ENERGY AND WATER DEVELOPMENT APPROPRIATIONS FOR FISCAL YEAR 2017

WEDNESDAY, MARCH 9, 2016

U.S. SENATE,
SUBCOMMITTEE OF THE COMMITTEE ON APPROPRIATIONS,
Washington, DC.

The subcommittee met at 2:37 p.m., in room SD–138, Dirksen Senate Office Building, Hon. Lamar Alexander (chairman) presiding.

Present: Senators Alexander, Graham, Hoeven, Lankford, Feinstein, Udall, Shaheen, and Coons.

DEPARTMENT OF ENERGY

OFFICE OF THE SECRETARY

STATEMENT OF HON. ERNEST J. MONIZ, SECRETARY

OPENING STATEMENT OF SENATOR LAMAR ALEXANDER

Senator ALEXANDER. The Subcommittee on Energy and Water Development will please come to order.

Today's hearing will review the President's fiscal year 2017 budget request for the Department of Energy. This is the subcommittee's third budget hearing this year. We will have our final hearing on the National Nuclear Security Administration's budget next week.

I would add that Senator McConnell has said to the Republican Caucus that he hopes we move rapidly on appropriations bills this year. He would like to start April 15. He said that after he received a letter from the Democratic leadership, urging him to do that.

In past years, this committee has been able to work well together, whether we had a Democrat or Republican chairman, and agree on a bill with our members in the House and be one of the first bills ready for consideration for the floor. I hope we can do that again.

In doing that, I hope that we will have plenty of policy items in the budget, and I hope so-called controversial riders will not be added in the subcommittee or committee, so we can get the bill to the floor. If anybody thinks they have 60 votes to put something controversial on the bill, they can offer it on the floor or they can run for the House of Representatives. Those are the two ways to do that.

[Laughter.]

Senator ALEXANDER. We will see. That will be our goal. I am hopeful we can do that.

Senator Feinstein and I will each have an opening statement. I will then recognize each Senator for up to 5 minutes for an opening statement, alternating between the majority and minority in the order in which they arrived. We will then turn to Secretary Moniz for his testimony on behalf of the Department of Energy. And then I will recognize Senators for 5 minutes of questions each, alternating back and forth.

I want to thank the Secretary for being here. We enjoy working with him. He is responsive to our questions, and he is competent in his work. We thank him for his service to the country.

Of course, it is a delight to work with Senator Feinstein on these important issues. We work well together. We have differences of opinion, but in the end, we come to a result.

Our witness today is Secretary Moniz, who has been Secretary since 2013. The department's energy budget request is about $32.5 billion, an increase of $2.9 billion over what Congress provided last year.

PRIORITIES

Governing is about setting priorities. Given our current fiscal constraints, especially on nondefense spending, we are going to have to make some hard decisions this year. That is why we are holding the hearing, to talk about the most urgent priorities.

I would like to focus on three main areas, one doubling basic energy research; two, the future of nuclear energy; three, keeping large projects on time and on budget.

I see Senator Graham here. He and all of us really are concerned about these large projects in the department, and we will get into that more later.

DOUBLING BASIC ENERGY RESEARCH

Doubling basic energy research, that is one of the most important things we could do. I think Republicans and Democrats agree that government-sponsored research has and continues to be important for our continued prosperity and job creation. Doubling basic energy research is a goal I have long supported. We have increased investment in basic energy research, both through our national labs and through the ARPA–E agency, which was created as part of the America Competes legislation 10 years ago and passed unanimously by the Senate. It authorized Congress to double funding for basic research over 7 years.

Last month, Senator Durbin and I cosponsored an amendment to the energy bill that is being worked on in the Senate that increases the authorized funding levels for the Office of Science by about 7 percent a year, which would double the Office of Science's budget from a little over $5 billion today to more than $10 billion in 10 years. The Senate adopted our amendment.

The President has also proposed to invest more in basic research, including the Mission Innovation proposal, a pledge launched by the United States and 19 other countries at the climate summit in Paris to double Federal clean energy research over the next 5 years.

The problem is that the President's budget request proposes $2.259 billion in new mandatory funding for the Department of Energy. The mandatory funding would be used to support clean energy proposals and replace several proposed cuts to programs that were currently funded with discretionary spending. These new mandatory spending proposals include $1.3 billion for the 21st Century Clean Transportation Plan; $674 million to replace discretionary spending cuts in cleanup programs that is especially concerning to me; $100 million for new Office of Science university grants; and $150 million to support ARPA–E (Advanced Research Projects Agency—Energy).

However, the President's commitment to double Federal clean energy research comes at the expense of other resources and agencies, and he proposes to pay for this new mandatory spending with new tax increases.

This is not a realistic proposal. The budget writers know this. Congress is not going to enact $3.4 trillion in new tax increases over the next 10 years to pay for an additional $682 billion in mandatory spending spread across Federal agencies over the next 10 years.

Senator Murray and I just finished a hearing this morning on our biomedical innovation project, and there is mandatory spending discussions there to replace the increases that we made this past year in funding for the National Institutes of Health.

This kind of budgeting is at best unhelpful, at worst misleading.

First, the President has underfunded the Army Corps of Engineers by $1.4 billion and the cleanup of former Cold War sites by $674 million. That makes it very difficult to draft an appropriations bill, much less fund the proposed new investments in Mission Innovation.

Second, while I have called for doubling our investment in basic research, I have also recommended paying for increases like that by ending subsidies for mature technologies like wind and oil and gas subsidies.

For example, we could start by eliminating the wind production tax credit in 2016 and putting the $4 billion this subsidy costs taxpayers over 10 years toward doubling energy research, and we could phase out subsidies for oil and gas. Legislative proposals similar to the one I supported in February to repeal oil and gas subsidies save $24 billion over 10 years, which could be spent on research and development.

Out of control mandatory spending on entitlements, which is projected to increase nearly 80 percent over the next 10 years, is already crowding out discretionary spending. Here is the most important point. Over the next 10 years, discretionary spending, the money we are talking about to fund cancer research in this morning's hearing, or Office of Science research in today's hearing, discretionary spending, that part of the budget is 32 percent of total Federal spending. If things continue at the pace they are on, it will be 22 percent in 10 years, according to the Congressional Budget Office.

