifted to maintaining the existing nuclear weapons stockpile indefinitely.

[7]Department of Defense, *Nuclear Posture Review Report* (Washington, D.C.: Apr. 6, 2010). The Nuclear Posture Review establishes the nation's nuclear weapons requirements and policy.

[8]Department of Defense, *Nuclear Posture Review* (Washington, D.C.: Feb. 2018).

and facilities, such as nuclear weapons production facilities. DOE's approach to addressing these environmental liabilities is often influenced by numerous site-specific factors, stakeholder agreements, and legal provisions. For years, we and others have reported on shortcomings in DOE's approach to addressing its environmental liabilities, including incomplete data on the extent of cleanup needed.

DOE relies primarily on contractors to carry out its programs, and it is the largest civilian contracting agency in the federal government. In fiscal year 2017, it spent approximately 90 percent of its $32 billion in annual funding on contracts and major capital asset projects.[9] We designated DOE's contract management—which has included both contract administration and project management—as a high-risk area in 1990 because DOE's record of inadequate management and oversight of contractors had left it vulnerable to fraud, waste, abuse, and mismanagement. In our 2017 high-risk update, we reported that NNSA and EM continued to demonstrate a strong commitment and top leadership support to improve contract and project management—a key criterion for removing agencies and program areas from our High-Risk List.[10] However, we also found that DOE still needs to make more progress on the other four criteria for removal: organizational capacity, corrective action planning, monitoring effectiveness, and demonstrating progress.

Further, in our 2017 high-risk update, we added the federal government's environmental liabilities to our High-Risk List. More than 80 percent of these liabilities are DOE's responsibility.[11] In our 2017 high-risk update, we reported that because of incomplete information and often inconsistent approaches to making cleanup decisions, DOE does not always approach environmental cleanup using a risk-informed approach to reduce health and safety risks in a cost-effective manner.

[9]Those are projects estimated to cost of $750 million or more. DOE defines a capital asset project as a project with defined start and end points required in the acquisition of capital assets.

[10]GAO-17-317. GAO's high-risk program identifies government operations with greater vulnerabilities to fraud, waste, abuse, and mismanagement or the need for transformation to address economy, efficiency, or effectiveness challenges.

[11]GAO-17-317.

My testimony today discusses (1) challenges related to the affordability of NNSA's nuclear weapons modernization plans; (2) challenges in addressing DOE's environmental liabilities; (3) the status of DOE's efforts to improve its management of contracts, projects, and programs; and (4) challenges facing NNSA's nonproliferation program. My statement is based primarily on our work from 25 GAO reports issued from April 2011 to January 2018—including 5 reports issued since I last testified on this issue in May 2017 (see the end of this testimony for a list of related reports).[12] Detailed information about the scope and methodology we used to conduct our prior work can be found in each of our issued reports. The work upon which this testimony is based was conducted in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the audit to obtain sufficient, appropriate evidence to provide a reasonable basis for our findings and conclusions based on our audit objectives. We believe that the evidence obtained provides a reasonable basis for our findings and conclusions based on our audit objectives.

Misalignment between NNSA's Modernization Budget Estimates and Plans Raises Affordability Concerns

In April 2017, we issued our latest report on NNSA's 25-year plans to modernize the nation's nuclear weapons stockpile and its supporting infrastructure.[13] In that report, we identified two areas of misalignment between NNSA's modernization plans and the estimated budgetary resources needed to carry out those plans, which could result in challenges to NNSA in affording its planned portfolio of modernization programs. First, we found that NNSA's estimates of funding needed for its modernization plans sometimes exceeded the budgetary projections included in the President's planned near- and long-term modernization budgets. In the near-term (fiscal years 2018 through 2021), we found that NNSA may have to defer certain modernization work beyond that time period to execute its program within the planned budget, which could increase modernization costs and schedule risks. This is a pattern we have previously identified as a "bow wave"—an increase in future years' estimated budget needs that occurs when agencies are undertaking more programs than their resources can support. In the long-term (fiscal years 2022 through 2026), we found that NNSA's modernization program

[12]GAO, *Department of Energy: Continued Actions Needed to Address Management Challenges*, GAO-17-651T (Washington, D.C.: May 24, 2017).

[13]GAO, *National Nuclear Security Administration: Action Needed to Address Affordability of Nuclear Modernization Programs*, GAO-17-341 (Washington, D.C.: Apr. 26, 2017).

budget estimates sometimes exceeded the projected budgetary resources planned for inclusion in the President's budget, raising additional questions about whether NNSA will be able to afford the scope of its modernization program. Second, the costs of some major modernization programs—such as for nuclear weapon refurbishments—may also increase and further strain future modernization budgets. We are currently reviewing NNSA's *Fiscal Year 2018 Stockpile Stewardship and Management Plan*.[14]

Misalignment between Estimates and Plans May Result in Increased Cost and Schedule Risks and Raises Affordability Concerns

As we reported in April 2017, NNSA estimates of funding needed for its modernization plans sometimes exceeded the budgetary projections included in the President's planned near- and long-term modernization budgets.[15]

Near-term Misalignment between Modernization Plans and Estimated Budgetary Resources

We found that NNSA may have to defer certain modernization work planned for fiscal years 2018 through 2021 beyond its current 5-year planning period, called the Future-Years Nuclear Security Program (FYNSP). As we reported in April 2017, this is caused by a misalignment between NNSA's budget estimates for certain nuclear modernization programs and the President's budgets for that period.[16] We concluded that this deferral could exacerbate a significant bow wave of modernization funding needs that NNSA projects for the out-years

[14]The National Defense Authorization Act for Fiscal Year 2013 includes a provision that we annually review a joint DOE-DOD report which addresses, among other things, the plan for the nuclear weapons stockpile and its delivery systems.

[15]GAO-17-341.

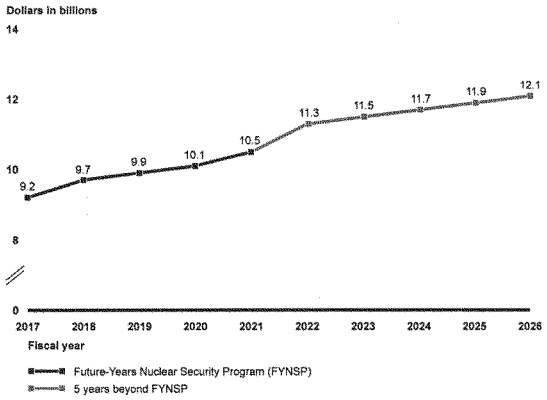
[16]GAO-17-341. Two key documents, updated annually, describe NNSA's operations, modernization plans, and budget estimates for implementing these plans; these documents comprise NNSA's nuclear security budget materials. First, the *Stockpile Stewardship and Management Plan* is NNSA's formal means of communicating to Congress information on modernization and operations plans and budget estimates over the next 25 years. Second, NNSA's annual justification of the President's budget provides program information and budget estimates for the next 5 years. This 5-year plan is called the Future-Years Nuclear Security Program (FYNSP), and the budget estimates in this plan reflect funding levels approved by the Office of Management and Budget. The budget estimates for years included in the FYNSP must align with the 5-year overall federal budget estimates in the President's budget. The budget estimates for years beyond the FYNSP are not subject to this requirement.

beyond the FYNSP and could potentially increase modernization costs and schedule risks.

As we have previously reported, such bow waves occur when agencies defer costs of their programs to the future, beyond their programming periods, and they often occur when agencies are undertaking more programs than their resources can support.[17] As NNSA's fiscal year 2017 budget materials show, its modernization budget estimates for fiscal years 2022 through 2026—the first 5 years beyond the FYNSP—may require significant funding increases. For example, in fiscal year 2022, NNSA's estimates of its modernization budget needs are projected to rise about 7 percent compared with the budget estimates for fiscal year 2021, the last year of the FYNSP, as shown in figure 1.

[17]GAO, *Orion Multi-Purpose Crew Vehicle: Action Needed to Improve Visibility into Cost, Schedule, and Capacity to Resolve Technical Challenges*, GAO-16-620 (Washington, D.C.: Jul. 27, 2016) and *Weapon System Acquisitions: Opportunities Exist to Improve the Department of Defense's Portfolio Management*, GAO-15-466 (Washington, D.C.: Aug. 27, 2015).

Figure 1: Comparison of the National Nuclear Security Administration's Fiscal Year 2017 Budget Estimates for the Future-Years Nuclear Security Program and 5 Years Beyond



Source: GAO analysis of National Nuclear Security Administration data. | GAO-18-374T

Note: Amounts are presented in nominal dollars, which are not adjusted for the effects of inflation.

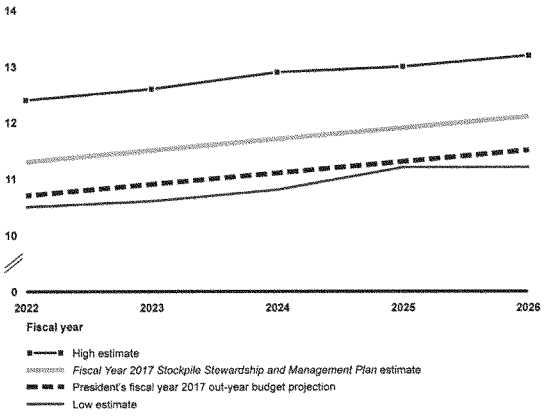
The analysis in our April 2017 report showed that NNSA has shifted this modernization bow wave to the period beyond the FYNSP time frame in each of the past four versions of the annual *Stockpile Stewardship and Management Plan*. For example, in the *Fiscal Year 2014 Stockpile Stewardship and Management Plan*, NNSA's budget estimates for its modernization programs increased from a total of about $9.3 billion in fiscal year 2018, the last year of the FYNSP, to about $10.5 billion in fiscal year 2019, the first year after the FYNSP—an increase of about 13 percent. Similar patterns showing a jump in funding needs immediately after the last year of the FYNSP are repeated in the funding profiles contained in the fiscal year 2015, 2016, and 2017 plans. As we have previously reported, deferring more work to future years can increase cost and schedule risks and can put programs in the position of potentially facing a backlog of deferred work that grows beyond what can be accommodated in future years.

Long-term Misalignment between Modernization Plans and Estimated Budgetary Resources

The *Fiscal Year 2017 Stockpile Stewardship and Management Plan* shows that NNSA's overall modernization budget estimates for fiscal years 2022 through 2026—the out-years beyond the FYNSP—may exceed the projected funding levels in the President's budgets for that period, raising further questions about the affordability of NNSA's nuclear modernization plans. According to NNSA's data, the agency's estimated budget needed to support modernization totals about $58.4 billion for fiscal years 2022 through 2026, and the out-year funding projections contained in the President's fiscal year 2017 budget for the same period total about $55.5 billion. The President's out-year funding projections, therefore, are approximately $2.9 billion, or about 5.2 percent, less than NNSA estimates it will need over the same period.

Despite this potential shortfall, NNSA's *Fiscal Year 2017 Stockpile Stewardship and Management Plan* concludes that the modernization program is generally affordable in the years beyond the FYNSP for two reasons. First, the President's out-year funding projections are sufficient to support NNSA's low-range cost estimates for its modernization programs for fiscal years 2022 through 2026. Based on NNSA data, the low-range cost estimates for fiscal years 2022 through 2026 total approximately $54.4 billion and the President's out-year funding projections total about $55.5 billion. Figure 2 illustrates data from the 2017 plan showing NNSA's budget estimates in nominal dollars, including high- and low-range cost estimates for its modernization program, along with the out-year funding projections from the President's fiscal year 2017 budget, for fiscal years 2022 to 2026. Second, NNSA concludes that its modernization programs are generally affordable beyond the FYNSP because the agency's estimated modernization budget needs will begin to decrease in fiscal year 2027.

Figure 2: Comparison of the *Fiscal Year 2017 Stockpile Stewardship and Management Plan's* Budget Estimates and High- and Low-Range Cost Estimates with the President's Fiscal Year 2017 Out-Year Budget Projections, Fiscal Years 2022 through 2026



Source: GAO analysis of National Nuclear Security Administration data. | GAO-18-374T

Note: Amounts are presented in nominal dollars, which are not adjusted for the effects of inflation.

In our April 2017 report, we noted that NNSA's conclusion—that its modernization program is affordable because the President's out-year funding projections fall within NNSA's modernization cost ranges—is overly optimistic. This is because the conclusion is predicated on optimistic assumptions regarding the cost of the modernization program beyond the FYNSP, particularly for fiscal years 2022 through 2026. For the program to be affordable, NNSA's modernization programs would need to be collectively executed at the low end of their estimated cost ranges. The plan does not discuss any options NNSA would pursue to support or modify its modernization program if costs exceeded its low-range cost estimates. In addition, the *Fiscal Year 2017 Stockpile Stewardship and Management Plan* states that the nominal cost of NNSA's modernization program is expected to decrease by approximately $1 billion in fiscal year 2027. In that year, according to the 2017 plan, it is anticipated that NNSA's estimated budgets for its

modernization program will begin to fall in line with projections of future presidential budgets. However, as we noted in our April 2017 report, the decrease that NNSA anticipates in its modernization funding needs beginning in fiscal year 2027 may not be achievable if the projected mismatch between NNSA's estimates of its modernization budget needs and the projections of the President's modernization budget for fiscal years 2022 through 2026 is not resolved. This mismatch creates concerns that NNSA will not be able to afford planned modernization costs during fiscal years 2022 through 2026 and will be forced to defer them to fiscal year 2027 and beyond, continuing the bow wave patterns discussed above.

Potential Rising Costs of Some Modernization Programs May Further Strain NNSA's Modernization Budgets

Our April 2017 report identified misalignment between NNSA's estimate of its budget needs and NNSA's internal cost range estimates for several of its major modernization programs. Further, we found that the costs of some major life extension programs (LEP) may increase in the future, which may further strain NNSA's planned modernization budgets.

With respect to the alignment of NNSA's estimate of its budget needs and NNSA's internal cost range estimates, in April 2017 we found that NNSA's budget estimates were generally consistent with NNSA's high- and low-range cost estimates.[18] However, for some years, NNSA's low-range cost estimates exceeded the budget estimates for some of the programs, suggesting the potential for a funding shortfall for those programs in those years. Specifically, we found that the low-range cost estimates for the W88 Alteration 370 program and all LEPs discussed in our April 2017 report exceeded their budget estimates for some fiscal

[18]According to NNSA officials, two approaches are used to estimate the costs of the LEPs, except for the W76-1. Under the first approach, according to officials, NNSA develops specific budget estimates by year through a "bottom-up" process. NNSA officials described this as a detailed approach to developing the LEP budget estimates that, among other things, integrates resource and schedule information from site participants. Under the second approach, which NNSA refers to as a "top-down" process, NNSA uses historical LEP cost data and complexity factors to project high- and low-range cost estimates for each LEP distributed over the life of the program using an accepted cost distribution method. According to NNSA, the W76-1 LEP, which is the only weapon program that has been through the development phase and the majority of the production phase, is used as the primary basis for modeling cost ranges for all future LEPs. NNSA does not prepare high- and low-range cost estimates for it. Officials noted that the values in these cost ranges reflect idealized funding profiles and do not account for the actual detailed schedule of program activities, planning for risk in the project, or the results of execution to date.

years within the 10-year time period from fiscal year 2017 to 2026.[19] As we reported in 2013 and 2016, this misalignment indicates that NNSA's estimated budgets may not be sufficient to fully execute program plans and that NNSA may need to increase funding for these programs in the future.[20]

Additionally, in April 2017 we found that the costs of two ongoing nuclear weapon LEPs and the W88 Alteration 370 program may increase in the future, based on NNSA information that was produced after the release of the fiscal year 2017 budget materials.[21] These potential cost increases could further challenge the extent to which NNSA's budget estimates support the scope of modernization efforts. The LEPs facing potential cost increases include:

- **B61-12 LEP.** An independent cost estimate for the program completed in October 2016 exceeded the program's self-conducted cost estimate from June 2016 by $2.6 billion.[22]
- **W80-4 LEP.** Officials from NNSA's Office of Cost Policy and Analysis told us that this program may be underfunded by at least $1 billion to meet the program's existing schedule.
- **W88 Alteration 370.** According to officials from NNSA's Office of Cost Policy and Analysis, this program's expanded scope of work may result in about $1 billion in additional costs.

To help NNSA put forth more credible modernization plans, we recommended in our April 2017 report that the NNSA Administrator include an assessment of the affordability of NNSA's portfolio of modernization programs in future versions of the *Stockpile Stewardship and Management Plan*, such as by presenting options (e.g., potentially

[19]See GAO-17-341 for greater detail on these and other examples.

[20]GAO, *Modernizing the Nuclear Security Enterprise: NNSA's Budget Estimates Increased but May Not Align with All Anticipated Costs*, GAO-16-290 (Washington, D.C.: Mar. 4, 2016) and *Modernizing the Nuclear Security Enterprise: NNSA's Budget Estimates Do Not Fully Align with Plans*, GAO-14-45 (Washington, D.C.: Dec. 11, 2013).

[21]NNSA's fiscal year 2017 budget materials include two key documents: the *Fiscal Year 2017 Stockpile Stewardship and Management Plan*, which was issued in March 2016, and the agency's annual justification of the President's budget, which was issued in February 2016.

[22]We are conducting ongoing work to determine how NNSA has, if at all, reconciled this difference.

deferring the start of or canceling specific modernization programs) that NNSA could consider taking to bring its estimates of modernization funding needs into alignment with potential future budgets. In commenting on our report, NNSA neither agreed nor disagreed with our recommendation.

DOE Annually Spends Billions on Cleanup, but the Cost of Its Environmental Liabilities Continues to Increase

DOE also faces challenges with addressing its environmental liabilities and its cleanup mission. In February 2017, we added the federal government's environmental liabilities to our High-Risk List.[23] Specifically, we found that the federal government's environmental liability has been growing for the past 20 years—and is likely to continue to increase—and that DOE is responsible for over 80 percent ($372 billion) of the nearly $450 billion reported environmental liability. Notably, this estimate does not reflect all of the future cleanup responsibilities that DOE may face.[24] In addition, DOE has not consistently taken a risk-informed approach to decision-making for environmental cleanup, and DOE may therefore be missing opportunities to reduce costs while also reducing environmental risks more quickly. Our recent work in this area has also identified opportunities where DOE may be able to save tens of billions of dollars.

As we have previously reported, DOE's total reported environmental liability has generally increased over time. Since 1989, EM has spent over $164 billion to retrieve, treat, and dispose of nuclear and hazardous waste and, as of 2017, it had completed cleanup at 91 of 107 sites across the country (the 91 sites were generally viewed by DOE as the smallest and least contaminated sites to address). Despite billions spent on environmental cleanup, DOE's environmental liability has roughly doubled from $176 billion in fiscal year 1997 to the fiscal year 2016 estimate of $372 billion.[25] Between 2011 and 2016, EM spent $35 billion, primarily to treat and dispose of nuclear and hazardous waste and construct capital asset projects to treat the waste (see fig. 3 for EM's annual spending and growing environmental liability). According to documents related to DOE's

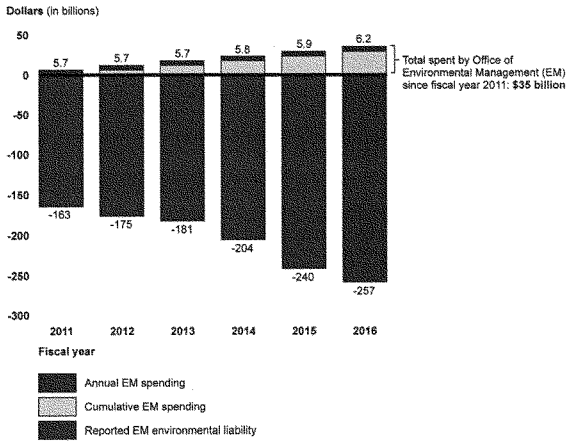
[23]GAO-17-317.

[24]Federal accounting standards require agencies responsible for cleaning up contamination to estimate future cleanup and waste disposal costs and to report such costs in their annual financial statements as environmental liabilities. Per federal accounting standards, federal agencies' environmental liability estimates are to include probable and reasonably estimable costs of cleanup work.

[25]We did not adjust environmental liability estimates for inflation because information about the amount of the liability applicable to each future fiscal year was not available.

fiscal year 2016 financial statements, half of DOE's environmental liability resides at two cleanup sites: the Hanford Site in Washington State and the Savannah River Site in South Carolina.

Figure 3: Department of Energy's Office of Environmental Management's Annual Spending and Growing Environmental Liability



Source: GAO analysis of Department of Energy budget data. | GAO-18-374T

Note: EM is the organization within the Department of Energy responsible for managing environmental cleanup and is responsible for cleaning up 107 sites across the country. To date, EM has completed cleanup at 91 of these sites. EM spending includes money to treat and dispose of nuclear and hazardous waste and to construct capital asset projects to treat the waste. We did not adjust environmental liability estimates for inflation because information about the amount of the liability applicable to each future fiscal year was not available.

In its fiscal year 2016 financial statement, DOE attributed recent environmental liability increases to (1) inflation adjustments for the current year; (2) improved and updated estimates for the same scope of work, including changes resulting from deferral or acceleration of work; (3) revisions in technical approach or scope for cleanup activities; and (4) regulatory and legal changes. Notably, in recent annual financial reports, DOE has cited other significant causes for increases in its liability. Other

causes have included the lack of a disposal path for high-level radioactive waste—because of the termination of the Yucca Mountain repository program—and delays and scope changes for major construction projects at the Hanford and Savannah River sites.

We also reported in February 2017 that DOE's estimated liability does not include billions in expected costs.[26] According to federal accounting standards, environmental liability estimates should include costs that are probable and reasonably estimable, meaning that costs that cannot yet be reasonably estimated should not be included in total environmental liability.[27] Examples of costs that DOE cannot yet estimate include the following:

- DOE has not yet developed a cleanup plan or cost estimate for the Nevada National Security Site and, as a result, the cost of future cleanup of this site was not included in DOE's fiscal year 2015 reported environmental liability. The nearly 1,400-square-mile site has been used for hundreds of nuclear weapons tests since 1951. These activities have resulted in more than 45 million cubic feet of radioactive waste at the site. According to DOE's financial statement, since DOE is not yet required to establish a plan to clean up the site, the costs for this work are excluded from DOE's annually reported environmental liability.
- DOE's reported environmental liability includes an estimate for the cost of a permanent nuclear waste repository, but these estimates are highly uncertain and likely to increase. In March 2015, in response to the termination of the Yucca Mountain repository program, DOE proposed separate repositories for defense high-level and commercial waste. In January 2017, we reported that the cost estimate for DOE's new approach excluded the costs and time frames for site selection and site characterization.[28] As a result, the full cost of these activities is likely billions of dollars more than what is reflected in DOE's environmental liability. In our annual report on Fragmentation, Overlap, and Duplication in the federal government that we issued in

[26]GAO-17-317.