So this share of the budget is going from 32 percent to 22 percent. So the more responsible proposal about mandatory spending would be to reduce mandatory spending by $682 billion, so we

could have more money for cancer research and energy research, rather than to propose more mandatory spending paid for by taxes.

The United States faces a choice between falling further behind competitors or advancing technologies, but we have to be responsible fiscally.

Supercomputing is one priority we agree on. It is critical to our competitiveness. By next year, the world's fastest computer will again be in the United States. I am glad to say it is in Tennessee through the joint collaboration of Oak Ridge, Argonne, and Lawrence Livermore in California. That computer will be called Summit. It will help researchers better understand materials, nuclear power, and energy breakthroughs. The next generation on the exascale is essential to both our country's competitiveness and national security.

FUTURE OF NUCLEAR ENERGY

Now, as for nuclear energy, nuclear energy provides 60 percent of our Nation's carbon-free electricity, 60 percent, and it must be part of any realistic energy plan. It is reliable. Unlike solar and wind, nuclear power works when the sun is not shining and the wind is not blowing. It is safe. We have never had anyone die in a nuclear accident at any of our commercial reactors or in our naval fleet.

The Department of Energy, Mr. Secretary, has an important role in many of the key challenges in advancing nuclear power, for example, safely extending the life of existing nuclear reactors already operating, the quickest and easiest and best way to provide ourselves with carbon-free electricity for the next 20 years; solving the nuclear waste stalemate, a goal that Senator Feinstein and I are united on; developing new nuclear technologies such as accident-tolerant fuels, small reactors, advanced reactors.

Regarding nuclear waste, Federal law makes the Government responsible for disposing of used nuclear fuel. The Government continues to fail in this.

I believe Yucca Mountain can and should be part of the solution, but we have more used fuel than Yucca Mountain's legal capacity. Senator Feinstein and I will again introduce a pilot program for nuclear waste storage in our appropriations bill, as we have for the past 4 years, to complement, not substitute, for Yucca Mountain.

The Nuclear Regulatory Commission chairman testified they expect to see license applications for commercial sites to store used nuclear fuel later this year. I am going to ask about your views on the role that commercial sites could play in the management of used nuclear fuel.

Finally, as we look to the future, the department is funding key R&D (Research and Development) that will design the nuclear reactors of the future, whether we are talking about small reactors or advanced reactor technology.

LARGE CONSTRUCTION PROJECTS

The last item is keeping large projects on time and on budget. The department is responsible for some of the largest and most expensive construction projects in the Federal Government—for that matter, in the country—including the uranium processing facility

in Tennessee and the MOX fuel fabrication facility in South Carolina. The department is a partner in the international thermonuclear experimental reactor known as ITER in France.

Now that you are no longer recused from discussing fusion energy and you know so much about it, we are looking for your recommendations about what to do.

Over the past 5 years, Senator Feinstein and I have worked hard with the department to keep costs under control. We have made some real progress with a uranium facility in Tennessee. I am glad to hear that the department continues to follow the red team's recommendation.

It has a capped cost of $6.5 billion, and a completion date of 2025. And we meet regularly to make sure it is proceeding on time and on budget.

Your budget request also proposes shutting down the MOX fuel facility in South Carolina and replacing it with a new plan to dispose of the plutonium in South Carolina. We have talked about that many times. I am sure Senator Graham will have questions about that, as I will as well.

I hope to hear the details about your alternative to dilute the plutonium material. I want to make sure we have a clear plan for getting the plutonium out of South Carolina, as the department has committed to do.

[The statement follows:]

PREPARED STATEMENT OF SENATOR LAMAR ALEXANDER

The Subcommittee on Energy and Water Development will please come to order.

Today's hearing will review the President's fiscal year 2017 budget request for the Department of Energy.

This is the Subcommittee's third budget hearing this year, and we will have our final hearing on the National Nuclear Security Administration's budget next week.

I want to thank Secretary Moniz for being here today, and also Senator Feinstein, who I will be working with to draft the Energy and Water Appropriations bill which funds basic science research and discovery, as well as cleanup of former Cold War sites, and maintains our Nation's nuclear weapons stockpile.

Our witness today includes Dr. Ernest J. Moniz, Secretary of Energy.

Secretary Moniz has served as Secretary of Energy since May 2013, and I thank the Secretary for his leadership and the efforts he has made to work with Congress. I greatly appreciate your leadership on innovation and our energy future.

We're here today to review the President's fiscal year 2017 budget request for the Department of Energy, a Federal agency with three critical missions: nuclear security, science and energy, and environmental management.

The Department of Energy's budget request for fiscal year 2017 is about $32.5 billion dollars. This is an increase of about $2.9 billion over what Congress provided last year.

Governing is about setting priorities, and given our current fiscal constraints—especially on non- defense spending—we are going to have to make some hard decisions this year to make sure the highest priorities are funded.

And that is why we are holding this hearing: to give Secretary Moniz an opportunity to talk to us about the Department of Energy's most urgent priorities so Senator Feinstein and I can make informed decisions as we begin to put together the Energy and Water Appropriations bill over the next few weeks.

Today, I'd like to focus my questions on three main areas, all with an eye toward setting priorities:

1. Doubling basic energy research;
2. The future of nuclear energy;
3. Keeping large projects on time and on budget.

DOUBLING BASIC ENERGY RESEARCH

Supporting government-sponsored basic research is one of the most important things our country can do to encourage innovation, help our free enterprise system create good jobs, and make America competitive in a global economy.

Doubling basic research is a goal I've long supported.

We have increased investment in basic energy research through both our national laboratory system and the Advanced Research Projects Agency-Energy (ARPA–E), which Congress created as part of America COMPETES in 2007, which was passed unanimously by the Senate and authorized Congress to double funding for basic research over 7 years.

Last month Senator Durbin and I co-sponsored an amendment to the Energy bill that increases the authorized funding levels for the Office of Science by about 7 percent per year which would double the Office of Science's budget from a little over $5 billion today to more than $10 billion in 10 years. The Senate adopted our amendment by voice vote.