[27]Federal Accounting Standards Advisory Board, *FASAB Handbook of Federal Accounting Standards and Other Pronouncements, as Amended* (Washington, D.C.: June 30, 2016).

[28]GAO, *Nuclear Waste: Benefits and Costs Should Be Better Understood Before DOE Commits to a Separate Repository for Defense Waste*, GAO-17-174 (Washington, D.C.: Jan. 31, 2017).

May 2017, we reported that DOE may be able to save billions of dollars by reassessing the rationale for its March 2015 proposal.[29] In June 2017, a bill that could result in renewed efforts to open the Yucca Mountain repository was introduced in the House of Representatives.[30]

In addition, according to the DOE Inspector General, DOE may have insufficient controls in place to accurately account for its environmental liabilities. In November 2016, the DOE Inspector General reported a significant deficiency in internal controls related to the reconciliation of environmental liabilities.[31]

Moreover, DOE does not consistently take a risk-informed decision-making approach to its environmental cleanup mission to more efficiently use resources. As our reports and those by other organizations issued over the last 2 decades have found, DOE's environmental cleanup decisions have not been risk-based, and there have been inconsistencies in the regulatory approaches followed at different sites. We and others have pointed out that DOE needs to take a nation-wide, risk-based approach to cleaning up these sites, which could reduce costs while also reducing environmental risks more quickly.

- In 2006, the National Research Council reported that the nation's approach to cleaning up nuclear waste—primarily carried out by DOE—was complex, inconsistent, and not systematically risk-based.[32] For example, the National Research Council noted that the current regulatory structure for low-activity waste is based primarily on the waste's origins rather than on its actual radiological risks. The National Research Council concluded that by working with regulators, public authorities, and local citizens to implement risk-informed

[29]GAO, *2017 Annual Report: Additional Opportunities to Reduce Fragmentation, Overlap, and Duplication and Achieve Other Financial Benefits*, GAO-17-491SP (Washington, D.C.: Apr. 26, 2017).

[30]Nuclear Waste Policy Amendments Act of 2017, H.R. 3053, 115th Cong. (2017).

[31]The U.S. Department of Energy Office of the Inspector General, *The Department of Energy's Fiscal Year 2016 Consolidated Financial Statements*, OAI-FS-17-02 (Washington, D.C.: November 15, 2016).

[32]National Research Council of the National Academies, *Improving the Regulation and Management of Low-Activity Radioactive Wastes* (Washington, D.C.: National Academies Press, 2006).

practices, waste cleanup efforts can be done more cost-effectively. The report also suggested that statutory changes were likely needed.

- In 2015, a review organized by the Consortium for Risk Evaluation with Stakeholder Participation reported that DOE was not optimally using available resources to reduce risk.[33] According to the report, factors such as inconsistent regulatory approaches and certain requirements in federal facility agreements caused disproportionate resources to be directed at lower-priority risks. The report called for a more systematic effort to assess and rank risks within and among sites, including through headquarters guidance to sites, and to allocate federal taxpayer monies to remedy the highest priority risks through the most efficient means.
- In May 2017, we reported on DOE's efforts to treat a significant portion of the waste in underground tanks at the Hanford Site.[34] We found that DOE chose different approaches to treat the less radioactive portion of its tank waste—which DOE refers to as "low-activity waste" (LAW)—at the Hanford and Savannah River Sites. At the Savannah River Site, DOE has grouted about 4 million gallons of LAW since 2007. DOE plans to treat a portion of the Hanford Site's LAW with vitrification, but it has not yet treated any of Hanford's LAW and faces significant unresolved technical challenges in doing so.[35] In addition, we found that the best available information indicates that DOE's estimated costs to grout LAW at the Savannah River Site are substantially lower than its estimated costs to vitrify LAW at Hanford, and DOE may be able to save tens of billions of dollars by reconsidering its waste treatment approach for a portion of the LAW at Hanford. Moreover, according to experts that attended a meeting we convened with the National Academies of Sciences, Engineering, and Medicine, both vitrification and grout could effectively treat Hanford's LAW. Experts at our meeting also stated that developing updated information on the effectiveness of treating a portion of Hanford's

[33]The Consortium for Risk Evaluation with Stakeholder Participation is a multi-university consortium organized in 1995 that provides several types of independent, multi-disciplinary reviews of DOE documents, projects, and reports. See: Omnibus Risk Review Committee, *A Review of the Use of Risk-Informed Management in the Cleanup Program for Former Defense Nuclear Sites* (August 2015).

[34]About 90 percent of the waste at Hanford is considered to be low-activity, meaning that it is much less radioactive than high-level waste. See GAO, *Nuclear Waste: Opportunities Exist to Reduce Risks and Costs by Evaluating Different Waste Treatment Approaches at Hanford*, GAO-17-306 (Washington, D.C.: May 3, 2017).

[35]Grout immobilizes waste in a concrete-like mixture. Vitrification immobilizes waste in glass.

waste, called supplemental LAW, with other methods, such as grout, may enable DOE to consider waste treatment approaches that would accelerate DOE's tank waste treatment mission, thereby potentially reducing certain risks and lifecycle treatment costs. We recommended that DOE (1) develop updated information on the performance of treating supplemental LAW with alternate methods, such as grout, before it selects an approach for treating supplemental LAW; and (2) have an independent entity develop updated information on the lifecycle costs of treating Hanford's supplemental LAW with alternate methods. DOE agreed with both recommendations.

Since 1994, we have made at least 28 recommendations related to addressing the federal government's environmental liability to DOE and others and 4 suggestions to Congress to consider changes to the laws governing cleanup activities. Of these, 13 recommendations remain unimplemented. If implemented, these steps would improve the completeness and reliability of the estimated costs of future federal cleanup responsibilities and lead to more risk-based management of the cleanup work.[36] We believe these recommendations are as relevant, if not more so, today.

DOE Has Taken Steps to Improve Management of Contracts, Projects, and Programs, but Challenges Remain

The Secretary of Energy has taken several important steps that demonstrate DOE's commitment to improving management of contracts and projects. However, our recent work indicates that, even with these efforts, NNSA and EM continue to face long-standing challenges in several areas.

DOE Has Made Progress in Managing Contracts and Projects

As we noted in our 2017 high-risk report, DOE has made progress in its contract and project management. DOE continued to meet the criterion for demonstrating a strong commitment and top leadership support for improving project management.[37] The Secretary of Energy issued two

[36]We have ongoing work examining the consistency of DOE's compliance agreements, looking specifically at the extent to which milestones within select compliance agreements are tailored to the environmental and human health risks that DOE is faced with addressing and the extent to which DOE's cleanup remedies are based on up-to-date assessments of conditions at sites and of DOE's technical capabilities.

[37]GAO-17-317.

memorandums, in December 2014 and June 2015, that lay out a series of changes to policies and procedures to improve project management. These changes were included in DOE's revised project management order, DOE Order 413.3B, issued in May 2016. As noted in the memorandums, some of these changes are in response to recommendations we made in prior years, such as requiring that projects develop cost estimates and analyses of alternatives according to our best practices.

DOE also made significant efforts to improve its performance in monitoring and independently validating the effectiveness and sustainability of corrective measures and now partially meets our monitoring criterion for removing agencies and program areas from our High-Risk List. For example, the Secretary improved the department's senior-level monitoring capability. The Secretary strengthened the Energy Systems Acquisition Advisory Board by changing it from an ad hoc body to an institutionalized board responsible for reviewing all capital asset projects with a total project cost of $100 million or more. The Secretary also created the Project Management Risk Committee, which includes senior DOE officials and is chaired by a new departmental position—the Chief Risk Officer. The committee is chartered to assess the risks of projects across DOE and advise DOE senior leaders on cost, schedule, and technical issues for projects.[38]

Challenges Persist in Several Areas

DOE's recent efforts do not address several areas where it continues to have challenges including (1) acquisition planning for its major contracts, (2) the quality of enterprise-wide cost information available to DOE managers and key stakeholders, (3) program and project management, and (4) major legacy projects.

Acquisition Planning for Major Contracts

As we have previously reported, during the acquisition-planning phase for contracts, DOE makes critical decisions that have significant implications

[38]As we stated in our 2017 High-Risk List update, additional time is needed for us to assess how effectively these recent monitoring improvements will validate the sustainability of corrective measures. We have not yet evaluated the operations of the newly created Project Management Risk Committee. In addition, DOE's new oversight and monitoring efforts are not comprehensive, as certain activities within EM are not subject to review by the committee, even though together they cost billions of dollars and last for numerous years. Finally, the effectiveness of DOE's monitoring of its contracts, projects, and programs depends upon the availability of reliable enterprise-wide cost information on which to base oversight activities. See GAO-17-317.

for the cost and overall success of an acquisition. The size and duration of DOE's management and operating (M&O) contracts[39]—22 M&O contracts with an average potential duration of 17 years, representing almost three-quarters of DOE's spending in fiscal year 2015—underscore the importance of planning for every M&O acquisition. In August 2016, we examined DOE's use of M&O contracts.[40] According to DOE officials we interviewed at that time, one of the primary reasons DOE uses M&O contracts is because they are easier to manage with fewer DOE personnel because they are less frequently competed and have broadly written scopes of work, among other attributes. We found that DOE did not consider acquisition alternatives beyond continuing its long-standing M&O contract approach for 16 of its 22 M&O contracts. We concluded that without considering broader alternatives in the acquisition planning phase, DOE cannot ensure that it is selecting the most effective scope and form of contract, raising risks for both contract cost and performance. We recommended in our August 2016 report that DOE establish a process to analyze and apply its experience with contracting alternatives. DOE generally concurred with our recommendation, and, in November 2016, issued updated guidance requiring acquisition planning documents to contain a thorough discussion of alternatives beyond simply extending or competing M&O contracts.[41]

Quality of Enterprise-Wide Cost Information

We have previously reported that the effectiveness of DOE's monitoring of its contracts, projects, and programs depends upon the availability of reliable enterprise-wide cost information on which to base oversight activities. For example, reliable enterprise-wide cost information is needed to identify the cost of activities, ensure the validity of cost estimates, and provide information to Congress to make budgetary decisions. However, we have found that meaningful cost analyses across programs, contractors, and sites are not usually possible because

[39]M&O contracts are agreements under which the government contracts for the operation, maintenance, or support, on its behalf, of a government-owned or government-controlled research, development, special production, or testing establishment wholly or principally devoted to one or more of the major programs of the contracting federal agency. Federal Acquisition Regulation § 17.601.

[40]GAO, *Department of Energy: Actions Needed to Strengthen Acquisition Planning for Management and Operating Contracts*, GAO-16-529 (Washington, D.C.: Aug. 9, 2016).

[41]We currently have four ongoing reviews related to contract management, including (1) performance management of DOE's management and operating contracts, (2) DOE and NNSA's subcontractor management, (3) NNSA's contract document management, and (4) NNSA's support service contracts.

NNSA's contractors use different methods of accounting for and tracking costs. NNSA developed a plan to improve and integrate its cost reporting structures; however, we found in January 2017 that this plan did not provide a useful road map for guiding NNSA's effort.[42] For example, we found that NNSA did not define strategies and identify resources needed to achieve its goals, which is a leading practice for strategic planning. NNSA's plan contained few details on the elements it must include, such as its feasibility assessment, estimated costs, expected results, and an implementation timeline. We concluded that, until a plan is in place that incorporates leading strategic planning practices, NNSA cannot be assured that its efforts will result in a cost collection tool that produces reliable enterprise-wide cost information that satisfies the information needs of Congress and program managers. We recommended that NNSA develop a plan for producing cost information that fully incorporates leading planning practices. NNSA agreed with our recommendation.

In addition, as we have previously noted, quality data are needed for DOE to manage its risk of fraud. The Fraud Reduction and Data Analytics Act of 2015 establishes requirements aimed at improving federal agencies' controls and procedures for assessing and mitigating fraud risks through the use of data analytics.[43] In a March 2017 report, however, we found that because DOE does not require its contractors to maintain sufficiently detailed transaction-level cost data that are reconcilable with amounts charged to DOE, it is not well positioned to employ data analytics as a fraud detection tool.[44] We found that the data were not suitable either because they were not for a complete universe of transactions that was reconcilable with amounts billed to DOE or because they were not sufficiently detailed to determine the nature of costs charged to DOE. We concluded that, without requiring contractors to maintain such data, DOE will not be well positioned to meet the requirements of the Fraud Reduction and Data Analytics Act of 2015 and manage its risk of fraud and other improper payments. We recommended that DOE require

[42]GAO, *National Nuclear Security Administration: A Plan Incorporating Leading Practices Is Needed to Guide Cost Reporting Improvement Effort*, GAO-17-141 (Washington, D.C.: Jan. 19, 2017).

[43]Data analytics enable an organization to analyze transactional data to obtain insights into the operating effectiveness of internal controls and to identify improper cost charges, potential indicators of fraud, or actual fraudulent payments or activities.

[44]GAO, *Department of Energy: Use of Leading Practices Could Help Manage the Risk of Fraud and Other Improper Payments*, GAO-17-235 (Washington, D.C.: Mar. 30, 2017).

contractors to maintain sufficiently detailed transaction-level cost data that are reconcilable with amounts charged to the government.

DOE did not concur with our recommendation. This is because, according to DOE, the recommendation establishes agency-specific requirements for DOE contractors that are more prescriptive than current federal requirements and that its M&O contractors, not DOE, are responsible for performing data analytics and determining what data are needed to do so. DOE's response to our recommendation is concerning because it demonstrates that DOE does not fully appreciate its responsibility for overseeing contractor costs. We believe that the use of data-analytic techniques by DOE employees could help mitigate some of the challenges that limit the effectiveness of DOE's approach for overseeing M&O contractor costs. However, effectively applying data-analytics depends on the availability of complete and sufficiently detailed contractor data. Therefore, by implementing our recommendation DOE could take the important steps necessary to require contractors maintain sufficiently detailed transaction-level cost data that are reconcilable with amounts charged to the government.

Program and Project Management

Although, as mentioned previously, DOE has taken some steps to improve program and project management, our recent work has shown that DOE continues to face several challenges in these areas. Specifically on program management:

- In November 2017, we found that NNSA had established program management requirements, such as developing cost and schedule estimates for its uranium, plutonium, tritium, and lithium programs and had established managers' roles and responsibilities for these programs.[45] However, officials told us that the programs had not fully met these requirements primarily because of staff shortages. We recommended that NNSA determine the critical staff skills it will need for these programs and use that information to address staffing shortages. NNSA agreed with our recommendation.[46]

[45]GAO, *Nuclear Weapons: NNSA Needs to Determine Critical Skills and Competencies for Its Strategic Materials Programs*, GAO-18-99 (Washington, D.C.: Nov. 14, 2017).

[46]We have ongoing work on NNSA's enriched uranium program and its efforts to extend the supply of enriched uranium for tritium production, including reviewing NNSA's plans and cost estimates of potential options.

- In a September 2017 report on the NNSA's uranium program, we found that NNSA had not developed a complete scope of work, a life-cycle cost estimate, or an integrated master schedule for the overall uranium program—all of which are considered leading practices—and it had no time frame for doing so.[47] We reported that NNSA plans to do so for the specific Uranium Processing Facility project,[48] as required by DOE's project management order. However, NNSA had not developed a complete scope of work for key program requirements, including important and potentially costly repairs and upgrades to existing buildings in which NNSA intends to house some uranium processing capabilities. We concluded that because NNSA had not developed a complete scope of work for the overall uranium program, it did not have the basis to develop a life-cycle cost estimate or an integrated master schedule for the entire uranium program, which runs counter to best practices identified in GAO's cost estimating and scheduling guides. We recommended that NNSA set a time frame for completing the scope of work, life-cycle cost estimate, and integrated master schedule for the overall uranium program. NNSA generally agreed with this recommendation and has ongoing efforts to complete these actions.
- In September 2017, we found that DOE's program to re-establish the production of a plutonium isotope used to provide electrical power for the National Aeronautics and Space Administration missions had made progress but that it faced a number of technical and organizational challenges to meeting production goals.[49] Specifically,

[47]GAO, *Modernizing the Nuclear Security Enterprise: A Complete Scope of Work Is Needed to Develop Timely Cost and Schedule Information for the Uranium Program*, GAO-17-577 (Washington, D.C.: Sept. 8, 2017). The scope of work reflects all activities as defined in the program's work breakdown structure, which defines in detail the work necessary to accomplish a project's objectives. A life-cycle cost estimate provides an exhaustive and structured accounting of all resources and associated cost elements required to develop, produce, deploy, and sustain a particular program. An integrated master schedule is a document that integrates the planned work, the resources necessary to accomplish that work, and the associated budget for a program, as called for in best practices.

[48]In 2004, NNSA initiated plans for the construction of a new Uranium Processing Facility, a more modern facility that would consolidate some of its uranium processing facilities—located at the Y-12 National Security Complex in Oak Ridge, Tennessee, and built in the 1940s and 1950s—which are outdated and deteriorating, into a single, more modern facility that would consolidate Y-12's uranium processing capabilities into a single facility.

[49]GAO, *Space Exploration: DOE Could Improve Planning and Communication Related to Plutonium-238 and Radioisotope Power Systems Production Challenges*, GAO-17-673 (Washington, D.C.: Sept. 8, 2017).

we found that NNSA had not developed an implementation plan that identifies milestones and interim steps that can be used to demonstrate progress in meeting production goals. Our prior work has shown that plans that include milestones and interim steps help an agency to set priorities, use resources efficiently, and monitor progress in achieving agency goals. In our September 2017 report, we made three recommendations, including that DOE develop such a plan for its plutonium isotope production approach and that DOE assess the long-term effects of known production challenges and communicate these effects to the National Aeronautics and Space Administration. DOE concurred with our recommendations.

Our prior work also demonstrates that DOE continues to face project management challenges in terms of having reliable performance data or conducting reliable analyses of alternatives. Specifically,

- In a January 2018 report, we found management challenges associated with NNSA's life extension programs (LEP).[50] For example, we found that NNSA had begun implementing requirements for using earned value management (EVM) [51]—a tool used across industry and government for conducting cost and schedule performance analysis—in three LEPs, but it had not adopted a key best practice that could help the agency better manage risk for LEPs. Specifically, we found that NNSA does not require an independent team to validate the EVM systems used by NNSA's contractors for LEPs against the national EVM standard. We concluded that without requiring validation of EVM systems, NNSA may not have assurance that its LEPs are obtaining reliable EVM data for managing their programs and reporting their status. We recommended that NNSA require an independent team to validate contractor EVM systems used for LEPs. NNSA agreed with our recommendation but stated that it already relies on a DOE project management office to independently validate contractor EVM systems. However, as we reported, DOE has not independently validated contractor EVM systems at six of the seven contractor sites that are responsible for conducting LEP activities.

[50]GAO, *Nuclear Weapons: NNSA Should Adopt Additional Best Practices to Better Manage Risk for Life Extension Programs*, GAO-18-129 (Washington, D.C.: Jan. 30, 2018).

[51]EVM measures the value of work accomplished in a given period and compares it with the planned value of work scheduled for that period and the actual cost of work accomplished.

- In May 2015, we reported that DOE initiated a new project, the Low Activity Waste Pretreatment System project,[52] to accelerate waste treatment at Hanford.[53] We found that this project was selected on the basis of similar past proposals without consideration of other potentially viable alternatives, contrary to requirements in DOE's project management order. We also reported that DOE's cost and schedule estimates for completion of the project were not conducted according to best practices and were therefore not reliable. We recommended that DOE re-evaluate alternatives and that it revise the cost and schedule estimates in line with best practices. DOE generally agreed with our recommendations but not some of the conclusions. In September 2017, amid concerns about project cost growth and schedule delays, DOE directed the contractor to conduct a new analysis of alternatives to identify options that will allow the project to be completed within current cost and schedule estimates. The department has suspended work on the project pending a decision on its design.

We will continue to monitor EM's management and oversight of its operations activities and DOE's risk-informed cleanup decisions to address environmental liabilities, as part of our ongoing work for this subcommittee.

Major Legacy Projects

As previously mentioned, in response to a 2015 memorandum on project management policies from the Secretary of Energy, DOE instituted project management reforms that—if fully implemented—will help ensure that future projects are not affected by the challenges that have persisted for DOE's major legacy projects. Although DOE has taken action on certain major projects, we found that it has not consistently applied these reforms, and in particular, DOE has not applied such reforms to its largest legacy cleanup project at its Hanford Site in Washington state. As we found in a May 2015 report, DOE continues to allow construction of certain Waste Treatment and Immobilization Plant (WTP) facilities at DOE's Hanford Site before designs are 90 percent complete.[54] This

[52]The Low Activity Waste Pretreatment System will receive and treat radioactive liquid waste from the radioactive waste tanks in preparation for direct-feed to the Waste Treatment Plant's Low Activity Waste facility.

[53]GAO, *Hanford Waste Treatment: DOE Needs to Evaluate Alternatives to Recently Proposed Projects and Address Technical and Management Challenges*, GAO-15-354 (Washington, D.C.: May 7, 2015).

[54]GAO-15-354. The WTP is DOE's current planned approach to treating some of Hanford's radioactive tank waste.

contrasts with DOE's revised project management order that now requires a facility's design to be at least 90 percent complete before establishing cost and schedule baselines and cost and schedule estimates that meet industry best practices. The WTP is DOE's largest project, and it has faced numerous technical and management challenges that have added decades to its schedule and billions of dollars to its cost. We recommended in May 2015 that DOE (1) consider whether to limit construction on the WTP until risk mitigation strategies are developed to address known technical challenges, and (2) determine the extent to which the quality problems exist, in accordance with its quality assurance policy, for the facilities' systems that have not been reviewed to determine if additional vulnerabilities exist. However, as of September 2016, DOE had not yet implemented our recommendations. In December 2016, DOE announced that the cost estimate for one portion of the WTP—the part needed to treat a fraction of the low-activity waste—had increased to nearly $17 billion.[55] We are currently in the process of completing a report on DOE's WTP quality assurance program.

NNSA's Nonproliferation Program Faces Performance Measurement and Program Management Challenges

Our previous work has found that NNSA also faces challenges implementing its nonproliferation programs under its Office of Defense Nuclear Nonproliferation (DNN), which implements nuclear nonproliferation programs worldwide. In recently completed reviews of DNN programs, we have identified several challenges NNSA faces in how it measures performance and conducts program management of these efforts. Specifically,

- In September 2017, we found that four DNN programs did not have schedule and cost estimates covering their planned life cycles and did not measure performance against schedule and cost baselines as is recommended by program management leading practices.[56] NNSA

[55]This cost estimate does not include the costs for a majority of the WTP's waste treatment scope, including high-level waste treatment. In light of longstanding challenges with major projects, such as with the WTP, we believe DOE must begin to apply project management reforms to the projects that need them the most. We also have ongoing work examining the Mixed Oxide Fuel Fabrication Facility, the Uranium Processing Facility, and the Waste Treatment and Immobilization Plant.