The President has also proposed to invest more in basic research, including the Mission Innovation proposal—the pledge launched by the U.S. and 19 other countries at the Climate Summit in Paris to double Federal clean energy research over the next 5 years.

The problem is that the President's budget request proposes $2.259 billion in new mandatory funding for the Department of Energy. The mandatory funding would be used to support clean energy programs and replace several proposed cuts to programs that are currently funded with discretionary spending.

These new mandatory spending proposals include:

—$1.3 billion for 21st Century Clean Transportation Plan Investments;

—$674 million to replace discretionary spending cuts in cleanup programs;

—$100 million for new Office of Science University Grants;

—And $150 million to support ARPA–E.

However, the President's commitment to double Federal clean energy research comes at the expense of other resources and agencies and he proposes to pay for this new mandatory spending with new tax increases.

The budget writers know this isn't a realistic proposal. Congress is not going to enact $3.4 trillion in new tax increases over the next 10 years to pay for an additional $682 billion in mandatory spending across all Federal agencies over the next 10 years.

The President's budget request this year is at best unhelpful, and at worst it's misleading.

First, the President has underfunded the Army Corps of Engineers by $1.4 billion and the cleanup of former Cold War sites by $674 million. This makes it very difficult to draft an appropriations bill, much less fund the proposed new investments in Mission Innovation.

Second, I've called for doubling our investment in basic scientific research, but I've also recommended paying for increases by ending subsidies for mature technologies like wind and oil and gas subsidies.

For example, we could start by eliminating the wind production tax credit in 2016, and putting the $4 billion this subsidy costs taxpayers over 10 years toward doubling energy research.

Or, we could phase out subsidies for oil and gas. Legislative proposals similar to the one I supported in February to repeal oil and gas subsidies could save $24 billion over 10 years, which could be spent on research and development.

Out-of-control mandatory spending on entitlements, which is projected to increase nearly 80 percent over the next 10 years, is already crowding out discretionary spending.

Over the next 10 years, discretionary spending will decrease from 32 percent of total Federal spending in 2015 to about 22 percent in 2026.

The United States faces a choice between falling further behind competitors like China, or advancing technologies that can make us safer and more competitive.

But we have to be fiscally responsible and carefully invest our limited resources in programs that can achieve results.

For example, supercomputing is one priority we agree on—and it is critical to our economic competitiveness and a secure energy future.

By next year, the world's fastest supercomputer will again be in the United States, and in Tennessee through the joint Collaboration of Oak Ridge, Argonne and Lawrence Livermore (CORAL).

That computer will be called Summit, and it will help researchers better understand materials, nuclear power, and energy breakthroughs.

Funding the next generation, known as exascale, is essential to our both our country's competitiveness and national security.

Exascale computers will be capable of a thousand-fold increase in sustained performance over today's petascale computers—which have been operating since 2008.

THE FUTURE OF NUCLEAR ENERGY

Nuclear power provides 60 percent of our Nation's carbon-free electricity, and it must be a part of any realistic energy plan.

It is reliable—unlike solar and wind, nuclear power works when the sun isn't shining or the wind isn't blowing.

It is safe—we've never had anyone die in a nuclear accident at any of our commercial reactors or in our naval fleet.

The Department of Energy has an important role in many of the key challenges in advancing nuclear power, including:

—Safely extending the life of the nuclear reactors already operating today;

—Solving the nuclear waste stalemate; and

—Developing new nuclear technologies such as accident tolerant fuels, small modular reactors, and advanced reactors.

Safely extending the operating licenses of commercial reactors from 60 to 80 years, where possible, is an important step to maintaining our largest source of carbon-free electricity.

I'd like to hear today what the Department of Energy is doing to achieve this goal and whether there are any additional steps we should be taking.

Regarding nuclear waste, Federal law makes the government responsible for disposing of used nuclear fuel, and the government continues to fail in this responsibility.

I believe that Yucca Mountain can and should be part of the solution, but we have more used fuel than Yucca Mountain's legal capacity.

Senator Feinstein and I will again include a pilot program for nuclear waste storage in the Energy and Water Appropriations bill, as we have for the past 4 years to complement Yucca Mountain.

The NRC Chairman recently testified that they expect to see license applications for commercial sites to store used fuel later this year. I'd like to hear your views on the role commercial sites could play in the management of used nuclear fuel.

Finally, as we look to the future, the Department is funding key research and development that will help design the nuclear reactors of the future.

Small modular reactors offer an additional source of clean, cheap, reliable energy, and have the potential to make nuclear power available to places that could not otherwise build large-scale reactors. The Department's work to support licensing a small modular reactor continues, and I would like to your views on the progress of this important work.

The Department is also doing research and development to address technical, cost, safety and security issues with advanced reactor technologies. I look forward to hearing the progress you are making in this area, and am particularly interested in your estimate for when the first application for certification would be filed with the Nuclear Regulatory Commission.

KEEPING LARGE PROJECTS ON TIME AND ON BUDGET

The Department of Energy is responsible for some of the largest construction projects in the Federal Government, including the Uranium Processing Facility in Tennessee and the MOX Fuel Fabrication Facility in South Carolina; and the Department is a partner in the International Thermonuclear Experimental Reactor known as "ITER" in France.

Now that you are no longer recused from discussing fusion energy and the ITER project specifically, I want to discuss the future of U.S. participation in the project, and when we can expect to receive your recommendations and details on the new cost of the project.

Over the past 5 years, Senator Feinstein and I have worked hard with the Department to keep costs under control and to make sure hard-earned taxpayer dollars are spent wisely. We need to make sure these projects are on time and on budget.

Senator Feinstein and I have focused much of our oversight on the Uranium Processing Facility in Tennessee, and I am glad to hear the Department continues to follow the Red Team's recommendations.

I look forward to a detailed update in the near future, including whether the project is still on time and on budget, and when the design will be 90 percent complete. We set a target of completion in 2025 at a cost of $6.5 billion and we need to know if that is achievable.

Your budget request also proposes shutting down the MOX fuel facility in South Carolina and replacing it with a new plan to dispose of the plutonium in South Carolina. We have talked about this project many times.