[56]GAO, *Nuclear Nonproliferation: NNSA Needs to Improve Its Program Management Policy and Practices*, GAO-17-773 (Washington, D.C.: Sept. 28, 2017). We reviewed the following four selected DNN programs: Nuclear Material Removal, Highly Enriched Uranium Reactor Conversion, Radiological Security, and the International Nuclear Security.

officials explained that in general this is due in part to high levels of uncertainty in planning the selected programs' work scope or schedules, particularly in working with partner countries; however, we noted that uncertainty should not prevent these programs from establishing more complete or longer-term estimates to account for the time and resources they need to achieve their goals and track their performance. In addition, we observed that DOE's cost estimating guide, which applies to NNSA programs, describes approaches for programs to incorporate risk and uncertainty in estimates. But we found that DNN's program management policy, which was updated in February 2017, did not outline requirements for programs to establish life-cycle estimates or measure performance against schedule and cost baselines. We recommended that DNN revise its program management policy to require DNN programs to follow life-cycle program management, such as requiring life-cycle estimates and measuring against baselines. Updating the DNN policy to include requirements and guidance on cost estimating and tracking performance against schedule and cost baselines could help ensure that NNSA managers and Congress have better information on (1) how much DNN programs may cost, (2) the time they may need to achieve their goals, and (3) how effectively they are being executed compared to plans. Although NNSA neither agreed nor disagreed with the recommendation, it indicated that it plans to take action to revise its policy to address the recommendation.

- In February 2017, we found that NNSA was unable to demonstrate the full results of its research and development technology for preventing nuclear proliferation.[57] Specifically, we reported that DNN's Research and Development program did not consistently track and document projects that result in technologies being transitioned or deployed. Furthermore, we found that DNN's Research and Development project performance was difficult to interpret because the program's performance measures did not define criteria or provide context justifying how the program determined that it met its targets. We concluded that this, in turn, could hinder users' ability to determine the program's progress. NNSA officials said that final project reports did not document their assessment of performance against baseline

[57]GAO, *Nuclear Nonproliferation: Better Information Needed on Results of National Nuclear Security Administration's Research and Technology Development Projects*, GAO-17-210 (Washington, D.C.: Feb. 3, 2017). A transitioned technology is provided to users outside of the project team for further development or deployment. A deployed technology is one that is being actively used in the field by a federal agency or foreign partner.

targets and that there was no common template for final project reports. We noted that documenting assessments that compare final project performance results against baseline targets for scope of work and completion date could enhance NNSA's ability to manage its programs in accordance with these standards. We also concluded that more consistently tracking and documenting the transitioned and deployed technologies that result from DNN's projects could also facilitate knowledge sharing within DNN. This would also provide a means by which to present valuable information to Congress and other decision makers about the programs' results and overall value. We recommended that NNSA consistently track and document results of DNN Research and Development projects and document assessments of final project results against baseline performance targets. NNSA agreed to take actions in response to both recommendations.

- In June 2016, we found that the Nuclear Smuggling Detection and Deterrence (NSDD) program had developed a program plan but that the plan did not include measurable goals and performance measures aligned to the goals.[58] As a result, we concluded that the NSDD program may not be able to determine when it has fully accomplished its mission and risked continuing to deploy equipment past the point of diminishing returns. We recommended that NSDD develop a more detailed pr ogram plan that articulates when and how it will achieve its goals, including completing key activities, such as the deployment of radiation detection equipment to partner countries. NNSA agreed with this recommendation.

Chairman Upton, Ranking Member Rush, and Members of the Subcommittee, this completes my prepared statement. I would be pleased to respond to any questions you may have at this time.

[58]GAO, *Combating Nuclear Smuggling: NNSA's Detection and Deterrence Program is Addressing Challenges but Should Improve Its Program Plan*, GAO-16-460 (Washington, D.C.: Jun. 17, 2016).

GAO Contact and Staff Acknowledgements

If you or your staff members have any questions about this testimony, please contact me at (202) 512-3841 or trimbled@gao.gov. Contact points for our Offices of Congressional Relations and Public Affairs may be found on the last page of this statement. GAO staff who made key contributions to this testimony are Nico Sloss, Assistant Director; Nathan Anderson; Allison Bawden; Natalie Block; Mark Braza; Antoinette Capaccio; Jenny Chow; Ricki Gaber; Jonathan Gill; William Hoehn; Cristian Ion; Amanda Kolling; and Diane LoFaro.

Related GAO Products

The following is a selection of GAO's recent work assessing the Department of Energy's management efforts, including at the National Nuclear Security Administration and at the Office of Environmental Management:

Nuclear Weapons: NNSA Should Adopt Additional Best Practices to Better Manage Risk for Life Extension Programs. GAO-18-129. Washington, D.C.: January 30, 2018.

Nuclear Weapons: NNSA Needs to Determine Critical Skills and Competencies for Its Strategic Materials Programs. GAO-18-99. Washington, D.C.: November 14, 2017.

Nuclear Nonproliferation: NNSA Needs to Improve Its Program Management Policy and Practices. GAO-17-773. Washington, D.C.: September 28, 2017.

Modernizing the Nuclear Security Enterprise: A Complete Scope of Work Is Needed to Develop Timely Cost and Schedule Information for the Uranium Program. GAO-17-577. Washington, D.C.: September 8, 2017.

Space Exploration: DOE Could Improve Planning and Communication Related to Plutonium-238 and Radioisotope Power Systems Production Challenges. GAO-17-673. Washington, D.C.: September 8, 2017.

Nuclear Waste: Opportunities Exist to Reduce Risks and Costs by Evaluating Different Waste Treatment Approaches at Hanford. GAO-17-306. Washington, D.C.: May 3, 2017.

2017 Annual Report: Additional Opportunities to Reduce Fragmentation, Overlap, and Duplication and Achieve Other Financial Benefits. GAO-17-491SP. Washington, D.C.: April 26, 2017.

National Nuclear Security Administration: Action Needed to Address Affordability of Nuclear Modernization Programs. GAO-17-341. Washington, D.C.: April 26, 2017.

Department of Energy: Use of Leading Practices Could Help Manage the Risk of Fraud and Other Improper Payments. GAO-17-235. Washington, D.C.: March 30, 2017.

High-Risk Series: Progress on Many High-Risk Areas, While Substantial Efforts Needed on Others. GAO-17-317. Washington, D.C.: February 15, 2017.

Nuclear Nonproliferation: Better Information Needed on Results of National Nuclear Security Administration's Research and Technology Development Projects. GAO-17-210. Washington, D.C.: February 3, 2017.

Nuclear Waste: Benefits and Costs Should Be Better Understood Before DOE Commits to a Separate Repository for Defense Waste. GAO-17-174.Washington, D.C.: January 31, 2017.

National Nuclear Security Administration: A Plan Incorporating Leading Practices Is Needed to Guide Cost Reporting Improvement Effort. GAO-17-141. Washington, D.C.: January 19, 2017.

Program Management: DOE Needs to Develop a Comprehensive Policy and Training Program. GAO-17-51. Washington, D.C.: November 21, 2016.

Department of Energy: Actions Needed to Strengthen Acquisition Planning for Management and Operating Contracts. GAO-16-529. Washington, D.C.: August 9, 2016.

DOE Project Management: NNSA Needs to Clarify Requirements for Its Plutonium Analysis Project at Los Alamos. GAO-16-585. Washington, D.C.: August 9, 2016.

Orion Multi-Purpose Crew Vehicle: Action Needed to Improve Visibility into Cost, Schedule, and Capacity to Resolve Technical Challenges. GAO-16-620. Washington, D.C.: July 27, 2016.

Department of Energy: Whistleblower Protections Need Strengthening. GAO-16-618. Washington, D.C.: July 11, 2016.

Combating Nuclear Smuggling: NNSA's Detection and Deterrence Program Is Addressing Challenges but Should Improve Its Program Plan. GAO-16-460. Washington, D.C.: June 17, 2016.

Modernizing the Nuclear Security Enterprise: NNSA's Budget Estimates Increased but May Not Align with All Anticipated Costs. GAO-16-290. Washington, D.C.: March 4, 2016.

Weapons System Acquisitions: Opportunities Exist to Improve the Department of Defense's Portfolio Management. GAO-15-466. Washington, D.C.: August 27, 2015.

Hanford Waste Treatment: DOE Needs to Evaluate Alternatives to Recently Proposed Projects and Address Technical and Management Challenges. GAO-15-354. Washington, D.C.: May 7, 2015.

DOE and NNSA Project Management: Analysis of Alternatives Could Be Improved by Incorporating Best Practices. GAO-15-37. Washington, D.C.: December 11, 2014.

Modernizing the Nuclear Security Enterprise: NNSA's Budget Estimates Do Not Fully Align with Plans. GAO-14-45. Washington, D.C.: December 11, 2013.

Commercial Nuclear Waste: Effects of a Termination of the Yucca Mountain Repository Program and Lessons Learned. GAO-11-229. Washington, D.C.: April 8, 2011.

Mr. OLSON. Thank you, Mr. Trimble.

Our final opening statements if from Dr. Ashley Finan from the Nuclear Innovation Alliance. She is the Policy Director there. Five minutes, ma'am, and welcome.

STATEMENT OF ASHLEY E. FINAN

Dr. FINAN. Thank you, Chairman Olson, Ranking Member Rush, and distinguished members of this subcommittee. Thank you for holding this hearing and for giving me the opportunity to testify. I am honored to be here today.

I am Ashley Finan, Policy Director for the Nuclear Innovation Alliance. The NIA is a nonprofit organization dedicated to supporting entrepreneurialism and accelerated innovation and commercialization of advanced nuclear energy.

The world will increase its energy demand by 40 percent or more by 2050, driven by an emerging middle class in the developing work, and the need to bring electricity to 1.2 billion people who lack it today. At the same time, it is well understood that clean energy is essential to human health, and many analyses point to the pressing need to transition to an emissions-free energy system.

Nuclear energy will play a vital role in a future energy supply that addresses these priorities. The question for us is: will the United States be a part of that?

In the U.S. and elsewhere, start-up companies are pioneering advanced nuclear designs that offer opportunities for increased safety and affordability, enhanced nonproliferation attributes, and a reduction in nuclear waste. These designs can revolutionize the nuclear industry and revitalize U.S. exports with products that take advantage of the latest manufacturing and computing technology, that are competitive in markets across the globe, and that exceed the expectations of customers and the public.

But the transition from design to commercialization and deployment has been hampered by significant underinvestment in research, development, and demonstration, by a slow and underprepared licensing process, and by a long and lengthening export control process.

The Government plays several roles in the commercialization and expert of a nuclear energy technology. It is an R&D collaborator, a demonstration partner, a regulator, and a promoter. In turn, as with any new technology, the Nation profits from the economic impact of the product and the exports and jobs it creates.

Unique to nuclear energy, though, are several other benefits: including centurylong strategic trade relationships with customer countries; reliable clean energy to fuel domestic and global prosperity; and stronger U.S. influence over global nuclear safety, security, and nonproliferation standards.

We have not seen a booming U.S. nuclear export business in decades. Not least among many causes is the lack of a compelling nuclear energy product from the private sector. The market demands plants that are more resilient and flexible, lower impact, and simpler and cheaper to build and to operate. As I touched on earlier, companies are answering that call, and they are innovating. They are finding a U.S. Government that is curious and interested, but not wholly invested, and not always ready to innovate.

Meanwhile, Russia is building a fast test reactor to replace its retiring predecessor, as well as a lead fast reactor to join its two operating sodium reactors. China is simultaneously running several major R&D programs, and its commercial high temperature gas reactor will be connected to the grid this year. India's prototype fast reactor will also enter operation this year.

I don't want to be alarmist. This does not need to devolve into a geopolitical race. But it is a harsh reality of business that if we are last to market, we are likely to become irrelevant. And it is a harsh reality of global nuclear security that the countries supplying nuclear power have the strongest hand in influencing how nuclear programs are protected from misuse and how safely those programs are run.

Export application timelines through DOE's Part 810 specific authorization process have slowed from 150 days on average to over 400 days between 2000 and 2014, with some decisions taking over 900 days. This authorization is often required very early in the marketing process to allow companies to share information with potential customers. Long processing times make it difficult for U.S. companies to compete.

The NIA has proposed actions to improve these timelines in its "Part 810 Reform" report, including changes to DOE's processing structure. We need to address this issue.

Similarly, NRC licensing of advanced reactor technology is fraught with major challenges, as described in detail in my written testimony. The NRC has begun addressing these challenges, but they have done so with extraordinarily limited resources. This work needs to be pursued with dedicated funding and with urgency.

To secure a leadership position in the global nuclear market, the U.S. needs to move its designs from development to demonstration and deployment. The NIA made recommendations in its "Leading on SMRs" report: Congress and the administration should expand support for the development of first-of-a-kind demonstration projects, and it should explore opportunities for advanced nuclear reactors to provide reliable power to Federal facilities.

The private sector cannot do this alone. And it is time for Government to move from being interested to being invested. It is time for Government to act with urgency and to support innovation earnestly. These efforts will help bring our homegrown advanced reactor technologies to market more quickly, so that these transformative technologies can leapfrog international competition.

Thank you for this opportunity to testify. I would be pleased to respond to any questions you might have, today or in the future.

[The statement of Dr. Finan follows:]

Written Testimony of
Dr. Ashley E. Finan
Policy Director, Nuclear Innovation Alliance

Before the U.S. House of Representatives Energy and Commerce Committee
Subcommittee on Energy

Hearing Entitled:

DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure

February 6, 2018

Summary of Testimony

Chairman Upton, Ranking Member Rush, and distinguished members of this subcommittee, thank you for holding this hearing and for giving me the opportunity to testify. My name is Ashley Finan, and I am Policy Director for the Nuclear Innovation Alliance (NIA), a non-profit organization dedicated to supporting entrepreneurialism and accelerated innovation and commercialization of advanced nuclear energy systems.

The world will increase its energy demand by 40% or more by 2050, driven by an emerging middle class in the developing world and the need to bring electricity to 1.2 billion people who lack it today. At the same time, it is well understood that clean energy is essential to human health and many analyses point to the pressing need to drastically reduce global carbon emissions if we are to avoid the worst impacts of climate change. Nuclear energy will play a vital role in a future energy supply that addresses these priorities. The question for us is: will the United States be a part of that?

In the U.S. and elsewhere, start-up companies are pioneering advanced nuclear designs that offer opportunities for increased safety and affordability, enhanced nonproliferation attributes, and a reduction in nuclear waste. These designs can revolutionize the nuclear industry and revitalize U.S. exports with products that take advantage of the latest manufacturing and computing technology, that are competitive in markets across the globe, and that exceed the expectations of customers and the public.

But the transition from design to commercialization and deployment has been hampered by significant underinvestment in research, development, and demonstration, a slow and underprepared licensing process, and long and lengthening export control processes.

The government plays several roles in the commercialization and export of a nuclear energy technology. It is a research collaborator, development supporter, demonstration partner, regulator, and promoter. In turn, as with any new technology, the nation profits from the economic impact of the product and the exports and jobs it creates. Unique to nuclear energy, though, are several other benefits: century-long strategic trade relationships with customer countries, reliable clean energy to fuel domestic and global prosperity, and stronger U.S. influence over global nuclear safety, security, and nonproliferation standards.

We have not seen a booming U.S. nuclear export business in decades. Not least among many causes is the lack of a compelling nuclear energy product from the private sector. The market

demands plants that are more resilient and flexible, lower impact, and simpler and cheaper to build and operate. As I touched on earlier, companies are answering that call, and they are innovating. They are finding a U.S. government that is curious, and interested, but not wholly invested, and not always ready to innovate.

Meanwhile, Russia is building a fast test reactor to replace its retiring predecessor, as well as a lead fast reactor to join its two operating sodium fast reactors. China is simultaneously running several major R&D and demonstration programs and its commercial high temperature gas reactor will be connected to the grid this year. India's prototype fast breeder reactor will also enter operation this year.

This does not need to devolve into a geopolitical race. But it is a harsh reality of business that if we are last to market we are likely to become irrelevant. And it is a harsh reality of global nuclear security that the countries supplying nuclear power have the strongest hand in influencing how nuclear programs are protected from misuse and how safely those programs are run.

Currently, NRC licensing of advanced reactor technology is fraught with major challenges, as described in detail in my written testimony.[1] The NRC has begun addressing these challenges, and has made progress, but they have done so with extraordinarily limited resources. This work needs to be pursued with dedicated funding and with urgency.

Export application decisions through DOE's Part 810 specific authorization process took on average about 150 days between 2000 and 2004. By 2014 the average was over 400 days, with some decisions taking over 900 days. Specific authorization is required for sales in certain countries, but it is often required very early in the marketing process to allow companies to share information with potential customers. Long processing times make it more difficult for U.S. companies to compete. The NIA has proposed actions to improve these timelines in its "Part 810 Reform" report, including fast-track authorization pathways for specified activities and destinations, and changes to DOE's processing structure.[2]

To secure a leadership position in the global nuclear market, the U.S. needs to move its designs from development to demonstration and deployment. The NIA made recommendations in its "Leading on SMRs" report: Congress and the administration should expand support for the development of first-of-a-kind demonstration projects and should pursue federal power purchase agreements to provide a market for clean and secure energy.[3]

The private sector cannot do this alone, and it is time for government to move from being interested to being invested. It is time for government to act with urgency and to support innovation earnestly.

Thank you for this opportunity to testify. I would be pleased to respond to any questions you might have, today or in the future.

---

[1] See also: *Enabling Nuclear Innovation: Strategies for Advanced Reactor Licensing*, Nuclear Innovation Alliance 2016. https://www.nuclearinnovationalliance.org/advanced-reactor-licensing

[2] *Enabling Nuclear Innovation: Part 810 Reform*, Nuclear Innovation Alliance 2017. https://www.nuclearinnovationalliance.org/part810reform

[3] Enabling Nuclear Innovation: Leading on SMRs, Nuclear Innovation Alliance 2017. https://www.nuclearinnovationalliance.org/leadingonsmrs

Full Written Testimony

Chairman Upton, Ranking Member Rush, and distinguished members of this subcommittee, thank you for holding this hearing and for giving me the opportunity to testify. My name is Ashley Finan, and I am Policy Director for the Nuclear Innovation Alliance (NIA), a non-profit organization dedicated to supporting entrepreneurialism and accelerated innovation and commercialization of advanced nuclear energy systems to bring more economically competitive zero-carbon emission energy to the world.

The world will increase its energy demand by 40% or more by 2050, driven by an emerging middle class in the developing world and the need to bring electricity to 1.2 billion people who lack it today. At the same time, many analyses point to the pressing need to drastically reduce global carbon emissions if we are to avoid the worst impacts of climate change, and clean air is essential to human health. Nuclear energy will play a vital role in a future energy supply that addresses these priorities. The question for us is: will the United States be a part of that?

In the U.S. and elsewhere, start-up companies are pioneering advanced nuclear designs that offer opportunities for increased safety and affordability, enhanced nonproliferation attributes, and a reduction in nuclear waste. These designs can revolutionize the nuclear industry and revitalize U.S. exports with products that take advantage of the latest manufacturing and computing technology, that are competitive in markets across the globe, and that exceed the expectations of customers and the public.

But the transition from design to commercialization and deployment has been hampered by significant underinvestment in research, development, and demonstration, a slow and underprepared licensing process, and long and lengthening export control processes.

The government plays several roles in the commercialization and export of a nuclear energy technology. It is a research collaborator, development supporter, demonstration partner, regulator, and promoter. In turn, as with any new technology, the nation profits from the economic impact of the product and the exports and jobs it creates. Unique to nuclear energy, though, are several other benefits: century-long strategic trade relationships with customer countries, reliable clean energy to fuel domestic and global prosperity, and stronger U.S. influence over global nuclear safety, security, and nonproliferation standards.

We have not seen a booming U.S. nuclear export business in decades. Not least among many causes is the lack of a compelling nuclear energy product from the private sector. The market demands plants that are more resilient and flexible, lower impact, and simpler and cheaper to build and operate. As I touched on earlier, companies are answering that call, and they are innovating. They are finding a government that is curious, and interested, but not wholly invested, and not always ready to innovate.

Meanwhile, Russia is building a fast test reactor to replace its retiring predecessor, as well as a lead fast reactor to join its two operating sodium fast reactors. China is simultaneously running several major R&D and demonstration programs and its commercial high temperature gas reactor will be connected to the grid this year. India's prototype fast breeder reactor will also enter operation this year. The U.S. has neither a fast test reactor needed to

support basic R&D nor any advanced reactor demonstrations that would support eventual commercialization of a new technology.

This does not need to devolve into a geopolitical race. But it is a harsh reality of business that if we are last to market we are likely to become irrelevant. And it is a harsh reality of global nuclear security that the countries supplying nuclear power have the strongest hand in influencing how nuclear programs are protected from misuse and how safely those programs are run.

Two of the most critical barriers to success are the lack of a clear and efficient pathway for a first demonstration project, and continuing doubt that the Nuclear Regulatory Commission (NRC) will be able to issue a license for a non-light water reactor in a time frame compatible with private-sector needs. *These obstacles **must** be addressed before we can realize the benefits of the next generation of nuclear technology.*

Many other hurdles exist, including technology challenges, supply chain limitations, a difficult market environment, inaction on nuclear waste management, and restrictions on international cooperation. In addition, clean air policy must be updated to recognize the benefits of nuclear power. Progress on all of these fronts is urgently required. The following three sections provide detailed recommendations in the areas of advanced reactor licensing, export control reform, and demonstration incentives.

Advanced Reactor Licensing

Current NRC regulation confronts the licensing of advanced technologies with two major challenges. First, NRC design certification or approval calls for enormous front-loaded investment during a protracted development and licensing phase—without a staged structure to provide applicants with clear, early feedback on an agreed schedule. Second, current regulation primarily evolved to oversee light water reactor (LWR) technologies. It must be adapted to the features and performance characteristics of advanced reactors, which rely on substantially different fuels, cooling systems, and safety strategies, and require novel operating strategies.

Figure 1 illustrates the investment challenge showing schematically the risk/investment profile of nuclear energy projects relative to the licensing process today, and the large monetary and temporal hurdle of obtaining design approval.

Figure 1: Current Project Risk/Investment Profile Relative to Licensing

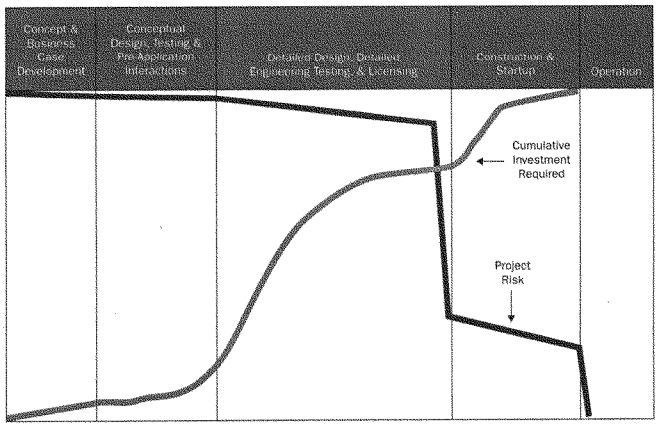
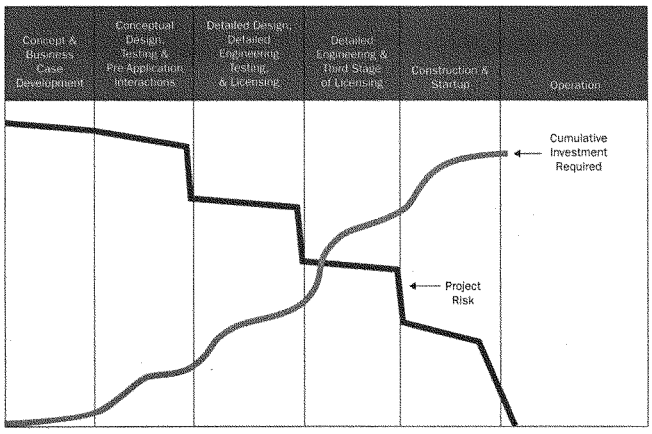


Figure 2 illustrates a staged approach – one that would update the current process to be more aligned with private sector development of innovative technology using a regulatory engagement plan, topical reports, and other existing mechanisms; and one that would offer clear and early feedback to investors and developers through an optional conceptual design assessment. This approach maintains the rigor and high standards of the NRC and facilitates the development of safer nuclear technology that produces less waste, or even consumes it.

Figure 2: Desirable Project Risk/Investment Profile Relative to Licensing



This approach can be achieved using existing regulatory tools at the NRC, with some adjustments in the NRC's approach and the development of additional guidance. The NRC has already begun doing this work, and has made considerable progress in the past year, but they have done so with extraordinarily limited resources. This work needs to be pursued with dedicated funding and with urgency. The Advanced Nuclear Technology Development Act

of 2017 (H.R. 590) is one bill that authorizes the NRC to do the crucial work to modernize the licensing process and prepare for new technologies with dedicated funding.

Over the past several years, the NIA has been developing strategies to facilitate the efficient, cost-effective, and predictable licensing of advanced nuclear power plants in the United States. These strategies are based on consultations with nuclear innovators, safety experts, former NRC staff and Commissioners, members of the financial community, and other nuclear industry stakeholders. The NIA also examined nuclear reactor licensing systems in the United Kingdom and Canada, and scrutinized analogous regulatory systems administered in the United States by the Federal Aviation Administration and the Food and Drug Administration. We compiled the results of some of our work into a report called "Enabling Nuclear Innovation: Strategies for Advanced Reactor Licensing," which was issued in April 2016. The report is available to the public on the NIA website. It discusses in much greater detail the points discussed in this testimony. The following three recommendations are highlighted here:

> **Recommendation 1:** Congress should revise the NRC's budget structure so that, instead of a 90% fee-based, 10% public funding model, licensees and applicants reimburse the NRC for activities related to their regulation, with Congress funding other agency-related activities—including the development of new regulations for advanced technologies, R&D, international programs, and other initiatives not related to a specific licensee. The nuclear fleet operating today was licensed by an NRC that had been fully funded by Congress, before the advent of current fee-recovery rules. Unlike that earlier generation of reactors, licensing of the AP1000s now under construction has been supported by substantial cost-shared funding from DOE. To prepare for the licensing of advanced reactors, the NRC faces a greater challenge that will require consistent public funding.
>
> **Recommendation 2:** Congress should authorize and appropriate funds for the NRC to prepare for advanced reactor licensing, including but not limited to:
>
> - Development and implementation of strategies to stage and expedite the advanced reactor licensing process;

- Development and implementation of risk-informed, performance-based licensing strategies for advanced non-light water reactors;
- Efforts to prepare the process of licensing advanced demonstration reactors; and
- Staff training or the hiring of experts.

Recommendation 3: To expand available financial resources for advanced reactor companies, Congress should continue to fund DOE to competitively award grants for early efforts to license advanced reactor companies, including but not limited to:

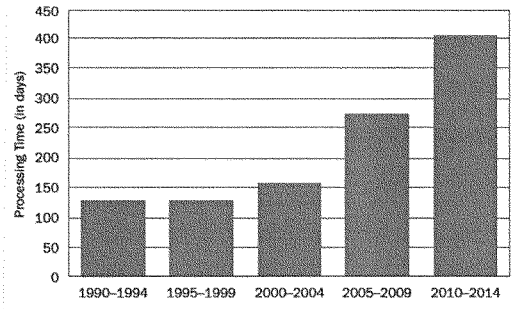
- Pre-application engagement with the NRC;
- Developing a regulatory engagement plan; and
- Applying for a conceptual design assessment or similar early-stage design review.

The DOE Gateway for Accelerated Innovation in Nuclear (GAIN) initiative's small business voucher program is one possible mechanism for this.

Export Control Reform

10 CFR Part 810 (Part 810) regulates the export of nuclear energy technology and unclassified assistance to foreign nuclear energy programs. The U.S. Department of Energy (DOE) now takes significantly longer to process applications for specific authorization under Part 810 (see Figure 3) than it did in the 1990s. Industry has stated that the lengthened processing times constitute a significant competitive disadvantage.

Figure 3: Average Processing Time for Specific Authorization Applications



In the 1990s, specific authorizations took on average 130 days to process. One contributing factor to the recent increase in processing time is a change in processing structure at DOE: previous to 2005, specific authorizations were signed by the Secretary of Energy "subject to the receipt of assurances" from foreign governments. This allowed the U.S. government to process applications for specific authorization while simultaneously seeking assurances from foreign governments. After 2006, this parallel approach was transitioned to a longer serial process, in which the DOE awaits receipt of assurances before completing its own review. The following three recommendations from the NIA's "Part 810 Reform" report are highlighted here:

> **Recommendation 1:** DOE should return to the pre-2005 process under which the Secretary of Energy signs determinations subject to the receipt of assurances. At a minimum, DOE should continue to process specific authorization applications while the interagency review process is ongoing and assurances are being sought by the State Department so that determinations are ready for the Secretary of Energy to sign immediately afterwards.
>
> **Recommendation 2**: DOE should initiate a rulemaking to establish two fast track authorization pathways for specified activities in countries that have made significant nonproliferation commitments. One authorization should focus on applications that need government to government assurances, and a second should involve applications that do not require such assurances. In both cases, DOE should establish the types of

activities that qualify for fast track approval, along with a list of countries eligible for expedited consideration.

Recommendation 3: DOE should re-examine its legal position that delegation of authority by the Secretary of Energy for activities under Section 57b is prohibited by Section 161n of the Atomic Energy Act of 1954 (AEA), as amended; if necessary, DOE should request that Congress amend Section 161n of the AEA to permit delegation.

A more detailed discussion of the NIA's recommendations is presented in Appendix A, which is the executive summary of the "Part 810 Reform" report.

Support for First-of-a-Kind Demonstration Projects

A critical obstacle to financing innovative nuclear power technologies is that there is no clear pathway for a first pilot-scale or larger demonstration reactor. Early demonstration reactors were heavily financed and overseen by the federal government. Advanced reactors under development today are likely to be demonstrated by privately-led coalitions, but government sites and other resources will be indispensible; new arrangements between DOE (or DOD) and the private sector will be needed. High assay low enriched uranium will be important for some early advanced reactor fuel, and the government could supply that from existing stocks. The Gateway for Accelerated Innovation in Nuclear (GAIN) is a promising platform; through ongoing support, growth, and stakeholder involvement, GAIN can enable private sector innovation and demonstration. By providing a policy, funding, and testing platform for qualified nuclear innovators, the risk, cost, and difficulty of first pilot-scale demonstrations could be greatly reduced, accelerating the innovation process.

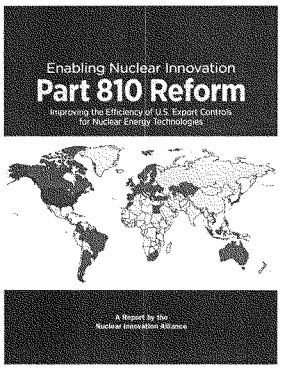
Domestic nuclear innovation would move faster if the federal government provided both a technology "push" in the form of grants or favorable cost-sharing programs for early-stage

reactor development and licensing costs, and a "pull" in the form of long-term power purchase agreements or other incentives for first-of-a-kind innovative commercial reactors. Because of the unique financial and technology risks associated with commercializing advanced nuclear technologies, this kind of broad-based support would encourage more innovators to enter the market, accelerate development of designs, and improve the chance of game-changing technologies reaching the global energy market.

To secure a leadership position in the global nuclear market, the U.S. needs to move its designs from development to demonstration and deployment. The NIA made recommendations in its "Leading on SMRs" report, the executive summary of which is presented in Appendix B.

These policies will not be enough on their own – nuclear innovators will need to succeed in realizing dramatic cost reductions and in demonstrating energy technology that is versatile, robust, simple to operate and quick to build. This will require new approaches, some of which may succeed while others may not. Both the public and private sectors will need to commit to an aggressive and unconventional approach; the rewards are well worth the investment.

Thank you for this opportunity to testify on behalf of the Nuclear Innovation Alliance. The NIA is pleased to work with the Committee to advance U.S. leadership in nuclear energy innovation.



APPENDIX A

EXECUTIVE SUMMARY

THE U.S. ENERGY INFORMATION Administration (EIA) projects that by 2050 countries around the world will add almost 200 gigawatts of new nuclear energy capacity.[1] Those construction projects will entail the flow of new nuclear materials, services, and equipment to a number of countries that currently do not possess significant nuclear power programs. A growth in nuclear energy use offers major commercial opportunities for nuclear reactor companies and carries implications for the global nonproliferation regime. As Table 1 shows, most of the expected deployments are projected to take place in countries that are not members of the Organisation for Economic Co-operation and Development (OECD).

In the United States, this intersection of business and national security takes place under the U.S. Department of Energy (DOE) 10 CFR Part 810 (Part 810) regulations.

Before the first reactors are under construction, however, supplier nations typically share proprietary information on their reactor designs with potential customer nations. These transactions may be the first technology transfers where the government of a supplier nation will have to consider the commercial and nonproliferation implications of broader nuclear energy cooperation with a first-time nuclear energy customer nation. Even between countries where nuclear trade has been ongoing for decades, new transactions such as these may pose unique and complex challenges.

In the United States, this intersection of business and national security takes place under the U.S. Department of Energy (DOE) 10 CFR Part 810 (Part 810) regulations, which control the flow of unclassified nuclear energy technology and assistance to foreign atomic energy activities. These regulations and their implementation are the subject of this report.

Activities regulated by Part 810 are largely divided between those that are generally authorized —that is, companies do not have to ask the U.S. government for permission—and those that require specific authorization from the Secretary of Energy. In recent years, U.S. officials have taken longer to process applications for specific authorization (see Figure 1) to the point where industry has stated that it constitutes a "significant competitive disadvantage" for U.S. companies.[2] DOE has recognized this issue and begun a process improvement plan; however there are challenges associated with Part 810 reform that may need assistance from Congress and industry.

In the 1990s, specific authorizations took on average 130 days from receipt of the application by DOE to final approval by the Secretary of Energy. As Figure 1 shows, applications for specific authorization in more recent years are taking an average of close to 400 days to complete the process. One contributing factor to the increased processing time is a change in processing structure at DOE: previous to 2005, specific authorizations were signed by the Secretary of Energy "subject to the receipt of

1 EIA, "International Energy Outlook 2017."

2 Comments of Nuclear Energy Institute, DOE Supplemental Proposed Rule, November 27, 2013. Page 10.

TABLE 1
EIA Projections for Additional Nuclear Energy Capacity by Region (capacity in gigawatts)

Region	2015	2030	2050	Change from 2015 to 2050
OECD Countries	256	259	200	-56
Non-OECD Europe and Eurasia	42	57	56	+14
Non-OECD Asia	39	124	231	+192
Non-OECD Americas	4	6	5	+1
Africa	2	4	6	+4
Middle East	1	12	17	+16
Total	**343**	**462**	**516**	**+173**

Source: EIA, "International Energy Outlook 2017," Table H5.

assurances" from foreign governments. This allowed the U.S. government to process applications for specific authorization while seeking assurances from foreign governments. The pre-2005 process was more efficient and facilitated a swifter response to U.S. companies whose applications were pending.

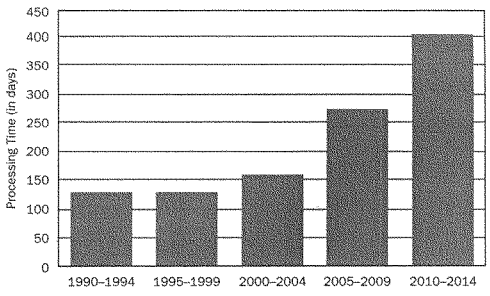
Government to government assurances are requested as part of each specific authorization.[3] The United States is obligated, as part of its adherence to the Nuclear Suppliers Group (NSG) Trigger List Guidelines, to obtain two types of assurances for nuclear technology transfers. These obligations require 1) assurances of peaceful uses for transferred technology and 2) assurances regarding any subsequent retransfer of the supplied technology.[4] The major nuclear supplier nations are also members of the NSG, and thus U.S. competitors have the same obligations to obtain assurances for nuclear energy technology transfers.

The current uncertainty in application processing times is challenging for U.S. companies as the application process may take 200 days or it may take 600 days or longer. One source of that uncertainty is that the U.S. government cannot control the response time of foreign governments supplying the requested assurances regarding peaceful uses and retransfers. In some cases, foreign governments have taken more than two years to supply the requested assurances.

When compared to other major supplier export control regimes, Part 810 is more efficient regarding activities that are generally authorized, but less efficient in some cases regarding specific authorizations. A 2012 report examined the export control regimes of foreign competitors—the Republic of Korea (ROK), Russia, Japan, and France—and noted that the stated periods in which government entities were required to process export control applications were 15 days, 25-45 days, 90 days, and nine months, respectively. If these periods correspond even roughly with actual specific authorization application processing speeds, then these nations are significantly faster than the specific authorization process under Part 810. Furthermore, it is likely that some other major suppliers are able to obtain approvals or denials in a shorter period of time than Part 810 specific authorizations, due to the fact that many suppliers are state-owned.

Other federal regulatory regimes offer potential templates for improving the efficiency of Part 810.

FIGURE 1
Average Processing Times for Specific Authorization Applications



Source: DOE reading room.

3 The one exception is the hiring of foreign nationals by U.S. companies, which is discussed in Chapter III.

4 See *http://www.nuclearsuppliersgroup.org* for the most recent documentation.

The U.S. Nuclear Regulatory Commission (NRC), for example, regulates the export of nuclear material and equipment under the 10 CFR Part 110 (Part 110) regulations. These regulations have a more risk-informed structure than Part 810 and include many different categories of exports, multiple country lists, processing structures, and levels of review depending on the significance of the proposed export. Some export applications are sent to the NRC commissioners for review, while others are not; likewise, some applications are sent to the Executive Branch for its views, based on a de facto assessment of risk or policy significance, while other applications are not. By contrast, the Secretary of Energy's attention and signature is currently required for even minor applications and amendments under Part 810; this process adds weeks or even months of additional processing time, often with no clear benefit.

The NRC has established a general license for minor reactor components to countries "sharing U.S. nonproliferation goals" and which had supplied the United States with generic assurances—in other words, certain minor exports have been expedited to countries with good nonproliferation credentials.

The NRC has also established a general license for minor reactor components to countries "sharing U.S. nonproliferation goals" and which had supplied the United States with generic assurances. In other words, certain minor exports have been expedited to countries that have demonstrated their nonproliferation credentials. This was done in part to reduce the regulatory burden on U.S. companies and NRC staff, but also to benefit U.S. nonproliferation objectives by demonstrating to other countries the advantages of supporting nonproliferation policies.

Likewise, the U.S. government should establish "fast track" approval pathways under Part 810 for countries that have made and are maintaining significant nonproliferation commitments (see Appendix A for an example list of possible countries and criteria). One criterion for determining which countries qualify for fast track eligibility could be previous authorizations under Part 810, which clearly indicate U.S. intent to cooperate on nuclear energy. Such a criterion would be similar to how the NRC exempts review by the NRC commissioners in some cases for subsequent Part 110 exports to a country or reactor after an initial export. A new "fast track" approval pathway would also need to identify eligible activities: for example, light-water reactor (LWR) technology could be given expedited consideration, considering its widespread deployment and availability from multiple suppliers.

China, India, and Russia are the only countries that have nuclear cooperation agreements in place with the United States, and yet are not generally authorized destinations under Part 810, owing to various geostrategic considerations. U.S. companies have required specific authorization to work with Chinese and Russian entities since the regulations were first issued in 1956, and with Indian entities since 1983. China is projected to build more than half of new global nuclear generation capacity over the next three decades, making it the most attractive market for nuclear companies worldwide to seek business opportunities. The U.S. government is concerned with technology transfers to China, however, for reasons that include: China's nuclear energy cooperation with Pakistan, whether or not China is maintaining its nonproliferation commitments, intellectual property issues, and potential diversions of civil nuclear energy technologies to military activities (e.g., naval reactor programs).

The following actions (discussed in greater detail in Chapter VI) are recommended[5] to improve the efficiency of U.S. export control regarding nuclear technology transfers and other unclassified assistance to foreign nuclear energy programs:

Recommendation 1: ***DOE should initiate a rulemaking to establish two fast track authorization pathways for specified activities in countries that have made significant nonproliferation commitments. One authorization should focus on applications that need government to government assurances, and a second should involve applications that do not require such assurances. In both cases, DOE should establish the types of activities that qualify for fast track approval,***

5 This report does not represent a legal opinion, nor does it offer advice of counsel for the Nuclear Innovation Alliance. Readers should consult with counsel for legal advice and direction, and with the National Nuclear Security Administration, a component of the U.S. Department of Energy, to obtain guidance on activities subject to the regulations discussed in this report.

along with a list of countries eligible for expedited consideration.

The Part 810 regulations already include a type of fast track authorization for operational safety activities in Section 810.6(c)(2). This section provides authorization for furnishing "operational safety information or assistance to existing safeguarded civilian nuclear reactors outside the United States in countries with safeguards agreements with the International Atomic Energy Agency (IAEA) or an equivalent voluntary offer, provided DOE is notified in writing and approves the activity in writing within 45 days of the notice." Given the type of activity (operational safety assistance to IAEA safeguarded reactors) and type of destination (countries with safeguards agreements with the IAEA or an equivalent voluntary offer) the expectation is that a given application will be approved, though the process still affords the U.S. government an opportunity to review and potentially reject the application.

Following the model in Section 810.6(c)(2), the new pathways would allow companies to notify DOE that they are intending to pursue specific activities and if they do not hear back from DOE after a specified amount of time (e.g., 45 days), the activity would be deemed to be approved (pending receipt of assurances for authorizations where they are needed).

Recommendation 2: *The White House should issue an Executive Order that affirms the importance of efficient processing of Part 810 applications to U.S. commercial and national security interests, and directs improvements toward that aim.*

As a model, the new Executive Order should look to Executive Order 12981, which governs the export of dual-use items. Executive Order 12981 set out timelines for agency actions, as well as provisions for handling incomplete applications and establishing mechanisms to resolve interagency disputes.

The Executive Order for Part 810 should state that it is the policy of the U.S. government to continue processing applications for specific authorization while government assurances are being sought (for the cases where assurances are necessary).

Recommendation 3: *For specific authorization applications, DOE should return to the pre-2005 process under which the Secretary of Energy signs determinations subject to the receipt of assurances. At a minimum, DOE should continue to process Part 810 packages while the interagency review process is ongoing and assurances are being sought by the State Department, so that applications are before the Secretary of Energy and ready to be signed as soon as possible upon receipt of the assurances.*

Returning to the pre-2005 policy, under which the Secretary signs determinations subject to the receipt of assurances, would provide U.S. companies an earlier notification that the U.S. government has approved the activity, pending the receipt of foreign government assurances. This would reduce uncertainty for U.S. businesses and accelerate specific authorization approvals without a reduction in nonproliferation controls.

Recommendation 4: *The DOE Offices of Nonproliferation and Arms Control, Nuclear Energy, and Intelligence should prepare a classified report analyzing the risks and benefits of nuclear energy technology transfers with China to provide a framework for future internal U.S. government discussions.*

An assessment of the nuclear energy technologies available and being supplied to China from other countries (e.g., Russia, France, Japan), along with China's own independent R&D progress, would provide additional context for a balanced accounting of the risks and benefits associated with specific authorizations to China.

DOE should return to the pre-2005 process under which the Secretary of Energy signs determinations subject to the receipt of assurances. This would reduce uncertainty for U.S. businesses and accelerate specific authorization approvals without a reduction in nonproliferation controls.

Recommendation 5: *The U.S. Department of State should seek generic assurances from countries, where possible, to cover transfers under Part 810 before applications for export are submitted.*

The U.S. government should seek generic assurances from individual countries for some of the more minor exports under Part 810. DOE could then process applications to countries more quickly, perhaps in combination with a fast track approval process, as the assurances step would already be completed.

Recommendation 6: *DOE should re-examine its legal position that delegation of authority by the Secretary of Energy for activities under Section 57b is prohibited by Section 161n of the Atomic Energy Act of 1954 (AEA), as amended.*

The Secretary of Energy currently signs off on every new specific authorization, no matter how minor, as well as extensions and minor amendments to existing authorizations, because of DOE's legal interpretation of Section 161n as prohibiting delegation by the Secretary to others. This adds weeks, if not months, to the processing of specific authorization applications with no obvious benefit. It is difficult to see why the Secretary of Energy's attention is needed or useful in any way for approving the hiring of foreign nationals, minor amendments to existing authorizations, renewals of authorizations, or other relatively technical or small-scale activities, such as operational consultations to existing LWRs under IAEA safeguards.

The delegation of minor activities by the Secretary of Energy and an expedited review for activities of lesser significance are both consistent with nuclear export control practices elsewhere in the federal government.

For comparison, the NRC Commissioners do not review most applications for the export of materials and equipment under the NRC's Part 110 regulations, and the NRC does not send most Part 110 applications to the Executive Branch for review. In other words, the delegation of relatively minor activities by the Secretary of Energy and an expedited review for activities of lesser significance, are both consistent with nuclear export control practices elsewhere in the federal government.