Today, I hope to hear the details about your alternative to dilute the plutonium material and permanently dispose of it. Specifically, I want to make sure you have a clear plan for getting plutonium out of South Carolina as the Department has committed to do.

Senator ALEXANDER. Senator Feinstein.

STATEMENT OF SENATOR DIANNE FEINSTEIN

Senator FEINSTEIN. Thanks very much, Mr. Chairman. I think you know that I treasure the relationship that we have, and particularly our ability to work closely together in solving some problems.

I am not going to repeat what you said. I find myself generally in agreement with it. But I am really very concerned, because it seems to me we are between a rock and a hard place with this. We do not yet have an allocation, and yet there are a number of conflicts within this budget.

Let me just thank you for the leadership and cooperation on finding a nuclear waste facility. I would be hopeful that the Secretary will be able to tell us in his remarks that the law is such that the private Texas facility can go ahead. I think that is extraordinarily important.

I hope, Mr. Secretary, that you will choose to speak about it.

I also want to congratulate the Secretary, because I have not had this chance, on his successful negotiations at the Paris agreement on climate change. I think it is becoming very clear that unless we reduce our greenhouse gas emissions, we are going to see catastrophic sea level rise, devastating droughts, more wildfires, more habitat loss, greater ranges of exposures for disease, and massive international refugee crises.

I say that as a Californian who is now in the midst of an unprecedented drought with just terrible results, land subsidence, 888 million trees losing their capacity, 10 million of them dead, 69 communities without water. It goes on and on and on.

So we do not want the climate to go the way it is set to go. It is my understanding that we must contain temperature rise to 2 degrees or less by 2100 or we court disaster.

Although this is a significant and difficult challenge, I think it can be done. For the first time, 195 countries have mutually pledged to constrain their greenhouse gas emissions in order to slow the changes in our climate, working not only to avoid the 2 degree increase, but toward a goal of a 1.5 degree increase.

But even the most optimistic assessment of the first round of international commitments is that they would still allow global temperatures to rise by even 2.7 degrees. That clearly is insufficient in terms of the danger that we prompt by so doing.

Secretary Moniz, you have championed the idea of using technology to make this goal easier to achieve, and you have worked to secure pledges from 19 other countries to double research and development funding for technologies that can lower temperature rise. I understand this is known as Mission Innovation and that it is complemented by a private-sector initiative led by Bill Gates to bring these new technologies to the market.

Our commitment is to double U.S. clean energy research and development over 5 years. Much of that needs to be funded by this subcommittee.

In view of what the chairman has just said, that is going to be a most difficult task to carry out. As I said, we do not have an allocation, but the likelihood of our having sufficient money even to fund what we are responsible for right now that we cannot do based on this President's budget is alarming to me.

I believe that if somehow we can get a sufficient increase in our allocation, that we should, in fact, make Mission Innovation a priority.

But one big obstacle to achieving this is the fact that the administration's budget request zeros out funding for uranium cleanup, which was $674 million in fiscal year 2016.

Now, that is a real Hobson's choice. There is not one of us, I think, that understands that uranium cleanup should be canceled out, and yet where is the money to come from? I gather the budget assumes that the cleanup program will become a mandatory funded program, which means it goes out of the budget because it is mandatory. Whatever its cost, it is paid for. But there is no indication this is going to happen.

So we will have to appropriate money for those activities within the bounds of our overall resources unless somebody is able to tell us where to get $674 million.

Also, as we deal with the impacts of climate change and promote infrastructure resiliency, I do not believe that Congress will accept the administration's proposal to cut funding for the Army Corps of Engineers by $1.3 billion or the Bureau of Reclamation by $163 million.

These are the Hobson's choices within our budget. The Corps is really our only infrastructure program. It is our government's only navigation infrastructure account. Reclamation brings water to our cities and farms. And both play an important role in responding to climate change.

So, Mr. Chairman and Mr. Secretary, to be brief, I have outlined nearly $1 billion of responsibilities for money that we will likely not have.

So, Mr. Secretary, I know I speak for this whole committee. We would very much like to work with you and our other colleagues to identify the ways we can best use the funding that is available to develop the new technologies, specifically the R&D that will make the difference in our fight against climate change. But we also have to fund uranium cleanup, the Bureau of Reclamation, and the Army Corps of Engineers, in particular.

I might just say that of the congressional interest, the Army Corps always crops up, Mr. Chairman, in requests for more members. I have come over the years to really believe that it is a very important program. It sounds kind of prosaic because it has always been there, but in terms of our rivers, our waterways, it is kind of the be-all and end-all.

So I thank you, Mr. Chairman, and look forward to working with you.

Senator ALEXANDER. Thank you, Senator Feinstein. We will now have opening statements from other Senators who are here. Senator Lankford. Senator Murray.

Mr. Secretary, we look forward to your testimony.

SUMMARY STATEMENT OF HON. ERNEST J. MONIZ

Secretary MONIZ. Thank you, Chairman Alexander and Ranking Member Feinstein, and members of the subcommittee for the chance to appear here to discuss our budget proposal for fiscal year 2017.

As you have said, it totals $32.5 billion in discretionary and mandatory spending. First, I do want to emphasize that the request for annual appropriations is $30.2 billion, an increase of 2 percent over the fiscal year 2016 enacted appropriation. Both the national security appropriations request and that for the domestic appropriations would each increase by 2 percent.

This is supplemented, as you have mentioned, by $2.3 billion in new mandatory spending authority, including $750 million for R&D and $674 million for uranium enrichment D&D (Decontamination and Decommissioning), the latter from the USEC (United States Enrichment Corporation) Fund.

I do want to emphasize that the $1.6 billion USEC Fund is an existing, not new, mandatory spending account. Our proposal is in keeping with the spirit of the current authorization that revenues from the beneficiaries of past uranium enrichment services rather than taxpayers at large be used to pay for the cost of D&D of the now shuttered facilities.

Indeed, in 2000, Congress recognized the applicability of the USEC Fund to support Portsmouth and Paducah D&D. The USEC Fund is one of three Federal funds totaling nearly $5 billion that can be used in this manner.