Recommendation 7: *If DOE continues in its determination that delegation of authority by the Secretary of Energy for activities under Section 57b is prohibited by Section 161n, Congress should amend Section 161n of the AEA to permit delegation, recognizing the very different global reality today as compared with 1954, as well as the minor activities that are currently being sent to the Secretary of Energy.*

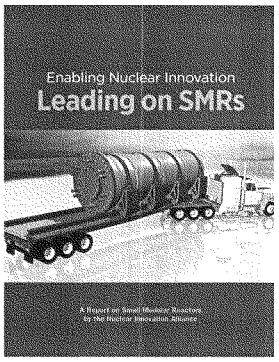
Recommendation 8: *Advanced reactor companies that intend to pursue work with foreign entities should engage DOE on Part 810 early in a similar manner to the pre-application interactions with the NRC on reactor design licensing.*

Early engagement between advanced reactor companies and DOE would familiarize the U.S. government with the technologies involved and also the end users under consideration. These interactions would provide early feedback to U.S. reactor companies on potential challenges with specific destinations and end users, as well as any concerns with the reactor technology itself.

Recommendation 9: *Industry should create a forum to share Part 810 experiences for the purpose of raising the quality of applications that are submitted to DOE.*

Companies that are new to the Part 810 process would especially benefit from hearing more experienced companies explain what information the U.S. government needs to process applications. This should help to cut down on processing times and reduce the resources expended by both private companies and the U.S. government.

APPENDIX B



EXECUTIVE SUMMARY

A CENTRAL CHALLENGE IN THE 21st Century is how to lift billions of people out of poverty without long-term damage to human health and the environment. Increased energy use has been linked to improvements in quality of life, and one consequence of that connection is clear: worldwide demand for energy, especially in the developing world, is predicted to increase substantially out to 2050. Fossil fuels currently supply roughly 85% of the energy that drives the world economy. With the traditional use of that energy source, however, comes serious air pollution and climate change risks. Nuclear energy is a dispatchable source of clean energy with decades of operational experience that could help to reduce these environmental risks, while supplying the energy necessary to spur economic growth that can advance quality of life worldwide. And one particular technology—small modular reactors (SMRs)—offers great promise.

Small modular reactors offer lower overall costs, shorter construction periods, and simplified designs that enhance safety.

In the past, the complexity of large light-water reactor designs contributed to construction delays, as it has with the most recent U.S. construction projects. SMRs offer lower overall costs, shorter construction periods, and simplified designs that enhance safety. They offer the potential to set new standards for passive nuclear energy safety in the U.S. commercial fleet, while their operational flexibility supports reliability of the electrical grid in an era of rising intermittent renewable energy generation. Through industrial heat applications, SMRs could potentially decarbonize sectors beyond electricity and contribute to nuclear/renewable hybrid energy systems.

In this report, SMRs are defined by their size, co-location of multiple modules, and approach to construction, rather than by coolant. In other contexts, SMRs may specifically mean light-water cooled designs, but here they include light-water cooled along with liquid metal, gas, and molten salt reactors. (See Chapter II: The Small Modular Reactor Option for further discussion.)

Natural gas combined cycle (NGCC) plants are the least expensive of any generation source in the current U.S. market, given the low price of natural gas. The levelized cost of electricity (LCOE) for a given energy technology is one measure of that technology's competitiveness against other energy sources.[1] The LCOE comparison for SMRs versus NGCC plants depends to a significant degree on the regulatory environment for electricity generation, as well as the specific financing structure for construction. While the LCOE for SMRs is much higher than NGCC plants in deregulated states, it narrows in other environments. Accounting for the cost of greenhouse gas emissions, SMRs can compete with NGCC plants in the public power sector. Adding SMRs to generating portfolios would also reduce utilities' exposure to natural gas price volatility.

1 As discussed in Chapter III, LCOE is an imperfect measure of an energy source's value, neglecting factors such as reliability, intermittency, and other issues.

Global public and private sector commitments to deploying cleaner energy technologies underlie various projections showing an increase of hundreds of gigawatts in nuclear energy capacity over the next 23 to 33 years. If SMRs capture even a small portion of total nuclear energy capacity worldwide, and move into process heat applications, the result will be tens of gigawatts or more of SMR deployment. Most of these builds will occur outside the United States, in the developing world, with likely three major SMR suppliers: China, Russia, and the United States. International opportunities could create or sustain hundreds of thousands of U.S. jobs.

The projected growth in nuclear energy generating capacity over the next several decades, including in countries that either do not have existing nuclear energy programs or have only very preliminary ones, has implications for the global nonproliferation regime. Since President Eisenhower's Atoms for Peace speech in 1953, the United States has seen a national interest in providing support for peaceful nuclear energy activities in exchange for a role in setting nonproliferation conditions. Government investment in the 1950s and 1960s paved the way for early U.S. global dominance of the nuclear energy markets, which in turn gave the United States an outsized role in setting nonproliferation supplier norms. With the coming expansion of nuclear power in the developing world, a renewed commitment to leadership in nuclear energy is needed to ensure a similar role for the United States once again.

Given the uncertainty in cost and availability for different nuclear reactor designs, the United States should provide a continuum of support through the different stages of reactor development and use the market to help guide technology down-selection. The federal government should also provide targeted incentives and support to leverage the specific regions and entities in the United States where nuclear energy is most attractive to achieve deployment of first-of-a-kind SMRs. Domestic deployment and U.S. Nuclear Regulatory Commission licensing will provide a marketing advantage to U.S. SMR companies seeking to gain a foothold in international markets. This will ensure that the United States has an active role in the development and evolution of the global nuclear energy and nonproliferation regime over the coming decades, which in turn will support U.S. national security interests.

To further these objectives, the following actions are recommended. (See Chapter VI: Recommendations for further details.) Additional research, development, and demonstration recommendations needed to support non-light water reactors will be described in greater detail separately.

Recommendation 1: Congress and the Administration should expand support for new reactor design and licensing to include non-light water designs and extend support through design finalization.

Recommendation 2: Congress should amend the nuclear energy production tax credit (PTC). *Congress should amend section 1306 of the Energy Policy Act of 2005 (EPACT05) to remove the in-service date of January 1, 2021, raise the cap to 9000 MW, allow nonprofit public power entities to qualify, and raise the payment rate for new deployments to 2.7 cents/kWh.*

Recommendation 3a: Congress should enable federal facilities to enter into power purchase agreements for low-emission technologies for periods of 20 years or greater.

Recommendation 3b: The Secretary of Energy should work with the Western Area Power Administration (WAPA) Administrator and the U.S. Department of Energy (DOE), the U.S. Department of Defense (DOD), and other federal facilities in the WAPA territory to procure 100–200 MW of power from the Utah Associated Municipal Power Systems (UAMPS) SMR project.

Recommendation 3c: The Secretary of Energy should work with the Tennessee Valley Authority (TVA) and DOE, DOD, and other federal facilities in the TVA territory to procure 100–200 MW of power from the TVA SMR project.

Recommendation 3d: DOE should identify options for federal power purchase agreements to help enable deployment of new reactor technologies.

Recommendation 4: States should expand any existing or proposed Renewable Portfolio Standards into Clean Energy Standards. *States should expand renewable portfolio standards into clean energy standards to increase the total amount of low-carbon electricity required and give utilities greater flexibility in reducing air pollution and greenhouse gas emissions, while also meeting reliability requirements.*

Mr. OLSON. Thank you, Dr. Finan. Now is the fun time, Members' questions. And the chairman gives himself 5 minutes for a round of questions.

The first question is to you, Ms. Korsnick. You mention in your opening statement the work other companies are doing to deploy nuclear reactors. And I want to translate that to Texan. You said we are getting whipped, I think. We are being whipped by these guys overseas.

Part of their deployment overseas is by cost and Government support, but they have regulatory hurdles as well that are part of their equation. My question is, can you talk about what they do that is different than what we do? Are they big differences? Are they safer, the pros, the cons? How can we catch up pretty quickly, because we are losing the race right now.

Ms. KORSNICK. Yes. So, as we have talked here, the competition is significantly in Russia and China. And I would say they look at their nuclear fleet in a much more strategic way. They decide quite up front that if they are involved in your energy they have some amount of control of your future.

So, a Russia person knocking on your door would say, "I am going to build you a reactor. I am going to operate your reactor. And I am going to take your used fuel."

It is not the same business proposition, quite frankly, that we can make.

On the positive side for us, we have very strong technology, very good technology, and we still have countries that are very interested to do business with the United States. But we need to be more aggressive. We have got to level the playing field. We need to make it much more easy for our businesses to do business in the nuclear sector.

Mr. OLSON. I have a question 2. Much of the conversation on nuclear energy is focused on commercial reactors for power, generating electricity. However, those reactors are just one piece of the entire fuel cycle. You have processes like mining, conversion, enrichment. They are all critical to have a robust nuclear industry.

We also forget about the workers. Comments were mentioned during the first panel, the South Texas Power Plant right there in Bay City is having a crisis of workers because opened up in 1979, those workers have been there since then, they are now retiring. Luckily, they have approached Wharton County Junior College, they have a campus down there, to train the next succession of workers, because without them that place goes dark.

And so, what is the state of our industry across the broader fuel cycle, what changes do we need dramatically now, and what to work on in the future to get this thing, this ship, righted quickly?

Ms. KORSNICK. So, if you look at the worker picture, I would say currently the picture is not too bad. The challenge that we have is if we don't continue to invest in this industry—and we heard from speakers earlier—that people don't continue to study nuclear engineering. They don't continue to go into these programs.

But over the last several years the nuclear industry has paired with local community colleges, et cetera, and put programs in place to keep that pipeline of talent, if you will, strong. Those programs have paid off. And I would say currently the pipeline is healthy.

But that is because the current state, if you will, there's some view that there are jobs to be held.

As they watch these plants close, that picture changes very quickly.

Mr. OLSON. Next question is for you, Dr. Peters. I understand that DOE, as you mentioned, has entered into a site use permit for the INL and NuScale to construct the first SMR. Your testimony, though, is that INL has partnered with NuScale since the outset in their efforts to build this new design. Based on that experience, what policies should be considered in the future to make what you are doing go all across the country?

Dr. PETERS. Thank you for your question, Mr. Chairman. So, so we have partnered with them from the beginning. And that started with actually a DOE grant, a few decades ago actually. So it has been a long run.

But the partnership that we have with them now, it is there is a permit that, an MOU effectively, that says, here, what it looks like to use our site. But there is also strong collaborations with them vis-a-vis potential use of some of the modules for, for research use, and also power purchase agreements between them and the Government. So I think those sorts of approaches can be used with other reactor vendors, so things like power purchase agreements, like using, using them for research.

And using the site. We have built 52 reactors on our site, so there is plenty of space. We can actually demonstrate more. So I think you have just got to take what we have already done and transfer that over to other reactor vendors.

I should also tell you—I can't get into specifics here, partly because of NDAs and whatnot—but there are other companies that are calling us now and saying, hey, with this NuScale-UAMPS deal can we actually talk to you about how we might be able to do that on your site as well?

So there is a lot of promise there. I would emphasize that the innovation and the advanced reactor space in the U.S. could put us back, could put us back in the lead if we play it right.

Mr. OLSON. And, sir, that is music to my ears.

My time has expired. The Chair now calls upon the ranking member of the subcommittee, Mr. Rush, for 5 minutes.

Mr. RUSH. Well, thank you, Mr. Chairman.

Ms. Korsnick, I have said it on several occasions that I believe that we must establish policies that place the light on our nuclear fleet, the sources of safe, reliable, low-carbon energy. However, I did not agree with the DOE NOFA because it appeared to be nonhastening and with little transparency or dissertation for how that outcome was decided.

And second, during our Powering America series of hearings we heard that fuel diversity is as important to reliability as any other characteristic.

So the question remains how do we get to the point where our nuclear fleet is thoroughly and reasonably valued for some of these unique attributes but we are not picking winners and losers only based on the 90-day storage rule.

So the question is, Do you support a strictly market-based approach wherein the ITOs implement price reform efforts to recog-

nize the different contributions of nuclear resources,or do you believe that there is a role for Congress in helping to enact policy objectives, such as moving toward a low-carbon economy that will make the most of the contributions made by the Nation's nuclear fleet?

And I also want to ask for a response from the other members of the panel.

Ms. KORSNICK. Thank you. I would say ultimately we do favor a market solution. But I would say that that market solution is too slow in coming. And so, the challenge that we have is as the market is trying to sort this out we are going to see still yet several additional plants close.

And, you know, I would just step back and say at a high level, currently, you know, electricity as a commodity, every electron is treated equally. Some of those electrons produce pollution to produce those; some of those electrons were produced in an intermittent fashion; some of those were produced from a baseload reliable resource; some produced carbon to make them; some produced emissions, some didn't. And so, at the end of the day we need a process where the market really values how those electrons were produced and not just that electrons were thrown onto the grid.

And this is the process that the market needs to, you know, to step through. We do appreciate an all-of-the-above energy strategy. But, again, the challenge that we have is the market's response has just been too slow in coming.

Mr. RUSH. Any other? Yes, sir.

Mr. OSTENDORFF. Congressman Rush, thank you for your question. I completely agree with Ms. Korsnick here. And would suggest that if under your—in your opening statement this morning you talked about all-of-the-above.

Mr. RUSH. Right.

Mr. OSTENDORFF. And I am part of that strategy. From my own philosophy, you need to recognize what we do to imperil nuclear energy as a potential source in the future if we don't support it right now.

Defendants say we need to not just be interested, we need to invest. I completely agree with what she just said here. This is not something that can wait 10 years and decide the Federal Government should invest; it needs to happen now. It is not going to get any better with time. And as more plants continue to close because of economic issues, I think we might face the reality of not having this open as a future option for us.

Mr. RUSH. Ms. Finan.

Dr. FINAN. I think that nuclear power is important because it can address a wide array of concerns, including but not limited to national security, energy security, air emissions, and reliability—all of those simultaneously. So it is appropriate to value all of those attributes as we think about our energy sources.

And the NIA will be pleased to work with the committee to evaluate ways that Congress can help.

Mr. RUSH. Mr. Chairman, I yield back my time.

Mr. OLSON. The gentleman yields back. The chair now calls upon the gentleman from Illinois, Mr. Shimkus, for 5 minutes.

Mr. SHIMKUS. Thank you, Mr. Chairman. And it is good to follow my colleague from Illinois.

Also, I am going to follow up. I am changing my order of questions. I want to go to Ms. Korsnick on this whole debate of market-based solution too slow.

Republican conservatives we believe in markets. And we believe that—but we also believe that if there is a risk profile or uncertainty, that is a cost that is passed on. So in my first panel round you heard me talk about the front end of the fuel cycle. Of course now I guess the question is, On the back end of the fuel cycle, because of Federal Government inaction, is there risk and additional cost incurred by the nuclear industry in holding, maintaining, storing, litigating the back end of the fuel cycle?

Ms. KORSNICK. There is a cost. But I would say it is even steeper than, than what perhaps you are suggesting. And I would say one of the number one reasons that people question the viability of nuclear power is because we do not have a waste strategy.

And so it is not only a cost in operation, it is a reputational cost, quite frankly, to the industry at large that says we don't understand. It must be really difficult to solve. It must be, in fact, technically impossible because, as the United States, we haven't solved it in decades.

And to try to counter that with, well, no, it is not technically difficult; no, there is a very technically feasible solution; we have just chosen, in fact, not to adopt it; it has actually put an albatross around the neck of the nuclear industry to, quite frankly, go forward with viable public support.

Mr. SHIMKUS. Yes, and I am glad you finished that way because I would say we do have a strategy. We do have a law. We just have failed to implement it. It has really been a political failure, not a scientific failure.

Of course, Mr. Ostendorff and I have had this discussion when he appeared before us with the NRC, and it took court cases to ring out of the hands of the NRC the safety and evaluation report that said long-term storage would be safe for a million years, which took a lot longer. I thought it was going to take a million years to get that report out.

But having said that, I want to go to Mr. Ostendorff. And I don't want to read the whole, the national security strategy of the United States of America, issued a report in December, but the basic premise is the Nation's ability to produce needed parts, systems help, and secure supply chains, and skilled U.S. workforce. That is their concern based upon the national strategy.

In your previous life as a boat captain, is there a concern? Is that a valid concern if we lose this expertise?

Mr. OSTENDORFF. I would suggest—I will answer this two ways, Mr. Shimkus. First, my experience on boats is a long time ago. But I can tell you at the end of the Cold War when I had taken command of a submarine in 1992, there were 100 attack submarines in the U.S. Navy. Today that number is 53. So the industry's base of providing products for naval reactors as an organization for nuclear powered submarines and aircraft carriers—and the cruisers have gone away, the cruisers have all been decommissioned—that product base where the supply is naval reactors has shrunk.

Naval reactors has indicated that they are doing oK right now, but there is not a lot of other options for them to go to. And whereas you used to have companies that did work for naval reactors and for the commercial nuclear industry, now it is just sole source naval reactors. And so that has your overhead costs increased because they have a smaller customer base. Those kinds of issues are real.

Mr. SHIMKUS. So in my couple seconds left, even former Energy Secretary Menezes mentioned that we have, we are the gold standard of engineering, development, construction. As we go through this high-risk profile of uncertainty do—and this is really you all kind of mentioned it in your opening statements—do we really believe that Russia and China, with their deployment and their construction, will be safer and trained better than if we were competitive in the world market?

Ms. Korsnick, what do you think on, on safety, security, international aspects in this Russia, China, world leadership debate?

Ms. KORSNICK. I think if your question is is the United States still the best operators of nuclear plants today, it is unquestionable that we are. You can see with our strong operational record and our 90 percent capacity factor. So I would say we are by far the best from an operational excellence perspective.

But at the end of the day, if the Chinese and the Russians are building the reactor, then that is the technology that is going to be out there, and that is the technology that people are going to want to understand how to operate and what to learn from. And that is why it, strategically, it is important for us to get our designs out there.

Mr. SHIMKUS. Thank you. Thank you, Mr. Chairman.

Mr. OLSON. The gentleman yields back.

The Chair now calls upon a Member who, during the first panel, is a big fan of Lynn Swann but not Harold Carmichael, the man from western Pennsylvania, Mr. Doyle, for 5 minutes.

Mr. DOYLE. Thank you, Mr. Chairman.

Ms. Korsnick, I wanted to ask you a question about your testimony regarding NRC fee structures. Can you explain how the current fee structure penalizes reactor licensees that continue to operate if another licensee decides to discontinue operation?

Ms. KORSNICK. Well, right now the way that the structure has, across the licensees, 90 percent of the budget for the NRC needs to be collected from the licensees. And so as plants shut down there is just fewer to spread those costs across to achieve that 90 percent.

Mr. DOYLE. Yes. And I think H.R. 1320, the bill that Representative Kinzinger and I have introduced and which you highlighted in your testimony, would address this issue. And I appreciate you mentioning it in your testimony.

Dr. Finan, in your written testimony you express similar concerns over the current fee structure of the NRC. In your testimony you urge, in preparation for the licensing of advanced reactors, consistent public funding for the agency. First, could you speak to what fee reform would be beneficial to the nuclear industry going forward, and what level of funding you would recommend?

Dr. FINAN. Well, the NIA supports reforms that address the NIA's fee structure. And in particular, H.R. 1320 would enable the

NRC to use dedicated funds to prepare for advanced reactor reviews. That is an important part of that bill.

It is also important that that authorization is paired with adequate appropriations to enable progress on that front. The NRC has identified figures of around $10 million per year as being adequate to support their ongoing effort.

I think that, additionally, the NRC's current schedule is slower than the innovators would like to see. So if there is a way to bump that up a little bit and allow the NRC to accelerate and move faster, that would be well worth it.

Mr. DOYLE. Great.

Can you tell me what other regulatory reforms you think we should consider to help spur deployment of advanced reactors?

Dr. FINAN. Well, I think that, you know, one important area is in the Part 810 reforms. We have issued a report recently recommending several reforms to Part 810. It is the export control regulations have evolved over the years. Initially there were 15 countries that required specific authorization. Over time, and by 2015 that had grown tenfold to 149. And in particular, in 2015 the number doubled from 75 to 149.

That, paired with the very long review times are really putting our companies at a disadvantage overseas. So we need to address that. And we have made several recommendations regarding the DOE's processing structure and some other opportunities to move that faster.

Mr. DOYLE. Thank you.

Ms. Korsnick, in your testimony you said the nuclear industry is at a crossroads. I want you to just elaborate on the current outlook for the nuclear industry.

Ms. KORSNICK. Well, I would say from a current outlook perspective, you know, five plants have shut down; eight plants have announced that they are going to shut down within the next several years. And those are ones that have just, as I said, given a specific date or a specific year that they are going to shut down.

And there are a handful of others that are clearly challenged. I mentioned the power plants in Ohio, for example. Those were not included in the eight that we mentioned, but clearly are challenged to continue to operate.

And so, if you look at that, you know, holistically, as I mentioned, it is more than 90 million megawatts of clean air energy that would be produced on an annual basis. That is a lot. And I know that there has been great technology in solar, and wind, and others that have been brought to bear. But we are digging a very deep hole for clean air that will be very difficult to fill. I would say it is not possible for the other clean air technologies to fill that.

So we are simply, if you will, working backwards.

Mr. DOYLE. Why don't you also just speak a little bit about the economic benefit of the industry to our country? I think people——

Ms. KORSNICK. Well, yes, I mean it is powerful. I mean, somebody mentioned that we employ, you know, 500,000 workers both directly and indirectly. I think from a tax base perspective I think we contribute, you know, $16 billion, something of that magnitude, might be $12 billion. So, I mean, it is a very strong contributor, in fact, to our economy.

I was a site vice president at a power plant in New York, and I saw firsthand the impact of these plants. You know, when I had to talk to the local mayor and the school superintendent about the possibility of the plant that I ran potentially shutting down, you know, they said, but, Maria, you are the school system. Right? We are so dependent on the tax base that you are to this local community that, you know, quite frankly they, they didn't really have a way to go forward without.

And that is very typical of where these plants operate in the rural communities and towns that they are a part of. You know, they are a part of the hospital system, the police system, the school system. And, you know, they have been operating reliably for so many years.

And I will remind you that when these plants were originally commissioned, you know, they were really commissioned for 40 years of operation. That 40 years has turned into 60 years. You just have a plant go forward this year that is taking that 60 years and asking for 80 years of operation. So these are gems. These are highly reliable, clean air technology. We are talking things that operate 80 years. And there is nothing magic about 80; they can probably go for 100 years.

So this kind of technology, this kind of investment, this is infrastructure in the United States, and we should look at it in that capacity.

Mr. DOYLE. Right. I see, Mr. Chairman. Thank you for your courtesy of letting—I just want to say as I close, as Commissioner Ostendorff said, that it is unwise for us to sit by and watch this industry decline because at some point decline becomes irreversible. I want you to know I couldn't agree with that statement any more. And I think we all need to take that very seriously.

Mr. Chairman, thank you so much for your courtesy.

Mr. OLSON. Thank you. The gentleman's time has expired.

To follow up on the gentleman's comments, Ms. Korsnick, you should know about South Texas Power Plant. When Hurricane Harvey hit the big power plant in my district had four coal generators and four natural gas. The coal got wet. All that coal is down. That nuclear plant kept running in the worst part of the hurricane. So that is an important part. It is reliable, it is there, it is clean, we have to make more of it.

The Chair calls upon Mr. Flores from Texas for 5 minutes.

Mr. FLORES. Thank you, Mr. Chairman. I appreciate the panel sharing their enlightened responses with us today.

Ms. Korsnick, I appreciate your answers to Mr. Doyle's questions about the impact that these plants have on the local communities. I was privileged in my first term to represent the Comanche Peak complex up in Somerwell County, Texas. And without those plants I mean there is no school system, no police. You are exactly right. There is no community. So I appreciate your comments on that.

I am privileged to represent two tier one research and education universities: Texas A&M, which has a highly acclaimed nuclear program; and also the University of Texas which was the home to former NRC Commissioner Dale Klein.

Mr. Ostendorff, as a professor of national security at the Naval Academy and as a former officer in the Nuclear Navy, are you con-

cerned about whether young men and women who are looking at their future careers, including those at the Naval Academy, are you concerned about what they are going to think about the nuclear industry moving forward in light of its state today?

Mr. OSTENDORFF. Yes, sir, I am. There is no, there is no question about it.

I don't have any statistics to share with you, but I see midshipmen all the time. I have been an adviser to the Naval Academy's nuclear engineering program. And I have spoken at the University of Texas, their engineering program, about nuclear issues when I was a Commissioner. And I see people saying, young people today in their twenties and early—I would say in their twenties, they are really looking ahead. What are the options out there for me 10 years, 20 years from now? And they are taking a very calculated look at what opportunities exist or do not exist.

And as Maria has said, when you have five plants that are shut down, eight more have announced to shut down, the signals are there. There is no ambiguity about the current status of the nuclear industry. And I have very strong feelings that that is a negative signal for people to want to pursue that.

Mr. FLORES. OK. Just in a few seconds each, does anybody else on the panel have any comments on that issue?

Dr. PETERS. Yes, I would, I would comment on that. Just reemphasize that, well, just briefly, I was at Texas A&M in November for an interaction between the laboratory and Texas A&M. And I was enthused by, I was in a room of about 100 students, and I got inundated with questions afterwards, including resumes and whatnot. So that is a good thing.

But I think that is fleeting. If we don't—you know, that will go away. Five years from now, that will not be the same room if we don't do something now.

Mr. FLORES. Right. And I appreciate Ms. Korsnick's comments and also Dr. Finan's comments about we, as policy makers, have to invest in helping to have a healthy nuclear industry moving forward.

Would anybody on the panel like to comment about the role of university nuclear programs and how these programs interact with ongoing research, and industry, and issues as we move into advanced nuclear? Anybody have any comments?

Dr. PETERS. Well, they are vital. We have close partnerships, the laboratories all work closely with the nuclear universities, the universities with nuclear programs across the Nation. They are vitally important.

And maintaining their infrastructure is really important as well. So the research reactor, like at Texas A&M for example, and other universities, because that teaches the kids how, not only how to operate reactors but also the kind of research that you can do in those reactors. So that is all very, very important.

But also, more collaborative programs, having DOE and the NRC continue their graduate fellowship, fellowship programs. And that is always something we collectively support up here, I know. But also more collaborations where we bring more kids to the lab for internships and whatnot. And we are working that very actively.

But they are vital. That is the pipeline. If we don't keep those alive, we are in trouble.

Mr. FLORES. Dr. Finan, you look like you would like to add something.

Dr. FINAN. I would just add that the university programs and the students play a vital role in inspiring the industry and the labs to think differently and to do things in a more innovative way. So they are really crucial, not just as a pipeline but as driving the industry to think big.

Mr. FLORES. OK, thank you.

Anybody else on this?

[No response.]

Mr. FLORES. OK. Thank you for your participation today. I yield back.

Mr. OLSON. The gentleman yields back. The Chair now calls upon the pride of Saratoga Springs, New York, Mr. Tonko, for 5 minutes.

Mr. TONKO. There you have it. Welcome, everybody.

I always am quoted as saying I want the United States to be the leader of the global clean energy economy. And that certainly includes advanced nuclear.

It seems clear from today's testimony that other countries around the world are overtaking us in commercial nuclear energy. Other nations see the need for clean energy as well as the export market opportunities. So there is a big question of what will be the consequences of nations like Russia or China dominating the global market.

And I know that, Dr. Finan, you had provided some examples of that in earlier questioning.

But, Dr. Peters, I believe our Nation has a tremendous advantage over our global competitors due to having the best facilities and universities in the world. You just made mention of that partnership of the labs. Can you drill down a little deeper for us about the importance of funding for our national labs and how they interact with the Department of Energy in terms of support for R&D investments, and what that means to our advanced nuclear research agenda?

Dr. PETERS. Sure. So the labs as a whole, across all of the DOE research portfolio, have—there is a partnership associated with it. There is the oversight component. But I feel very good about the partnership and helping set the research agendas from the Office of Science, which you are familiar with in Brookhaven, over to the applied programs like nuclear.

As you heard Mr. McGinnis say earlier, a small number of the labs, including INL, work very closely with them to help set the research agendas. So I feel good about the partnership.

I can't say, I can't agree more on the need for stable, stable research funding, and not having this up and down, up and down. We are maintaining large facilities. We are retaining world class workforce.

I would also say it is, it is a question of maintaining international leadership because other countries are trying to emulate the national lab system.

Mr. TONKO. Yes.

Dr. PETERS. That is going on across the world.

Mr. TONKO. It is interesting that you point out the certainty level.

Dr. PETERS. Yes.

Mr. TONKO. And where we have been losing some people in an international competition, where it may not even be about the applied salary as opposed to that the certainty is there.

Dr. PETERS. Right.

Mr. TONKO. There is this long-term commitment. And I am hearing that now in your statement.

Dr. PETERS. Yes. The lab records as a whole have concerns, lack of stability. We have exciting work to do. That is never a question. It is the lack of certainty from year to year that does tend—and it is either folks who perhaps foreign nationals who work at the lab, which are an important part of the lab, who go back to their home country. Or, for that matter, U.S. people who go to a university to work, or over to industry.

And I always say I am not afraid to lose good people if it is for the right reason. But that is not the right reason.

Mr. TONKO. Yes, absolutely.

And, Mr. Ostendorff, you made some very strong comments about human infrastructure with which I completely agree. A great point that you made. And this sector needs our Nation's best engineers and scientists. And I have been able to meet with amazing young people pursuing these careers in my district. Sailors training at Kesselring in Saratoga County; nuclear engineers over at RPI, some of whom have gone on to work at Knolls Atomic Power Lab in Niskayuna.

And the failure to develop the next generation of nuclear technology, coupled with the decommissioning of our existing nuclear fleet, would certainly hurt our ability to maintain an industrial base, supply chain, and the necessary human infrastructure in order to have the United States be a global leader.

If those capabilities go away, can you explain the difficulty to rebuild that infrastructure, the human infrastructure?

Mr. OSTENDORFF. Just a real quick comment. I lived in Saratoga Springs 6 months in 1977 going to Ballston Spa prototype, S3G core-3. So I——

Mr. TONKO. Good choice.

Mr. OSTENDORFF [continuing]. Know that area well.

But and the people there were military and civilian. General Electric had the contract. And so we were working with a mixed workforce where people took great pride in this. And others, you know, Dr. Finan has very capably mentioned the security aspect, knowing what the future presents as far as opportunities, that is very essential. And people will beat their feet to go elsewhere if they don't have the opportunities.

And very quickly, we have seen, Ms. Korsnick is more of an expert on this than I am, but I saw as NRC Commissioner how hard it was for us to start the construction of the AP1000 reactors in the United States. Just look at Lake Charles, Louisiana—I grew up in Louisiana, so I can say this—they struggled mightily to develop the modular construction for these containment pieces that, because we had not done that for many years, didn't have welding qualification

standards in place, did not have the NQA–1 nuclear stamp processes. Those things are much better today than they were, but back in 2012 when construction started it was not going that well.

And so I think we should not underestimate how hard it is to resume something after a long hiatus.

Mr. TONKO. Thank you. That is a very helpful insight.

So, with that, Mr. Chair, I yield back.

Mr. OLSON. He yields back.

The Chair now calls upon a Member who is from one of six States that were a part of the Republic of Texas, Mr. Mullin from Oklahoma.

Mr. MULLIN. Oh, my goodness. If you didn't have such a good baseball season, I would make some wisecrack about our great football season.

Hey, Mr. Ossendorff—am I saying that right?

Mr. OSTENDORFF. Ostendorff.

Mr. MULLIN. Ostendorff. All right. I apologize about that.

Thank you, first of all, the entire panel for being here. It is very enlightening for all of us and for Congress as a whole.

But, you know, for years the U.S. led in nuclear power. And as we have said multiple times already here, you know, China has quickly taking that role. Strategically speaking what does that, what does that mean for the U.S.? What does that mean for the future of our nuclear power and the stability, even on national security issues, for us moving forward?

Mr. OSTENDORFF. So let me give you these two examples. I will use the one I was personally involved in was the aftermath of the March 2011 Fukushima event.

Mr. MULLIN. Right.

Mr. OSTENDORFF. The United States' industry, NEI, U.S. industry, NRC, Department of Energy, State Department played a major role in helping Japan look at how to move forward. We would not have had that opportunity if we were not operating the largest reactor fleet at the time, period. There is no question about that. We were a key player, Japan looked to us. And I think we added a lot of value to nuclear safety worldwide.

Second area let's talk about, and others have mentioned, China and Russia developing new reactor technology. And I used to do a lot with Russia when I was an official of NNSA 10 years ago. Russia has significant technical capabilities on the engineering side; a long history of nuclear engineering on the commercial side; and then their submarine force. Our ability as a country to influence future nuclear standards going forward is almost nil if we are not doing something ourselves in the United States.

Mr. MULLIN. Good point.

Mr. OSTENDORFF. And if we are not a player, we don't get a voice. It is as simple as that.

Mr. MULLIN. So how would you think that plays into our national security risks?

Mr. OSTENDORFF. So, one example I would just offer: our ability as a country to have an understanding of what other countries' abilities are in uranium enrichment, the ability to produce weapons grade material for a bomb. Our understanding of other countries'

ability is informed by people like Dr. Peters and INL staff, because they are doing research, they have the technology every day.

So, not to get into classified issues, which is not the purpose of us being here, but there is a nexus with understanding other countries' capabilities by being involved in nuclear technology, research, and development.

Mr. MULLIN. So is it safe to say because of our lack of really moving forward with our nuclear technology and the nuclear power that we have, and it seems that we are drawing backwards, is there going to be a drain on the expertise of personnel that is going to be available to be able to understand where to move to, understand what our threats are and what the future holds for it?

Mr. OSTENDORFF. I think we will always have dedicated Americans ready to work and support Department of Defense, intelligence community, and so forth. However, in many cases they leverage the research done, Argonne National Laboratory, Los Alamos, Lawrence Livermore, and so forth. They also leverage the lessons learned from the NuScale, looking at their SMR designs.

And so as we decrease that reactor technology R&D in this country there will be less of an opportunity for us to have an understanding of what is in the art of the possible elsewhere.

Mr. MULLIN. So just kind of an overview, could you tell us where you feel like the industry is headed, and in what areas we could help in?

Mr. OSTENDORFF. Well, I think, as others have greater expertise than I will just give you my layman's version. Let me go back to Dr. Finan's comment. I think at this stage the Federal Government needs to invest. I think Department of Energy has done a very credible job of trying to support——

Mr. MULLIN. Invest in specific areas?

Mr. OSTENDORFF. Oh, I am going to talk about small modular reactors just for a moment.

Mr. MULLIN. OK.

Mr. OSTENDORFF. I think the small modular reactor work that Department of Energy, Office of Energy, Mr. McGinnis' group has been very good. I am not sure that is going to be sufficient to ensure that SMRs are going to be economically marketable.

A former head of Naval Reactors talked about the building of the 18-unit Ohio Class submarines back in the 1970s and early 1980s. That former four-star admiral in a discussion 4 years ago said that Naval Reactors learned about a 78 percent efficiency curve going from the first Trident submarine build to the 18th. We have to have X number of units to spread the risk out. It is just not going to be sufficient for the United States to build just one or two SMRs. We need to be able to spread that risk out over many more than that.

I think perhaps the Federal Government has a role in investing in that project.

Mr. MULLIN. Yes. My time is out. Panel, thank you so much. Mr. Chairman, thank you so much for, for the time you allowed me, and I yield back.

Mr. OLSON. The gentleman's time has expired.

The Chair now calls upon the gentleman from the Wolverine State, Mr. Walberg, for 5 minutes.

Mr. WALBERG. Thank you, Mr. Chairman, and thanks to the panel for being here. Having a nuclear power plant in my district, this is an important issue to understand.

Ms. Korsnick, I understand that in addition to paying fees to the Nuclear Regulatory Commission, commercial nuclear power plants also fund FEMA's REP program as well. Industry fees I am told total over 30 million annually to support FEMA's efforts to coordinate State, local, and Tribal governments to plan, to train, and conduct preparedness exercises in the event of a radiological emergency, which we hope never takes place.

This program supports some important activities. However, given the ongoing cost pressures on our fleet of nuclear reactors I want to be assured that these fees are only directed to activities that support the program's mission.

And so, Mr. Korsnick, are you aware of this program? And secondarily, what sort of oversight is necessary to make sure the program is run efficiently?

Ms. KORSNICK. Yes, thank you. I am aware of the program. The program, it stands for Radiological Emergency Preparedness Program. And we actually are very concerned, relative to the transparency, of how these funds are being spent. I do think that it is important. And we ask, in fact, this committee as oversight to help us gain that transparency.

Because right now, although we put in a sufficient amount of those funds—and you mentioned, you know, $30 million—it is very difficult to appreciate exactly how these funds are being spent. And, in fact, there has been allegations to suggest that they are being spent on non-REP activities.

Mr. WALBERG. Do you have any examples of that?

Ms. KORSNICK. Well, I can just say that there has been allegations that were made. I don't personally, I can't personally substantiate the veracity of those allegations. But we do suggest that an audit of those funds would be appropriate.

Now, would this, this audit provide that transparency that you are seeking? And how? Is there a mechanism—help me out with that—is there a mechanism by which if you did have an audit that that information could be transparent to you and be useful?

Ms. KORSNICK. Yes. And I guess what I am suggesting is I do think that that would be an important thing to take on. Perhaps that is something that this committee, with your jurisdiction, could help encourage that such an audit would be performed.

And then, of course, depending on the results of that audit, obviously, you know, we could be the best next steps going forward. Would there be some additional transparency requirements, different reports perhaps that would need to be, that would need to be made?

But I think a good first step is to get an audit.

Mr. WALBERG. OK. Any further, anything from the rest of the panel?

[No response.]

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

Mr. OLSON. The gentleman yields back.

The Chair now calls upon the gentleman from the Palmetto State, Mr. Duncan, for 5 minutes.

Mr. DUNCAN. Well, Mr. Chairman, I am surprised that you know that we are the Palmetto State, but we are glad we are because 57.6 percent of the State's electricity comes from nuclear power. So, very apropos to the hearing today.

Captain Ostendorff, you mentioned in your opening statement that a prerequisite for national security is energy national security. And I couldn't agree with you more.

First off, thank you for your service to our country in the United States Navy and all that you continue to do training the young men and women of the future in the Navy today.

You also mentioned it is imperative the U.S. remain a global leader in nonproliferation efforts. And this depends upon as domestic, commercial activity increases. The President mentioned in his State of the Union a push for a robust 21st Century nuclear program for our nuclear arsenal, deterrence, and all that goes along with that.

Nuclear energy has almost zero emissions. That is a good thing. But as we create that energy we also create nuclear waste. Oconee Nuclear Station and Oconee County, South Carolina, has about 40 years' worth of nuclear waste sitting on site.

The Vogtle Plant probably has the same amount.

So we have got all this nuclear waste sitting on site in dry cast or wet storage at nuclear production sites. We have in the nuclear weapons arsenal production, whether it is what happened at Hanford or Savannah River Site creating our nuclear arsenal, we have a lot of yucky stuff that is being taken out of the ground through environmental management efforts. And a cleanup site at Hanford and the EM down at Savannah River Site, we could go through Idaho and Oak Ridge and all these others, but at the end of the day we end up with a lot of yucky, highly radioactive waste, whether it is in the tank farms or whether it is the spent fuel rods that are sitting in dry and wet storage around the country. And you heard Shimkus, Chairman Shimkus mention earlier about Yucca Mountain.

We need as a nation to embrace the law of the land, which is a long-term, stable storage facility. After all the science, all the money, everything, taking money from ratepayers in South Carolina to create Yucca Mountain as a long-term storage site, but yet it sits in mothballs because of politics. But the law of the land is the law of the land. So we need to do something with that waste.

Take that in consideration of what happened in South Carolina this year. I am a proponent for nuclear energy. I think it is a great source of electricity to meet the 21st Century and beyond, electricity needs to manufacture, heat and cool our homes, or whatnot, possibly power our cars. And we need to build more nuclear power plants in this country because we have aging nuclear reactors around the country. Whether that is California or South Carolina, the facts are the facts that they are aging.

And we are starting actually to decommission some reactors in the Northeast. And some of those decommissioned reactor parts, reactors parts come to South Carolina to a storage facility in Barnwell, low—level nuclear waste facility.

So if we are going to build new nuclear plants we need something to change, because what we just saw in South Carolina was

7, 8 years into a project to build two new nuclear reactors, and the company made mistakes, defaulted, and that is mothballed. Billions of dollars, tens of billions of dollars invested and two new nuclear reactors in South Carolina that will never come online.

So going forward, wanting nuclear reactors and nuclear power to be a part of our energy matrix, how do we ensure for the investors that are going to be needed that if you invest tens of billions of dollars, mainly because of the regulatory environment that we have, the length of time it takes to permit a new power plant, how are we going to assure them that you best invest those tens of billions of dollars—and there are years of investment, time investment—how are we going to assure them that 7, 8, 9 years down the road, the rug isn't going to be pulled out from under that project and those investors are going to lose that money? The ratepayers that had to pay extra are going to lose that money, as what is happening in South Carolina.

The General Assembly is debating this issue today on what ratepayers do. So how do we assure the investors, how do we assure the Nation we are going to meet our energy needs, we are going to be able to invest those large dollars?

I guess where I am going is how can we do it cheaper, better, faster to bring nuclear online? Is it small modular reactors? Is it shrinking the permitting process? Is it creating several pre-approved plants for nuclear reactors and replicating those, versus having a brand new permitting process over and over and over? What is the answer? Captain?

Mr. OSTENDORFF. Wow, there is a lot there. Yes, sir.

Mr. DUNCAN. And I am last, so you might have a few extra seconds.

Mr. OSTENDORFF. I think I would on the construction fees, again I am not, I am not a construction expert. I have been, because I have been to Summer many times and Vogtle many times, and Watts Bar 2 when there was a resumption of construction there starting 6 years ago. I have seen the NRC resident inspectors and construction inspectors working. I have seen the industry working. And I think one overarching piece of this is when you don't do something for many years it is extremely difficult to start it up and do it error free the first time.

It is not an excuse. It is not a justification. It is just a fact of life, human nature.

Some of the construction delays were associated with inadequacy of completion of engineering drawings at Summer, at AP1000. Summer was the—earlier I mentioned the construction, the modular components for containment, there were welding problems, quality assurance problems. I would say that those on much better track today in 2018 at Vogtle than they were 5 years ago at Summer, even 3 years ago at Summer.

So part of this is, we have to recognize when you have a process that sits in mothballs for a number of years and you don't exercise it, you should not be surprised that there be problems starting it back up. That is one piece.

Small modular reactors I think are very promising. The earlier panel talked about that at some length between Department of Energy and NRC. I think there is a lot of promise there. At the same

time, I think in order to see that move out there has to be a number of buyers to make economic sense for NuScale. And I think the Federal Government perhaps has a role to play there in investing. Dr. Peters has talked about that in his testimony.

The third piece—and I will stop there due to time—is, and Ms. Korsnick mentioned it, I do think there is a role for Congress to look at the market structure.

Anecdote: Fall of 2015, when I was NRC Commissioner, we were meeting at FERC headquarters. Every other year we met with the FERC group. And closure of Pilgrim in Cape Cod, Massachusetts, was being discussed. This is 2 years and 3 months ago. This was November of 2015. And one of the staff individuals said, Hey, Pilgrim is going to shut down in 2019, and 50 percent or more of the carbon-free electricity in Massachusetts will go away.

And I asked the Chairman of FERC and his Commissioner colleagues, "Is that a concern to FERC?"

And he said, "No, Commissioner Ostendorff, it is not. Our job is to provide the lowest cost possible to the consumer."

And so, without some rethinking of what the role nuclear plays in the future, what a sabbatical from nuclear means for the ability to bring it back up 50 years from now, I think there is a value judgment to be made, a chance to look at markets and how we look at reliable baseload, carbon-free generation, and what human capital expertise that is unique to this technology that merits further investment.

Mr. DUNCAN. Mr. Chairman, I appreciate the extra time.

At any given time we have in this country over 100 small reactors floating around the seas of the world in the United States Navy without any mishap. That ought to be considered.

And also, as we continue to look at the nuclear weapon enhancement that the President talked about, remember, there is going to be yucky stuff as a residual.

And with that, I yield back.

Mr. OLSON. I thank you. Before my friend leaves, you talked about the safety of our nuclear submarines. We have lost two. We have lost the *Scorpion* and the *Thresher*. Both sunk dramatically. And what happened, though, the design, the scram sets itself down. It worked perfectly.

The *Scorpion* was coming back home from deployment; never showed up. It took us a couple months to be able to find her, like 12,000 feet of water. We go there about every 5 years just to check out to make sure there is no radiation coming from her. It sank in 1968. Not one thing has come out over almost 50 years. That is safety.

And seeing there are no further witnesses of which to ask questions, I would like to thank all, all the witnesses for being here today on the 98th day of the Astros being the world champs in baseball.

And before we conclude our last break, I would like to ask consent for one document for the record, a document from Uranium Producers of America. Without objection, so ordered.

[The information appears at the conclusion of the hearing.]

Mr. OLSON. And pursuant to committee rules, I will remind all Members that they have 10 business days to submit additional

questions for the record. And I ask that the witnesses submit their responses within 10 business days upon receipt of those questions.

Without objection, this committee is adjourned.

[Whereupon, at 2:17 p.m., the subcommittee was adjourned.]

[Material submitted for inclusion in the record follows:]

URANIUM PRODUCERS OF AMERICA
141 EAST PALACE AVENUE, POST OFFICE Box 669, SANTA FE, NEW MEXICO 87504-0669
TELEPHONE (505) 982-4611; www.theupa.org

February 5, 2018

The Honorable Fred Upton
United States House of Representatives
Washington, DC 20515

The Honorable Bobby Rush
United States House of Representatives
Washington, DC 20515

Dear Chairman Upton and Ranking Member Rush:

On behalf of the Uranium Producers of America (UPA), we applaud the committee for holding a hearing on the economic and national security benefits of America's nuclear infrastructure, particularly the front-end of the nuclear fuel cycle.