Finally, in this introduction I want to acknowledge that underpinning all of our priorities is stewardship of the department as a science and technology powerhouse with an unparalleled network of 17 national laboratories. We are working hard to strengthen the strategic relationship between the department and our national laboratory network.

I also want to highlight the crosscutting R&D initiatives in the budget. Among these initiatives are our largest increases. Our proposed increases are for modernization, the energy and water nexus, and the exascale high-performance computing initiative to support everything from nuclear weapons to energy technologies to cancer solutions.

The supporting budget details for each of these areas are provided in a 40-page statement for the record, and I request that it be inserted into the record and use the rest of my time to describe our Mission Innovation initiative and why it merits your support.

The fiscal year 2017 budget includes an increase of 21 percent in discretionary spending for clean energy R&D activities that support the U.S. Mission Innovation pledge. The President's budget proposes this 21 percent increase in discretionary funds within the overall discretionary budget cap. The mandatory request is incremental but the discretionary is within the cap.

Mission Innovation is an unprecedented global initiative by 20 countries that have pledged to seek a doubling of public clean energy R&D over 5 years. The Mission Innovation countries represent over 80 percent of global government investment in clean energy R&D. So this entails a highly leveraged opportunity to drive energy innovation.

This is a key to cost reduction in clean energy. That in turn is key to increasing ambition and driving us to a clean energy future.

Mission Innovation is long overdue. In 2010, the American Energy Innovation Council, comprised of CEOs from multiple sectors, recommended that the government triple its investment in clean energy R&D, and the council made three key points.

First, innovation is the essence of America's strength. Second, public investment is critical to generating the discoveries and inventions that form the basis of disruptive energy technologies. And third, the costs of RD&D are tiny compared to the benefits.

The pledge to seek to double the level of government investment over 5 years is ambitious but needed. Bill Gates, a leader of the AEIC, has recently met with a number of Members of Congress and has reiterated the need for greatly increased government-sponsored energy R&D.

The objective of Mission Innovation is to greatly expand the suite of the investable opportunities in clean energy technologies. The United States and global clean energy markets have been growing rapidly and should pick up the pace even more as the world's nations implement the Paris agreement.

Picking up the pace of our own clean energy innovation will result in commensurate benefits for our economy, environment, and security.

The scope of Mission Innovation spans the entire innovation cycle from the earliest stage of invention through initial demonstrations with a weighting toward the early stages and all clean supply and demand technologies and infrastructure enablers.

Mission Innovation is complemented by the Breakthrough Energy Coalition that was launched simultaneously with Mission Innovation. It is spearheaded by Bill Gates, launched with 28 investors from 10 countries.

The coalition committed to providing investment in new technologies originating from the expanded innovation pipelines in the Mission Innovation countries from early-stage R&D through ultimate market deployment.

These investors are committed to a higher risk tolerance and patience for return than is typical combined with a willingness to take the most promising innovations all the way past the finish line to deployment. That is another important leveraging of Mission Innovation.

In particular, I want to single out the fiscal year 2017 budget proposal for $110 million to establish regional clean energy innovation partnerships as not-for-profit consortia competitively selected for a fixed period to manage regional clean energy R&D programs focused on the energy needs, policies, resources, and markets of the individual regions. The program design and portfolio compositions for each partnership will be based on regional priorities.

As research portfolio managers, not performers, the partnerships will connect resources and capabilities across universities, industry, innovators, investors, and other regional leaders to accelerate the innovation process within each region. This approach tracks recommendations from the National Research Council's Rising to the Challenge, which noted that until very recently, U.S. Federal agencies have done little to support State and regional innovation cluster initiatives and recommended that, and I quote, "Regional innovation cluster initiatives by State and local organizations should be assessed and, where appropriate, provided with greater funding and expanded geographically."

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

That concludes my summary. I thank the subcommittee for its interest in support of our programs. I look forward to our discussion and to working together over the next months.

[The statement follows:]

PREPARED STATEMENT OF HON. ERNEST J. MONIZ

Chairmen Cochran and Alexander, Vice Chairwoman Mikulski and Vice Chairman Feinstein, and Members of the Subcommittee, thank you for the opportunity to appear before you today to discuss the Department of Energy's (DOE) Budget Request for fiscal year 2017. I appreciate the opportunity to discuss how the Budget Request advances the Department of Energy's missions.

ADVANCING NUCLEAR SECURITY, SCIENCE & ENERGY, AND ENVIRONMENTAL CLEANUP

The Department of Energy requests $32.5 billion for fiscal year 2017, an increase of $2.9 billion from the fiscal year 2016 enacted level of $29.6 billion. The fiscal year 2017 Budget Request consists of $30.2 billion in discretionary funding—$640 million above the fiscal year 2016 enacted appropriation—and $2.3 billion in new mandatory spending proposals requiring new legislation.

The DOE Budget Request supports a broad portfolio of programs, including support for the National Laboratory system of 17 laboratories to carry out critical responsibilities for America's security and economy in three areas:

—Building the Future through Science and Clean Energy;
—Ensuring Nuclear Security; and
—Organizing, Managing and Modernizing the Department to Better Achieve its Enduring Missions.

Underpinning all of these priorities is stewardship of the Department as a science and technology powerhouse, with an unparalleled network of national laboratories, harnessing innovation to successfully address national security, create jobs and increase economic prosperity, boost manufacturing competitiveness, mitigate and adapt to climate change, and enhance energy security.

Energy has been an important driver for recent U.S. economic growth, due to expanded domestic energy production and reduced petroleum imports; increased energy efficiency and productivity; and significant cost reduction and expanded market application of a variety of clean energy generation and energy-efficient industrial, commercial and consumer energy products. DOE has advanced this technology-based energy revolution by supporting the scientific foundations of energy sciences and technology, clean energy and manufacturing technological innovation, early commercial demonstration and deployments, and new technologies and standards to enhance end use energy efficiency. For example, because of DOE technology successes, favorable policies, and other factors, the cost of utility-scale photovoltaic solar power fell 59 percent and power purchase agreements for wind power fell 66 percent from 2008 to 2014. Yet work remains to enhance energy security and U.S. clean energy competitiveness while enabling global climate goals.