UPA is the national trade association representing the domestic uranium mining and conversion industries. UPA's mission is to promote the viability of the nation's uranium industry, while being good stewards of the environments in which we work and live. UPA members conduct uranium exploration, development, and mining operations in Arizona, Colorado, Nebraska, New Mexico, South Dakota, Texas, Utah, and Wyoming. Members include Cameco Resources, ConverDyn, Energy Fuels, Laramide Resources, Rio Grande Resources, Ur-Energy, Strata Energy-Peninsula Energy, Uranium Energy Corporation, and Uranium One.

State of the U.S. Uranium Industry – A National Security Crisis

Without a strong and stable domestic uranium industry, America's nuclear infrastructure is at risk. Uranium is the fuel source for nuclear reactors, which account for 20 percent of the electricity produced in the U.S. and 60 percent of our carbon-free electricity. Unfortunately, due to an oversupplied market, flawed government policies, and an uneven global playing field, we are now facing an energy security crisis. The U.S., which was once the world's largest uranium producer and a net exporter, is now almost entirely dependent on imported uranium to power our domestic reactors. The industry once employed more than 21,000 Americans. Today we are less than 560 and further cuts are anticipated.

With average direct production costs ($34/lb. reported by the Energy Information Administration [EIA]) significantly exceeding the current spot market price ($22/lb. as of January 29), the situation is growing worse by the day. In 2016, the domestic uranium industry supplied less than 6 percent of the uranium needed to power U.S. nuclear reactors. U.S. imports in 2016 came from Canada (25 percent), Kazakhstan (24 percent), Australia (20 percent), Russia (14 percent), Uzbekistan (4 percent), and other countries (12 percent).

U.S. producers have been and are continuing to put projects on hold, halting further exploration, and dramatically scaling back the workforce. The sole conversion facility in the U.S., a joint venture between General Atomics and Honeywell has also recently suspended its operations. Based on current projections, in 2018, **domestic uranium will likely account for less than two percent of domestic reactor fuel demand**, and production will fall to the lowest level since 1949. We are on the verge of losing this industry.

While there are a number of factors contributing to current market conditions (*e.g.,* the Department of Energy [DOE] uranium transfers, uneven global playing field, oversupplied market post 2011 Fukushima disaster, nuclear reactor closures, burdensome regulatory environment, etc.), UPA wants to highlight two issues today that are within the committee's jurisdiction: (1) the management of the federal uranium inventory; and (2) the burdensome regulatory environment.

Mismanagement of DOE's Excess Uranium Inventory

DOE's mismanagement of the federal excess uranium inventory is a significant driver of the current market conditions. Since 2008, DOE has transferred more than 37 million pounds of uranium (U_3O_8) from an inventory deemed in excess of national security needs to pay for the cleanup of federal legacy nuclear sites. UPA recognizes the cleanup of these sites, including the project in Portsmouth, OH, is a priority. However, given the state of the uranium market, any further cleanup work should be funded through the regular appropriations process.

DOE has a legal obligation under the USEC Privatization Act (P.L. 104-134), to certify uranium transfers will not have an "adverse material impact on the domestic uranium mining, conversion, or enrichment industry." In our view, the DOE transfers have had and continue to have an adverse material impact on the domestic industry. Since 2011, the amount of DOE material entering the market on an annual basis has exceeded the total amount of uranium produced by the domestic industry. The transfers in 2013 to 2016 exceeded more than two times the total domestic production. Clearly transfers of this magnitude are having an adverse material impact on the domestic industry. As market prices forced the domestic industry to significantly scale back production and shed jobs, the DOE transfers continue, largely unabated.

UPA applauds Energy Secretary Rick Perry for scaling back transfers in 2017, but DOE transfers, even at the reduced rate, continue to exceed more than two times the total domestic uranium production. UPA has consistently warned DOE that additional transfers would create an adverse material impact on the domestic industry, and the current state of the industry now reflects that impact. **UPA again calls on DOE to immediately halt further transfers until the market recovers.** If the domestic uranium industry is a strategic asset and policymakers are concerned about the U.S. becoming entirely dependent on foreign uranium, DOE should be working to strengthen, rather than compete with, the domestic uranium mining and conversion industries.

UPA also encourages DOE to bring together the key stakeholders to discuss a long-term management plan for the inventory that is transparent, predictable, and protective of the

domestic uranium industry. Important questions raised by the Government Accountability Office (GAO) about whether the DOE barter program is legal should also be reviewed. GAO found the DOE barter program is in violation of the Miscellaneous Receipts Act, which requires the proceeds from the sale or transfer or any federal asset to go to the U.S. Treasury, not to run a program that is operated outside of the congressional appropriations process. GAO has also identified concerns in DOE's decision process, specifically the "assumption that DOE's planned uranium transfers would not have a cumulative effect on the term market."

Finally, UPA encourages Congress to enact S. 512, the Nuclear Energy Innovation and Modernization Act. This bill, which has 17 cosponsors in the Senate (9 Republicans and 8 Democrats), would place annual caps on the amount of uranium that DOE could transfer into the market. The legislation would also make the management of the inventory more transparent and ensure robust public and stakeholder input. Finally, the legislation would clarify that DOE's stockpile of depleted tails are covered by the USEC Privatization Act.

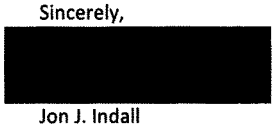
Regulatory Threats and Permit Delays

Despite a long-standing regulatory framework that is fully protective, the Environmental Protection Agency (EPA) proposed a rule at the end of the last Administration (Part 192 – Health and Environmental Protection Standards for Uranium and Thorium Mill Tailings) that would make in-situ uranium production cost prohibitive in the U.S. The rulemaking is entirely unnecessary – EPA acknowledges there is no evidence in-situ uranium recovery has ever caused an adverse impact to local groundwater. In addition, the Nuclear Regulatory Commission (NRC), which is the primary regulator of uranium mining, concluded the Part 192 rule "would be impractical or unnecessarily cost prohibitive to implement without providing any significant benefit." UPA urges EPA to immediately withdraw the Part 192 rulemaking and work with NRC on a Memorandum of Understanding (MOU) that clearly outlines the roles and responsibilities of each agency when it comes to regulating uranium mining.

UPA also urges the Administration to identify ways to streamline the permitting process – it should not take six to eight years to permit a low-risk, in-situ uranium mine. Finally, UPA encourages NRC to improve the transparency of its billing practices for license applications and renewals, including moving to a flat-fee schedule.

Thank you again for holding this hearing. We look forward to continuing to engage the committee on these important issues.

Sincerely,



Jon J. Indall
Counsel for Uranium Producers of America

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6115
Majority (202) 225–2927
Minority (202) 225–3641

March 7, 2018

Mr. Ed McGinnis
Principal Deputy Assistant Secretary
Office of Nuclear Energy
Department of Energy
1000 Independence Avenue, S.W.
Washington, DC 20585

Dear Mr. McGinnis:

Thank you for appearing before the Subcommittee on Energy on February 6, 2018, to testify at the hearing entitled "DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Wednesday, March 21, 2018. Your responses should be mailed to Kelly Collins, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to kelly.collins@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

Fred Upton
Chairman
Subcommittee on Energy

cc: The Honorable Bobby L. Rush, Ranking Member, Subcommittee on Energy

Attachment

QUESTIONS FOR THE RECORD RESPONSES FROM ED McGINNIS

QUESTIONS FROM CHARIMAN FRED UPTON

Q1. When we talk on this Committee about DOE modernization, one key approach is to update the relevant laws to ensure the agency's security missions fit the global realities of today, not the 1970's or the 1950's.

Q1a. Several witnesses at the hearing talked about the connection between our nuclear infrastructure and threats to our national security interests, if U.S. global leadership on commercial nuclear technology continues to erode. Does DOE recognize these risks? And if so, what in DOE's view are the most important steps to take to address these risks in the short term and long term?

A1a. Yes. The Department of Energy (DOE) recognizes that more than half of its National Nuclear Security Administration's [NNSA's] facilities are over 40 years old, and nearly 30 percent date back to the Manhattan Project era. Science, innovation, and the recruitment of a talented workforce were key to beginning the Manhattan Project, and they will also be the key to modernizing our aging infrastructure, including our nuclear security enterprise, and addressing threats to our national security. The Department is also committed to working with American commercial partners to strengthen relationships and promote innovation to ensure that the U.S. nuclear industry stays strong in a challenging and increasingly competitive environment.

Q1b. Will you work with Committee Members to identify where statutory authorities can help strengthen the agency's role to ensure a robust nuclear infrastructure?

A1b. Yes, the Department is prepared to work with Committee members to strengthen the agency's role to ensure a robust nuclear infrastructure.

Q2a. What other specific steps is DOE considering to help the ultimate deployment of SMRs?

A2a. In addition to supporting the development of viable domestic sites for Small Modular Reactor (SMR) deployment, improving SMR economics is critical for assuring that these projects can be a vital part of a diversified energy portfolio and are competitive with other electricity generating technologies. The report, *Small Modular Reactors: Adding to Resilience at Federal Facilities (December 2017),* provides recommendations for the Government to facilitate the financing and development of SMRs by expanding power

purchase agreement authorities, extending the loan guarantee program to support SMRs, and identifying ways to value the resilience of SMRs, among others. The Office of Nuclear Energy (NE) is evaluating these recommendations as one of several means of improving SMR economic competitiveness and utility attractiveness. To further support the development and deployment of a broad range of innovative nuclear technology concepts by U.S. industry, the Department recently published a multi-year funding opportunity announcement that will award at least $30 million in Fiscal Year (FY) 2018 for cost-shared, private-public technical partnerships with U.S. industry to achieve these goals. In FY 2018, NE will invest in early-stage research and development (R&D) on next generation reactor technologies, including $20 million supporting advanced SMRs. Additional funding will be provided for more technical partnerships in FY 2019 and beyond, contingent upon Congressional appropriations.

Q2b. Does DOE need specific legislative authority to implement the SMR deployment report's recommendations and, if so, what are those authorities?

A2b. The referenced SMR report identifies several recommendations involving specific legislative authorities that would be required for implementation. One of the report recommendations, extension of the Energy Policy Act of 2005 (EPAct 2005) production tax credits, has already been approved by Congress as of February 2018 and is expected to have a positive impact on the further development of advanced nuclear development, including advanced SMRs. NE is evaluating the SMR report and its other recommendation involving legislative actions to improve the financing and development outlook of SMRs.

Q3a. What is DOE's role in providing input to the civil nuclear review?

Q3b. What is the expected timing of the civil nuclear review's release?

Q3c. Will the civil nuclear review receive input from non-government stakeholders and, if so, what is the process by which the review will receive such input?

Q3d. Will the civil nuclear review make recommendations for statutory changes or propose legislative language to more accurately reflect today's interconnected global civil nuclear market?

Q3e. How will the civil nuclear review prioritize its recommendations to appropriately balance long-term infrastructure needs, such as the development and maintenance of a robust fuel cycle, with near-term actions that can directly support the existing fleet of nuclear power plants?

Q3f. Will you, as the lead organization for civilian nuclear energy policy issues, commit to working with the Committee to assure our interests are appropriately reflected in the civil nuclear review?

A3a-f. This Administration is fully committed to nuclear energy as a vital component of our Nation's energy portfolio. We are aggressively working to revive and expand our nuclear energy sector. On June 29, 2017, during a visit to DOE, President Trump called for a complete review of our Nation's nuclear energy policy. That review is currently underway and being led by the National Economic Council, the National Security Council, and the Office of Science and Technology Policy in the Executive Office of the President (EOP). DOE, along with several other federal agencies, is actively participating and working with the EOP on the review.

Q4. Today, in the United States, there are only two new reactors at one site in Georgia. China and Russia are competing to expand their dominance in nuclear technology globally, and the hearing testimony suggestion the U.S. risks falling behind our competitors.

This is not a good situation for the national security, economic, or safety benefits of U.S. civilian nuclear participation in global markets. As you know, the Departments of Defense, State, and Commerce all have prominent roles relating to the Administration's nuclear priorities.

Where does DOE fit in the Administration's Cabinet framework with respect to nuclear issues? Is it generally accurate to say the Secretary of Energy is the principal advisor in the Cabinet on matters relating to atomic energy generally, and nuclear weapons technology, and technical nonproliferation matters?

A4. The Secretary of Energy serves as the principal advisor to the President of the United States, as a member of the President's Cabinet and National Security Council on nuclear matters related to energy, weapons, and nonproliferation. As the Secretary said during his budget testimony to the Senate Energy and Natural Resources Committee on March 20, 2018, DOE's "greatest duty is to protect our citizens and nuclear deterrence is a core part of that mission."

The National Nuclear Security Administration, through the Undersecretary for Nuclear Security/NNSA Administrator, advises the Secretary of Energy on all defense nuclear security matters, whereas the Office of Nuclear Energy, through the Undersecretary of Energy, advises the Secretary of Energy all civil nuclear energy matters.

On defense nuclear security matters, DOE's role in the President's Cabinet is to maintain modern, flexible, and resilient nuclear capabilities that are safe and secure; prevent the spread of materials, technology, and expertise that could be used in weapons of mass destruction; advance counterterrorism and counter proliferation objectives; serve as the United States government's primary response to radiological and nuclear emergencies; and ensure the safe, reliable, and long-lived operations of our nation's nuclear Navy.

On civil nuclear energy matters, DOE's role in the President's Cabinet is to revive and expand the U.S. nuclear energy sector. The Department advances nuclear energy technologies through targeted early-stage investments, leveraging public-private partnerships, and world-class research and development capabilities of our national laboratories. DOE is also working to encourage a resilient nuclear supply chain, while promoting a strong advanced nuclear pipeline. Finally, the Department is committed to finding a solution for our Nation's nuclear waste.

Q5. How will the Office of Nuclear Energy prioritize and balance these types of proposed initiatives within realistic, historical budgets, while still providing the adequate level of funding to maintain existing infrastructure, including stewardship of DOE's lead nuclear energy laboratory, and research programs that can have a more immediate and tangible impact on the existing nuclear fleet?

A5. The Office of Nuclear Energy (NE) recognizes the budgetary, regulatory, and technical challenges of supporting a broad program of nuclear research and development (R&D) aimed at advanced reactor development while sustaining a healthy fleet of existing reactors and associated industry infrastructure. NE is prioritizing these challenges within current budgetary constraints to have the most immediate and tangible impact on the existing nuclear fleet. Initiatives to engage in private-public partnerships to drive technologies and capabilities to commercialization are underway and will help to leverage our government investments. Also, NE is evaluating the required investments in

future capabilities, particularly those with high upfront costs and continuing mortgages, in a strategic manner to ensure we are making the right decisions to maintain the relevance of our institutional R&D capabilities for generations to come.

QUESTION FROM REPRESENTATIVE RICHARD HUDSON

Q1a. **Mr. McGinnis, what potential defense applications for nuclear reactors does DOE see in the near future and what needs to be done to enhance collaboration between DOD and your office?**

A1a. The Department of Energy (DOE) sees significant potential for the deployment of very small "micro reactors" that meet defense power demands for forward operating bases and other remote sites with large electrical loads.

The Senate Armed Services Committee (SASC) requested that DOD engage in research, development, demonstration, and deployment of micro-reactor concepts, also known as very Small Modular Reactors (vSMR), and prepare a manufacturing feasibility report within 24 months. In response, DOD discussed micro-reactor technology with the Idaho National Lab and recognized that DOE and the National Labs are likely the most appropriate entities to oversee such prototype development. DOD also has initiated efforts to identify proper subject matter experts within the services and DOE for preparing the manufacturing feasibility report.

The Departments of Defense and Energy are also in consultation with the Department of State to ensure that all issues related to the international safety, security and nonproliferation regime are appropriately addressed.

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6115
Majority (202) 225–2927
Minority (202) 225–3641

March 7, 2018

Mr. Art Atkins
Associate Deputy Administrator for Global Material Security
National Nuclear Security Administration
Department of Energy
1000 Independence Avenue, S.W.
Washington, DC 20585

Dear Mr. Atkins:

Thank you for appearing before the Subcommittee on Energy on February 6, 2018, to testify at the hearing entitled "DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Wednesday, March 21, 2018. Your responses should be mailed to Kelly Collins, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to kelly.collins@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

Fred Upton
Chairman
Subcommittee on Energy

cc: The Honorable Bobby L. Rush, Ranking Member, Subcommittee on Energy

Attachment

QUESTIONS FOR THE RECORD RESPONSES FROM ART ATKINS

QUESTION FROM CHAIRMAN FRED UPTON

Q1. Your testimony suggests review times for Part 810 specific authorizations have dropped from 18 12 months. Does this reduction in processing time include authorizations that are now deemed exports? If so, please do a side by side comparison that excludes the things that are now deemed exports.

A1. Average processing times for specific authorizations approved pursuant to 10 CFR Part 810 (Part 810) have decreased from a high of more than 18 months, which was the average processing time in Fiscal Year (FY) 2012, to the current average of approximately 12 months. These figures reflect all approved specific authorizations, including both deemed export applications and all other specific authorizations (referred to here as "regular exports"). Between FY 2012 and the present, the average time for approval of deemed exports decreased significantly, from 28 months to 11 months, while the average processing time for regular exports increased slightly from 15 months to 17 months.

These changes in average processing times are due to a number of factors. Processing times in FY 2012 for deemed export applications were high because the Department was in the process of determining the legal requirements and appropriate administrative procedures for authorizing this type of export. These processing times began to decrease once the Department finalized the procedures, which allow for foreign nationals working for U.S. companies to be granted specific authorizations under Part 810 on the basis of a nondisclosure agreement signed by the individual, rather than a written assurance from their government, which had been required previously. Foreign governments often are hesitant to provide such assurances for individuals who live and work outside of their borders.

With regard to regular export authorizations, processing times have increased for a variety of reasons, including new provisions in the FY 2016 National Defense Authorization Act that require the Office of the Director of National Intelligence to review all proposed transfers to China and Russia. While this requirement applies to both deemed and regular exports, deemed exports to Chinese and Russian citizens are relatively rare, so the new requirement has had a much larger impact on the processing times for regular exports. Additionally, approval times

were further impacted by ongoing policy reviews, and the time required to obtain government-to-government nonproliferation assurances.

As discussed below, the Department is currently implementing a number of actions that will reduce processing times for both deemed and regular exports, while maintaining strong nonproliferation controls on U.S. nuclear technology.

Q2. During the hearing you noted that DOE is looking at actions that can reduce processing times, such as providing the Secretary the authority to approve authorizations contingent on receiving assurances from the Department of State. Please provide further detail regarding the prospective policy changes the Department is considering improving the efficiency of specific authorization approval, including expected timeframes and milestones.

A2. As part of the implementation of the Department of Energy (DOE)'s Part 810 Process Improvement Plan, the Department is taking a number of steps to reduce processing times and improve efficiency and transparency. First, DOE is modifying the Part 810 review process so that most of the required DOE reviews of applications for specific authorization can be conducted in parallel with the Department of State's (DOS) effort to obtain nonproliferation assurances from the foreign government that would receive the technology. Under the revised process, however, applications will not be sent to the National Nuclear Security Administration (NNSA) Administrator or Secretary of Energy, until the application package is complete, including a final DOS concurrence and the associated government-to-government nonproliferation assurance. DOE expects to begin implementing parallel processing starting with the next application for specific authorization that is received. Moving forward, DOE will also continue to work with DOS on options to reduce the time required to obtain nonproliferation assurances from foreign governments.

Second, DOE is working to establish timely yet realistic deadlines for internal review of Part 810 applications. This will further reduce processing times by holding offices accountable for meeting specified review timelines, and will improve the predictability of the application review process for applicants. DOE is finalizing the review deadlines now and expects to have them in force within the next several weeks.

Third, DOE is enhancing the functionality of e810, an electronic submissions portal for Part 810 applications and reports that was made available to exporters in January 2017 to streamline the application process and increase transparency for applicants. By March 2019, DOE will release e810 Phase 2, which will include new functionality for electronic review of documents by DOE and the interagency. This will make it easier for DOE to track the progress of reviews and will enable regular, automated status updates to applicants. Subsequently, DOE will begin development of e810 Phase 3, which will add detailed reporting functionality to the system. The Phase 3 system update is planned for release by March 2020.

In addition to these ongoing process improvement initiatives, DOE is reviewing additional options that would further reduce processing times and enhance compliance and monitoring.

Q3. Your testimony noted that NNSA is "looking at capability to meet High-assay LEU" for commercial needs. Will you please describe the nexus between NNSA's material management and opportunities to provide high-assay LEU for commercial purposes?

A3. NNSA is responsible for managing the United States' inventory of enriched uranium to ensure that it is used effectively. Due to the limited supply of enriched uranium, and projected future demands for both government and commercial use, NNSA is also working within the broader DOE to explore the establishment of a domestic enrichment capability.

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6115
Majority (202) 225-2927
Minority (202) 225-3641

March 8, 2018

Mr. James Owendoff
Principal Deputy Assistant Secretary
Office of Environmental Management
Department of Energy
1000 Independence Avenue, S.W.
Washington, DC 20585

Dear Mr. Owendoff:

Thank you for appearing before the Subcommittee on Energy on February 6, 2018, to testify at the hearing entitled "DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Thursday, March 22, 2018. Your responses should be mailed to Kelly Collins, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to kelly.collins@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

Fred Upton
Chairman
Subcommittee on Energy

cc: The Honorable Bobby L. Rush, Ranking Member, Subcommittee on Energy

Attachment

QUESTIONS FOR THE RECORD RESPONSES FROM JAMES OWENDOFF

QUESTIONS FROM CHARIMAN FRED UPTON

Q1. DOE is responsible for about $372 billion in federal environmental liabilities. Now, of DOE's $5.4 billion annual cleanup request (in FY 2017) about $4.4 billion was for operational activities-actually doing cleanup. The remaining $1 billion was for construction projects to support the operational activities.

In March last year, we asked GAO to look at what DOE is doing to monitor the performance of the $4 billion in operational spending to be sure we are making cost-effective progress on cleanup. That work is underway.

Q1A. Is it possible to measure the how DOE operational spending is reducing environmental liabilities?