The DOE fiscal year 2017 Budget Request includes a programmatic level of $12.9 billion for energy, science, and related programs, an increase of $2.8 billion from the fiscal year 2016 enacted level. The fiscal year 2017 Budget includes $11.3 billion in discretionary funding—$1.2 billion above fiscal year 2016— and $1.6 billion in mandatory spending proposals to support increased investment in leading-edge science and technology; new research facilities to advance the frontiers of science; advanced manufacturing institutes; implementation of the Administration's strategy for nuclear waste management; and crosscutting initiatives to further technological innovation using an enterprise-wide approach to research efforts. The Budget Request takes steps to implement recommendations from the first installment of the Quadrennial Energy Review (QER), released in 2015, to strengthen U.S. energy infrastructures and enhance our collective energy security.

The Request supports ongoing implementation of the President's Climate Action Plan and builds on the systems-based analysis of the Quadrennial Technology Review (QTR) released in 2015. The fiscal year 2017 Budget Request also takes a significant first step toward fulfilling the United States' pledge to seek to double Federal clean energy research and development investment over the next 5 years as part of Mission Innovation, an initiative launched by the U.S. and 19 other countries to accelerate widespread clean energy technology innovation and cost reduction. The Request provides a total of $5.86 billion in discretionary funding for clean energy activities that span the full range of research and development from use-inspired basic research to demonstration, representing an increase in discretionary funding of over 21 percent above the fiscal year 2016 baseline of $4.82 billion. DOE's funding is 76 percent of the $7.7 billion government-wide Mission Innovation investment in fiscal year 2017.

The fiscal year 2017 Budget Request also includes mandatory funding for clean energy R&D that complements activities supported by discretionary funding. The Request includes $150 million in mandatory funding for the Advanced Research Projects Agency—Energy (ARPA–E) as part of the ARPA–E Trust proposal that seeks $1.85 billion in mandatory funding over 5 years to reliably increase the program's transformational clean energy technology R&D. In addition, as part of the $1.3 billion mandatory proposal for the DOE portion of the Administration's 21st Century Clean Transportation Plan, the Request includes $500 million in fiscal year 2017 to scale-up clean transportation R&D through initiatives to accelerate cutting the cost of battery technology; advance the next generation of low carbon biofuels, in particular for intermodal freight and fleets; and establish a mobility systems integration facility to investigate systems level energy implications of vehicle connectivity and automation.

The fiscal year 2017 Budget Request provides a programmatic level of $12.9 billion for the National Nuclear Security Administration (NNSA), $357 million above the fiscal year 2016 enacted level, to support DOE's nuclear security responsibilities. The Budget Request includes funding to maintain a safe, secure, and effective nuclear deterrent without underground nuclear explosive testing, including life extension programs for major weapons systems and modernization of the Nation's research and production infrastructure.

The Request also ensures that the United States is ready to respond to nuclear and radiological incidents at home and abroad and supports programs that reduce the threats of nuclear proliferation globally, including supporting implementation and monitoring of the Joint Comprehensive Plan of Action with Iran to verifiably prevent Iran from obtaining nuclear weapons. Finally, DOE's Request for nuclear security supports activities that provide safe and effective propulsion for the U.S. nuclear Navy.

The fiscal year 2017 Budget Request includes $6.8 billion for Departmental management and performance programs, including environmental cleanup programs to meet the nation's Manhattan Project and Cold War legacy responsibilities. The Request includes $6.1 billion, which includes $5.4 billion in discretionary funding and proposes $674 million in mandatory spending from the United States Enrichment Corporation Fund, to uphold the U.S. Government's commitment to States and communities to remediate the environmental legacy of over six decades of nuclear weapons and nuclear research, development, and production. The Request supports major management reforms, including new project oversight, assessment, and cost estimation initiatives as part of ongoing efforts to strengthen effective project and program management across the enterprise. The Request also supports continued implementation of a new and improved Human Resource Management service delivery business model and efforts to improve information technology management and further strengthen cybersecurity.

SCIENCE AND ENERGY

The fiscal year 2017 Budget Request provides a programmatic level of $12.9 billion for science, energy, and related programs, which is $2.8 billion above the fiscal year 2016 enacted level and includes $11.3 billion in discretionary funding and $1.6 billion in mandatory spending. The Department's science and energy programs invest in all stages of innovation across a diverse portfolio of clean energy technologies to enhance economic competitiveness in a low-carbon world and secure America's long-term energy security. The Request takes the first step in fulfilling the U.S. Government's pledge to Mission Innovation, an unprecedented global initiative across 20 nations to double public clean energy research and development (R&D), in conjunction with commitments for private investments led by a coalition of 28 private investors from ten countries. The Request also continues to implement the President's Climate Action Plan through the development and deployment of clean energy technologies that reduce carbon pollution. Following COP–21, these investments will be a critical next step in enabling the transition to a low carbon energy future through innovation and cost reduction.

The fiscal year 2017 Budget Request sustains DOE's role as the largest Federal sponsor of basic research in the physical sciences and constructs and operates cutting-edge scientific user facilities at the National Laboratories to maintain the nation's preeminence in science and innovation. The Request supports transformational R&D in critical technology areas, including advanced manufacturing, renewable energy, sustainable transportation, energy efficiency, electricity grid modernization, advanced nuclear reactors, and fossil energy with carbon capture and storage. The Request builds on the analytical foundation provided by the Department's 2015 Quadrennial Technology Review (QTR), as well as the recommendations of the 2015 Quadrennial Energy Review (QER), by funding measures to strengthen U.S. energy infrastructures and enhance our collective energy security posture.

MISSION INNOVATION: ENABLING A CLEAN ENERGY FUTURE

The President's fiscal year 2017 Budget Request takes a significant first step toward fulfilling the U.S. pledge to seek to double Federal clean energy research and development investment over the next 5 years as part of Mission Innovation, an initiative launched by the U.S. and 19 other countries to accelerate widespread clean energy technology innovation and cost reduction. It is a widely-shared view that innovation is essential for economic growth by providing affordable and reliable energy for everyone, is critical for energy security, enhances U.S. competitiveness, and is the key to a transition to a clean energy future. Each of the 20 participating countries, which together represent over 80 percent of global governmental clean energy research and development, will seek to double its governmental investment in clean energy research and development over 5 years. While each country will determine its own doubling plan and portfolio, the collection of countries will provide new opportunities for synergies and collaboration.