A1a. It is possible to measure how the Department of Energy (DOE) spending on operational activities as well as capital projects is reducing environmental liability. The calculation for environmental liability is updated and audited annually. DOE reported $372 billion in federal environmental liabilities in its Fiscal Year (FY) 2016 Agency Financial Report. Of this amount, the Office of Environmental Management (EM) is responsible for $257 billion. At the end of each audit period, the amount spent on completed activities in that fiscal year is subtracted from the remaining liability. As part of the liability audit, each project and activity is reviewed and adjustments are made to reflect if a project is behind or ahead of schedule, and to reflect any changes to the estimates of the remaining work scope. For instance, in FY16 the liability was reduced by $6.4 billion of work accomplished including defense and non-defense spending. However, the liability increased by $17 billion from FY2015 due to escalation, an updated estimate for treatment of tank waste at Hanford. Regardless of whether the liability increases or decreases from one year to the next, the progress of the activities completed that address the environmental liability is measured.

Q1b. Does DOE issue performance assessments to validate that its operational spending is reducing environmental liabilities?

A1b. EM conducts monthly site reviews that assess performance including contractor progress for cleanup operations compared to an annual performance plan or a 5-year contract

performance plan. Each site provides an assessment by contractor that includes operational accomplishments and status related to mission goals or cleanup performance measures, cleanup/regulatory milestones, and in some cases, earned value. In addition, sites report monthly performance data and narrative assessments for operational activities in the EM corporate database. The EM monthly site performance assessments provide both quantitative and qualitative validation of environmental liability reduction associated with EM operational spending.

Q2. Last September the Government Accountability Office issued a report that addressed long-term planning needs associated with the Waste Isolation Pilot Plant (WIPP). The report noted DOE has not yet initiated certain steps to assess options to expand the size of WIPP or enter into discussions with the State of New Mexico to acquire needed environmental permits. Since the issuance of GAO's report, what steps has DOE started to address these long-term needs?

A2. DOE has initiated a strategic planning effort to define and develop future waste emplacement areas that allow the Waste Isolation Pilot Plant (WIPP) to dispose of waste up to the statutory volume limit of 6.2 million cubic feet. Internal workshops have been held to define key technical aspects to be considered for future waste panels. The Department expects to develop a conceptual design for potential new panels by the end of 2018, and will identify corresponding regulatory actions as the design develops. In January 2018, DOE submitted a WIPP permit modification to revise the method for calculating the volume of waste emplaced in the mine. This change would more efficiently allocate the statutorily-defined waste volume.

Q3. Is the Department considering options to align conflicting definitions of how certain radioactive waste is classified?

A3. Yes, one option under consideration is to focus on key aspects of the Nuclear Waste Policy Act definition of high-level radioactive waste (HLW) that account for relative risk based on the level of radioactivity. This would replace the current approach of managing wastes resulting from the reprocessing of spent nuclear fuel based on its source, regardless of the level of radioactivity.

Q3a. If so, is there a need for statutory clarification?

A3a. DOE believes it has sufficient authority to adopt such a revised policy without any statutory clarification or legislative action.

Q4. DOE submitted a required report to Congress with disposal options for material that is known as "Greater Than Class C" (GTCC) waste, pursuant to the Energy Policy Act of 2005. While the expected disposition path at the time was in the Yucca Mountain repository, the previous administration's decision to terminate the Yucca program resulted in a major delay in meeting the 2005 Act. Please briefly describe DOE's recommendations contained in this report and what further authorities the Department needs to move forward.

A4a. The Report to Congress referenced the preferred alternative for the disposal of greater-than-Class C (GTCC) low-level radioactive waste and GTCC-like waste identified in the final environmental impact statement, which is land disposal at generic commercial facilities and/or disposal in the WIPP geologic repository.

The Report to Congress noted that legislative and regulatory actions would be required for DOE to implement the preferred alternative.

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6115
Majority (202) 225–2927
Minority (202) 225–3641

March 7, 2018

Mr. Victor McCree
Executive Director of Operations
U.S. Nuclear Regulatory Commission
One White Flint North
11555 Rockville Pike
Rockville, MD 20852

Dear Mr. McCree:

Thank you for appearing before the Subcommittee on Energy on February 6, 2018, to testify at the hearing entitled "DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Wednesday, March 21, 2018. Your responses should be mailed to Kelly Collins, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to kelly.collins@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

Fred Upton
Chairman
Subcommittee on Energy

cc: The Honorable Bobby L. Rush, Ranking Member, Subcommittee on Energy

Attachment

UNITED STATES
NUCLEAR REGULATORY COMMISSION
WASHINGTON, D.C. 20555-0001

April 16, 2018

The Honorable Fred Upton
Chairman, Subcommittee on Energy
Committee on Energy and Commerce
United States House of Representatives
Washington, DC 20515

Dear Mr. Chairman:

The U.S. Nuclear Regulatory Commission appeared before the Committee on Energy and Commerce on February 6, 2018, at the hearing entitled, "DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure". From that hearing, you forwarded questions for the hearing record to Mr. Victor McCree. The responses to those questions are enclosed.

If I can be of further assistance, please do not hesitate to contact me.

Sincerely,

/RA/ Eugene Dacus

Eugene Dacus, Director
Office of Congressional Affairs

Enclosure:
As stated

cc: The Honorable Bobby L. Rush, Ranking Member
Subcommittee on Energy

House Energy and Commerce, Subcommittee on Energy
Hearing entitled "DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure"
February 6, 2018
Questions for the Record

Chairman Fred Upton
(Questions for Mr. McCree)

QUESTION 1. **High-assay LEU, uranium enriched at higher levels than what is typically available in the current commercial market, may be needed for advanced reactor technology developers to ultimately deploy and commercialize their reactor designs. A recent industry survey of 16 leading U.S. advanced reactor technology developers found the lack of access to high-assay LEU ranks at the top of policy concerns that require resolution to move forward with those projects. Has the NRC considered potential policy challenges associated with this material?**

ANSWER.

The NRC does not see any insurmountable policy challenges associated with licensing or regulating this material. High-assay Low Enriched Uranium (LEU) is considered to include enrichments up to 20%. The NRC has regulations that would allow for the licensing of uranium enrichment facilities to produce these higher assay materials. These materials could come from NRC-licensed domestic enrichment facilities, the Department of Energy (DOE), or foreign sources.

The NRC would leverage its past experience licensing new technologies such as the facilities intended to produce Molybdenum-99 medical isotopes. The requirements for the existing

enrichment and fuel fabrication facilities regarding high-assay LEU could be established through rulemakings, issuance of orders, or through license conditions.

Although not NRC policy challenges, there are some issues the industry would need to address to facilitate the production of high-assay LEU and the fabrication of fuel using high-assay LEU. Uranium enrichers will produce the high-assay LEU in the form of uranium hexafluoride and ship it to fuel fabricators to be made into reactor fuel. Shipping packages for each different form of the high-assay LEU (i.e., uranium hexafluoride and fresh reactor fuel) would need to be developed and certified. Additionally, there is currently a lack of criticality benchmarks, used in the verification of criticality computer codes, for uranium enrichments at the high-assay LEU levels. Without these benchmarks, additional safety precautions would have to be added to ensure that an inadvertent criticality does not occur. The additional safety precautions could impact the design of the transportation packages as well as the facilities producing and using the high-assay LEU (e.g., smaller packages, less throughput in plant systems, etc.).

QUESTION 2. **DOE, in partnership with the Electric Power Research Institute and other industry partners, is working to develop what is known as "Accident Tolerant Fuels" or ATF. ATF could be a game changer for existing nuclear power plants by significantly reducing the risk of an emergency release and therefore results in corresponding reductions in regulatory requirements. How is NRC considering potential technical and policy issues that may have to be addressed to qualify these fuels?**

ANSWER.

In consideration of potential technical and policy issues related to implementation of Accident Tolerant Fuels (ATF), the staff has drafted a project plan (ADAMS Accession ML17325B771) that outlines the strategy to license ATF designs in the near-term and the longer-term. The draft plan covers all aspects of ATF, including fabrication, transportation, storage, and the regulatory framework for in-reactor performance. The draft plan contains tasks covering regulatory infrastructure needs (regulations and guidance), tools and methods for safety evaluations, and accounts for interactions with industry, the DOE, and international organizations regarding appropriate experimental data and code capabilities for regulatory decision processes. The draft plan was published in the *Federal Register* for public comment with nearly 80 comments from 10 entities received. The staff discussed comments with stakeholders during a February 27, 2018, public meeting (ADAMS Accession ML18057A189). The staff anticipates incorporating stakeholder feedback and finalizing the plan by mid-summer 2018. The plan is intended to be a living document and will evolve as ATF concepts are refined.

QUESTION 3. **Advances in super computing and application of new modeling techniques provide great opportunity to drive innovation and develop new nuclear technologies, particularly to help qualify new nuclear fuels. However, to realize the full benefits of modeling and simulation, the NRC must be prepared to analyze and accept the data.**

a) How is the NRC considering its level of preparedness to analyze and accept modeling and simulation for fuel qualification?

b) What are some of the obstacles NRC faces to realize the benefits of advanced computing?

ANSWER.

a) Throughout the history of licensing nuclear technologies, the NRC has approved applications that rely on a combination of computer simulation, modeling, and experimental data to demonstrate compliance with NRC safety requirements. Consistent with past practice, the NRC supports the appropriate use of computer models and simulation tools to evaluate the safety of nuclear technologies.

The NRC has been meeting with representatives from the DOE, national labs, the Electric Power Research Institute, and international organizations to define how their current and planned advanced modeling and simulation capabilities can be used for fuel qualification and how they will be validated against relevant data to ensure that they appropriately model physical processes and accurately predict the results of phenomena of interest.

The NRC is actively engaged in leveraging existing advanced modeling and simulation to advance our codes and build our staff expertise in advanced computing. For example, over the last 6 months, DOE has sponsored several training opportunities for the NRC staff and provided NRC access to a number of DOE codes. Additionally, NRC and DOE code development experts are exploring linking NRC and DOE codes and developing greater understanding of code capabilities and analysis needs. The efforts initiated to date have been productive.

b) The main challenge NRC faces to realize the benefits of advanced computing is related to code verification and validation. For advanced modeling and simulation tools, there is a need to reach a common understanding of (1) the level of rigor of verification and validation and (2) the experimental and empirical basis supporting validation when these advanced modeling

and simulation tools are used to support safety decisions. The NRC looks forward to working with proponents of advanced computing to support regulatory safety decisions, such as fuel qualification.

QUESTION 4. **The state of Texas has petitioned the NRC to have the regulatory authority to regulate a potential GTCC disposal site in the State. While NRC regulations require GTCC is disposed of in a geologic repository, I understand that a Texas company has expressed interest in a near-surface disposal facility. Please provide an update on the status of NRC's activities relating to GTCC waste disposal.**

ANSWER.

In 2015, the Commission directed the NRC staff to prepare a regulatory basis for the disposal of Greater-than-Class-C (GTCC) waste through means other than deep geologic disposal, including near-surface disposal. Additionally, the Commission directed that the regulatory basis should analyze whether, in accordance with section 274c.(4) of the Atomic Energy Act, disposal of GTCC waste presents a hazard such that the NRC should retain authority over its disposal. If the staff concludes, as a result of its analysis, that some or all GTCC waste is potentially suitable for near-surface disposal, the staff is directed to proceed with the development of a proposed rule to include disposal criteria for licensing the disposal of such waste under 10 CFR Part 61.

The NRC staff is continuing to gather relevant information to develop the GTCC regulatory basis. On February 14, 2018, the NRC published a *Federal Register* notice (83 Federal Register 6475) requesting stakeholder comments on identifying the various technical issues that should be considered in the development of the regulatory basis. Comments have been requested to be submitted by mid-April 2018. The NRC staff also held a public meeting and

webinar on February 22, 2018, to discuss the various technical issues that the NRC staff should consider. Approximately 100 stakeholders participated, including industry representatives, a Congressional staff-member, other Federal Executive agencies, environmental groups, Agreement States, and other members of the public. An additional public meeting on the disposal of GTCC and transuranic waste was held on March 23, 2018, shortly after the 2018 Waste Management Symposia in Arizona.

After development of a draft regulatory basis, the NRC staff plans to hold additional public meetings this summer. The NRC staff plans to publish the final regulatory basis in early 2019.

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6115
Majority (202) 225–2927
Minority (202) 225–3641

March 7, 2018

Dr. Mark Peters
Director
Idaho National Laboratory
P.O. Box 1625
Idaho Falls, ID 83415

Dear Dr. Peters:

Thank you for appearing before the Subcommittee on Energy on February 6, 2018, to testify at the hearing entitled "DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. To facilitate the printing of the hearing record, please respond to these questions and requests with a transmittal letter by the close of business on Wednesday, March 21, 2018. Your responses should be mailed to Kelly Collins, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to kelly.collins@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

Fred Upton
Chairman
Subcommittee on Energy

cc: The Honorable Bobby L. Rush, Ranking Member, Subcommittee on Energy

Attachment

Chairman Upton,

Thank you for your follow-up questions to my testimony of Feb. 6.

Question 1: There is a broad portfolio of activities that the Department of Energy can provide leadership to help develop advanced nuclear reactors. Some of those proposals include:

a. **A follow-on licensing project similar to "NP 2010" and the Small Modular Reactor Licensing Technical Support;**
b. **The development of a prototype reactor test bed infrastructure with extensive facility needs; and,**
c. **A multibillion dollar new fast neutron test reactor.**

All of these proposals would require sustained investment to successfully achieve the program goal. How would you recommend that DOE best prioritize and balance those types of proposed initiatives within realistic, historic budgets, while still providing the adequate level of funding to maintain INL's existing infrastructure and research programs than can have a more immediate and tangible impact on the existing nuclear fleet?

A follow-on licensing project similar to "NP 2010" and the Small Modular Reactor Licensing Technical Support, development of prototype reactor test bed infrastructure, and a new fast neutron test reactor, are important components of the United States regaining and sustaining its leadership in nuclear energy. While the government's (DOE's) efforts are essential, they need to be synchronized with the enabling of a vibrant nuclear energy industry, including a robust domestic supply chain.

Many of the program elements within DOE, including the initiatives you have listed, are aimed at supporting this goal. Predicting the future is not possible. We need a flexible portfolio where, in a funding-constrained environment, our priorities can be adjusted in terms of relative investments as the civil nuclear energy landscape evolves. Sustained funding at the appropriate levels (with adjustments as needed) for these initiatives would be in the nation's best short- and long-term interests.

Speaking more broadly, and in line with the Nuclear Energy Technology Roadmap developed by INL, Argonne and Oak Ridge national laboratories, Congress should support activities that have the greatest potential to foster breakthrough

technologies, particularly in regard to the cost of nuclear systems and U.S. technology deployment domestically and globally.

If we are to prioritize those initiatives based on today's understanding of the nuclear energy landscape, I would do so in this order:

1. SMR licensing technical support, leading to SMR deployment
2. A new fast neutron test reactor
3. Prototype reactors

Congress continues to support SMR development and deployment in the fiscal year 2018 budget. The 2019 Office of Nuclear Energy budget request specifies $54 million to support SMR technology. Continued technology support is important to ensure the future of nuclear energy, and by extension, the nation's economy, environment, and national security.

Considerable private and public investment has been made in light-water-based SMR technologies. Therefore, crossing the finish line through a full-scale, first-of-a-kind demonstration with this technology is in our best interest and would be a short-term win for U.S. leadership.

If this goal is not achieved, thinking about longer-term leadership in other advanced reactors would be difficult for the U.S. It is also important to note that achieving this first-priority goal is not based solely on investments in technical support (which is relatively small given the maturity of this technology), but requires policy-related support as discussed below in the answer to your second question.

In sustaining U.S. leadership in nuclear energy technologies, a new fast neutron test reactor should be the second-highest priority because it will enable multiple advanced reactor technologies of the future without DOE deciding what the best technology should be.

A fast test reactor will allow industry to increase the maturity and improve the economics of various advanced reactors they are working on, and the best competitive technologies will emerge naturally through market decisions.

The fast test reactor will fill a major void in our R&D infrastructure, and strengthen our global R&D leadership which has been brought to world-leading standards in the last two decades in many areas except in enabling the

commercialization of fast-spectrum small or large reactors. Currently, the U.S. industry developing these technologies relies on access to reactors in Russia, a competitor to the U.S companies for leadership of this technology.

Finally, it is important for the U.S government to support first-of-a-kind technology demonstrations. However, the decision on what technologies need to be demonstrated must be based on:

- industry interests;
- solid business plans that lead to subsequent large-scale commercialization following the demonstration;
- private-sector interest in cost-sharing such demonstrations. As private-sector interest in such demonstrations grows financially and technically, priorities in the public funding at appropriate levels to support these interests should be adjusted.

Question 2: INL has worked with NuScale since the outset of their efforts to develop this new design. What other policies should be considered to help the deployment of SMRs?

Private-public partnerships are absolutely necessary to getting first-of-its-kind technologies into the marketplace.

As INL has worked with NuScale, other companies interested in developing and deploying SMRs, vendors and government officials, consensus opinion is that the following federal policies would facilitate the private-public partnerships needed to design, demonstrate and deploy SMRs:

1. Expansion of the SMR Licensing Technical Support (LTS) program to include the design and engineering, regulatory review, and approval of SMR technologies and facilities.
2. An SMR commercial deployment program to stimulate new SMR generation sufficient for self-sustaining deployment, made available through a combination of the following investment mechanisms:
    - Production tax credits (PTC) that stimulate SMR deployment as already enacted by Congress in EPACT (2005) and modified and extended earlier this year as part of the Bipartisan Budget Act of 2018.

- Allowing the Department of Energy and Department of Defense to enter into long-term power purchase agreements (PPA) and compensate SMR projects that supply carbon-free and highly resilient and reliable electricity to facilities supporting critical national security missions or other federal goals and priorities.
- Loan guarantees that support financing, through continuation of the existing loan guarantee program and authority, for design and construction of SMR facilities and SMR component manufacturing facilities.

3. An SMR investment tax credit (ITC) for manufacturing capabilities that form a robust U.S. supply chain for domestic SMR facilities and export of U.S. SMR components, equipment, and reactor technologies.
4. DOE research, development and demonstration of innovative SMR capabilities.
5. DOE and DOD programs to develop the requirements and specifications for SMR-powered (and very small SMR) secure and reliable microgrids, capable of operating independent of the main electrical grid, to improve reliability and resiliency for selected federal facilities to make them less vulnerable to man-made and natural threats.

I want to commend the Idaho State Legislature, which recently enacted statute changes that will assist NuScale Power and a partner utility in its effort to deploy a first-of-its-kind SMR on the INL Site, and allow the Laboratory to utilize up two of the 50-megawatt modules for vital research and development.

Programs such as The Joint Use Modular Plant (JUMP) initiative would allow INL to use one or two of the modules to examine how we can use energy differently in the future, create more integrated systems, and demonstrate safe, secure and resilient microgrid systems.

I would also commend the federal government for its efforts to develop and deploy SMRs. The Department of Energy has supported the design and licensing of the NuScale SMR with a $217 million grant of matching funds.

Mark Peters,

Director, Idaho National Laboratory

GREG WALDEN, OREGON
CHAIRMAN

FRANK PALLONE, JR., NEW JERSEY
RANKING MEMBER

ONE HUNDRED FIFTEENTH CONGRESS

Congress of the United States

House of Representatives

COMMITTEE ON ENERGY AND COMMERCE

2125 RAYBURN HOUSE OFFICE BUILDING
WASHINGTON, DC 20515–6115
Majority (202) 225–2927
Minority (202) 225–3641

March 7, 2018

Dr. Ashley Finan
Policy Director
Nuclear Innovation Alliance
114 State Street; 6th Floor
Boston, MA 02109

Dear Dr. Finan:

Thank you for appearing before the Subcommittee on Energy on February 6, 2018, to testify at the hearing entitled "DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure."

Pursuant to the Rules of the Committee on Energy and Commerce, the hearing record remains open for ten business days to permit Members to submit additional questions for the record, which are attached. To facilitate the printing of the hearing record, please respond to these questions with a transmittal letter by the close of business on Wednesday, March 21, 2018. Your responses should be mailed to Kelly Collins, Legislative Clerk, Committee on Energy and Commerce, 2125 Rayburn House Office Building, Washington, DC 20515 and e-mailed in Word format to kelly.collins@mail.house.gov.

Thank you again for your time and effort preparing and delivering testimony before the Subcommittee.

Sincerely,

Fred Upton
Chairman
Subcommittee on Energy

cc: The Honorable Bobby L. Rush, Ranking Member, Subcommittee on Energy

Attachment

May 16, 2018

Response to Questions for the Record from Hearing Entitled "DOE Modernization: Advancing the Economic and National Security Benefits of America's Nuclear Infrastructure" on February 6, 2018 before the U.S. House of Representatives Energy and Commerce Committee Subcommittee on Energy.

From:
Dr. Ashley Finan, Nuclear Innovation Alliance

1. NNSA's testimony suggests that Part 810 processing times have fallen from 18 to 12 months. Do the findings in Nuclear Innovation Alliance's recent report on the Part 810 process align with that testimony? If so, is 12 months a reasonable time for processing these authorizations or could DOE process them more quickly?

NIA recently published an addendum to the "Part 810 Reform" report, and that addendum provides averages for Part 810 application processing times in recent years. For 2012, 2013, 2015, and 2016, the average processing times for specific authorization applications were 588, 477, 277, and 682 days, respectively. These averages are sorted by the year that the determinations were signed by the Secretary of Energy, though the sorting could be arranged by the year the application was received, which would shift the quoted yearly averages. Using NIA's formulation, however, the 18-month processing time that NNSA is referring to could potentially be the applications approved in either 2012 or 2016, although the average in 2016 is closer to 22 months. NIA does not have a data set for determinations signed in 2014, so it is possible that this is the year NNSA has in mind. Likewise, NIA does not have a full set of application processing data for 2017, so it is possible that the 12-month average that NNSA refers to is from that year. Otherwise, the average in 2015 could be what NNSA is referring to, although it is closer to 9 months.

NIA does not believe that 12 months is a reasonable amount of time for the U.S. government to spend, on average, for processing applications for specific authorizations. The NIA report, "Part 810 Reform," makes several recommendations which should improve the efficiency of Part 810. Some recommendations are directed towards DOE and NIA believes they would lead to faster processing of specific authorization applications. Other recommendations are directed at Congress and industry, and those would also be helpful.

2. Mr. McGinnis was asked about NIA's contention that the government is interested but not invested in nuclear energy programs. Would you clarify how the Department of Energy's Nuclear Energy program could better execute its mission and program direction?

NIA applauds the work being done by the DOE Office of Nuclear Energy, and the improvements that have been made over the past several years in GAIN and the advanced reactor concepts program. Further improvements are always possible, and NIA will work to research and develop suggestions. The contention that the government is not sufficiently invested applies much more broadly: The Office of Nuclear Energy cannot alone ensure U.S. leadership in nuclear energy. DOE leadership, the NNSA, the State Department, the Senate, the House of Representatives, and the White House all play critical roles, and U.S. nuclear energy leadership will require the concerted efforts of all of those groups. It is incumbent on each to understand the importance of the U.S. role in nuclear energy globally, to understand their responsibilities and opportunities to support that, and to take action. NIA will seek to support that work wherever possible.

○