The need for a substantial investment in clean energy research and development is clear. Many studies have examined the contribution of technological innovation to U.S. economic growth. In 2010, the American Energy Innovation Council, comprised of Chief Executive Officers from multiple industries, called for the tripling of energy research and development, citing the need for a dramatic expansion of the energy innovation pipeline to meet critical national priorities. Another report that same year from the President's Council of Advisors on Science and Technology also recommended accelerating the pace of technology innovation to meet economic competitiveness, environmental and energy security needs. The need for greater regional innovation efforts was highlighted in a 2012 National Research Council report calling for the establishment of regional innovation cluster initiatives that build upon existing knowledge clusters and comparative strengths of a geographic region.

The President's fiscal year 2017 Budget takes a significant first step toward fulfilling the U.S. pledge to seek to double Federal clean energy research and development investment over the next 5 years by providing $7.7 billion across 12 Federal agencies, with DOE responsible for approximately 76 percent of that government-wide total. The DOE fiscal year 2017 Request provides a total of $5.86 billion in discretionary funding for clean energy research and development. This funding represents an increase of over 21 percent above the fiscal year 2016 baseline of $4.82 billion of appropriated funds.

The Budget supports clean energy activities that span the innovation spectrum from use-inspired basic research to demonstration, and encompasses all clean energy technologies, including renewable energy, energy efficiency, sustainable transportation, nuclear energy, fossil energy, and the electricity grid of the future. The

DOE program components supporting Mission Innovation include elements of use-inspired basic research sponsored by the Office of Science, ARPA–E and portions of the applied energy programs that support clean energy research, development, and demonstration activities. Overall, programs supporting Mission Innovation comprise slightly more than half of the total President's fiscal year 2017 Budget Request for science and energy, including ARPA–E.

The increased investments proposed in the fiscal year 2017 Budget support a broad-based strategy for accelerating the innovation process. The strategy emphasizes investments strategically targeted to support innovative platforms for early stage research and technology development, as well as development and demonstration activities that target cost-reduction and advance transformational concepts that can achieve meaningful scale. For example, the President's fiscal year 2017 Budget supports an expansion of promising existing programs, such as Energy Frontier Research Centers, ARPA–E, Clean Energy Manufacturing Institutes, the BioEnergy Research Centers, SuperTruck II, and advanced carbon capture technology pilot projects. The fiscal year 2017 Budget also supports new initiatives, such as $110 million to establish regional clean energy innovation partnerships, $45 million to expand R&D collaborations between innovators and small businesses and the DOE National Laboratories, and an advanced materials crosscutting initiative.

The President's fiscal year 2017 Budget also includes mandatory funding for clean energy R&D that complements activities supported by discretionary funding. The fiscal year 2017 Budget Request includes $150 million in mandatory funding for ARPA–E as part of the ARPA–E Trust proposal for $1.85 billion in new mandatory spending authority over 5 years. The mandatory spending authority will complement annual appropriations by enabling ARPA–E to support projects of a different character than can otherwise be funded under the current program. For example, the mandatory funding will support projects that are larger in scale and address more complex energy challenges that have large transformative potential. As part of the Administration's 21st Century Clean Transportation Plan, the President's fiscal year 2017 Budget Request also includes $500 million in mandatory funding at DOE in fiscal year 2017 to scale-up clean transportation R&D through initiatives to accelerate cutting the cost of battery technology; advance the next generation of low-carbon biofuels, in particular for intermodal freight and fleets; and establish a smart mobility research center to investigate systems level energy implications of vehicle connectivity and automation.

Mission Innovation investments will be leveraged by private capital that drives innovation and clean energy deployment. The initiative is complemented by a separate private sector-led effort, the Breakthrough Energy Coalition (Coalition), as increased government investment, while necessary, is insufficient by itself. This parallel initiative includes over 28 investors from 10 countries and will supplement the large and growing private sector investment in commercialization of clean energy technologies by targeting new investments at an earlier stage of the innovation cycle and managing these investments through the completion of the innovation process, including the formation of new companies and the commercial introduction of new products and processes. The Coalition will be investing in technologies and projects originating in the Mission Innovation participating countries.

Together, these initiatives will drive innovation essential for economic growth enabled by affordable and reliable energy, for energy security, for U.S. competitiveness, and for a transition to a low carbon energy future.

INTEGRATING SCIENCE AND ENERGY PROGRAMS ACROSS THE DOE ENTERPRISE

The fiscal year 2017 Budget Request further strengthens DOE and its national missions by fully integrating across its science and energy programs, and across the DOE enterprise with the national laboratories as strategic partners.

DOE has continued to strengthen and institutionalize its strategic relationship with the National Laboratories through organizations and forums such as the Laboratory Policy Council, the Laboratory Operations Board, and the annual National Laboratories Big Ideas summits, which convene DOE and the Laboratories on a regular basis. DOE is sustaining this strategic partnership through these ongoing collaborations and through new efforts, such as a comprehensive report on the National Laboratories. The Request also outlines how DOE will implement recommendations of the Secretary of Energy Advisory Board (SEAB) taskforce on the national laboratories and the Commission to Review the Effectiveness of the National Energy Laboratories (CRENEL). Last week, the Department submitted its detailed response to the final CRENEL report that addresses the Commission's findings and recommendations.

The fiscal year 2017 Budget also supports DOE's crosscutting initiatives that leverage the science, technology, and engineering capabilities across programs and National Laboratory partners. DOE first proposed the crosscutting initiatives in fiscal year 2015 to enhance enterprise-wide planning and improve collaboration across organization boundaries for key science and technology areas with impact across DOE's missions. Each crosscutting initiative reflects a comprehensive and integrated work plan to optimize programmatic objectives and efficiently allocate resources. The crosscutting initiatives help bolster DOE's efforts to institutionalize enhanced program management and coordination across program offices, while accelerating progress on key national priorities.

DOE has 2 years of experience with integrated planning and program management across program offices, enabling accelerated progress on key national priorities. The fiscal year 2015 and fiscal year 2016 appropriations have provided DOE with funding for the crosscutting initiatives, including $1.1 billion in fiscal year 2016 coordinated across all three Under Secretaries. Moving forward, the fiscal year 2017 Budget Request continues six existing crosscutting initiatives, and proposes a new initiative, Advanced Materials for Energy Innovation. Together, the initiatives closely coordinate the $1.5 billion request, a $330 million increase, in crosscutting R&D across the enterprise in seven technology areas:

—Electricity grid technology modernization accelerates the development of the technologies and tools to enable modernization of the grid to support U.S. economic growth, environmental quality and security objectives.

—Subsurface science, technology, and engineering coordinates efforts to develop next-generation technologies for energy generation, storage, and disposal applications through mastery of the subsurface, with a science-based focus on advanced imaging of geophysical and geochemical signals.

—Supercritical carbon dioxide technology enables large-scale commercialization of the supercritical carbon dioxide (sCO_2) power cycle, which has the potential for higher thermal efficiencies with lower capital cost compared to steam-based power systems and can provide significant benefits for electric power generation, including reducing the costs of carbon capture and storage.

—Energy-water nexus accelerates the Nation's transition to more resilient and sustainable coupled energy-water systems, including a new effort on desalination technology and regional data, modeling and analysis test beds.

—Exascale computing, a joint Science-NNSA collaboration, significantly accelerates the development and deployment of capable exascale computing systems, applications and software infrastructure to meet national security needs and to provide next-generation tools for scientific discovery;

—Cybersecurity protects the Department of Energy enterprise from a range of cyber threats and improves cybersecurity in the electric power and oil and natural gas subsectors; and

—Advanced materials for energy innovations, which have the potential to revolutionize entire industries by employing advanced synthesis, modeling, and characterization to accelerate and reduce the cost of materials qualification in a wide variety of clean energy applications.

SCIENCE: PROVIDING THE BACKBONE FOR DISCOVERY AND INNOVATION

DOE's Office of Science is the largest Federal sponsor of basic research in the physical sciences, supporting more than 24,000 investigators at over 300 U.S. academic institutions and the DOE laboratories. The Office of Science provides the backbone for discovery and innovation, especially in the physical sciences, for America's research community.

The fiscal year 2017 Budget Request provides $5.67 billion for Science, $325 million above the fiscal year 2016 enacted level, to lead basic research in the physical sciences and develop and operate cutting-edge scientific user facilities while strengthening the connection between advances in fundamental science and technology innovation. The fiscal year 2017 Budget Request includes a proposal for $100 million in mandatory funding for university grants that will be made available through a competitive, merit-based review of proposals solicited from and provided by the university community in the Office of Science mission areas.

The Budget Request provides major increases for advanced scientific computing research, basic energy sciences, and biological and environmental research, and funding to operate the Office of Science's scientific user facilities at optimal levels in support of more than 31,000 researchers from universities, national laboratories, industry, and international partners.

Sustaining Leading-Edge Discovery Science

The fiscal year 2017 Budget Request sustains leading-edge discovery science through support for the High Energy Physics and Nuclear Physics programs, a 14 percent increase in investments in Scientific Laboratories Infrastructure, and the new $100 million mandatory proposal for university grants.

In these discovery science programs, Office of Science has contributed to many major recent accomplishments, including collaborating with two international experiments that led to the Nobel Prize in physics for discovering oscillations in neutrinos (fundamental building blocks of our universe that remain poorly understood); contributing to the discovery of three of the four new superheavy elements in the periodic table; opening the most advanced storage-ring-based light source facility, the National Synchrotron Light Source II (NSLS–II); and continuing effective execution of major ongoing science construction projects—the Linac Coherent Light Source II (LCLS–II) and the Facility for Rare Isotope Beams (FRIB)—on schedule and within budget.

For High Energy Physics, the request provides $818 million, $23 million above the fiscal year 2016 enacted level, to understand how the universe works at its most fundamental level by discovering the most elementary constituents of matter and energy, probing the interactions among them, and exploring the basic nature of space and time. The Request implements activities and projects based on the High Energy Physics Advisory Panel (HEPAP) May 2014 strategic plan, including $45 million, an increase of $19 million, to support design for a reconfigured international Long Baseline Neutrino Facility hosted at Fermilab and initial construction for the Deep Underground Neutrino Experiment in South Dakota.

For Nuclear Physics research, the Budget includes $636 million, $19 million above the fiscal year 2016 enacted level, to discover, explore, and understand nuclear matter in a variety of different forms, including continued construction of the Facility for Rare Isotope Beams (FRIB).

Expanding Use-Inspired Research

The Office of Science funds basic science programs that support use-inspired research towards energy and other applications. The Budget Request provides funding to increase operation of the National Laboratory user facilities to optimal levels to accommodate increases in Mission Innovation work. The Request also expands investments in foundations for key technology crosscutting areas, including advanced materials, the subsurface, and the energy-water nexus.

The fiscal year 2017 Budget Request includes $1.94 billion for Basic Energy Sciences, $88 million above the fiscal year 2016 enacted level, to provide the foundations for new energy technologies, to mitigate the environmental impacts of energy use, and to support DOE missions in energy, environment, and national security by understanding, predicting, and ultimately controlling matter and energy. The Budget Request provides $143 million, an increase of $33 million, to initiate five new Energy Frontier Research Centers (EFRCs) and continue to support the existing EFRCs.

The Request provides $662 million for Biological and Environmental Research, $53 million above the fiscal year 2016 enacted level, to support fundamental research and scientific user facilities to achieve a predictive understanding of complex biological, climatic, and environmental systems for a secure and sustainable energy future, including an expanded focus on regional energy-water systems. The Request provides $90 million, a $15 million increase, to expand technology transfer activities during the last year of a 10-year program at the three existing Bioenergy Research Centers (BRC). The Request also includes $10 million for a new initiative in microbiome research that builds on the Department's experience in fundamental genomic science of plants and microbes to understand the fundamental principles governing microbiome interactions in diverse environments.

For Fusion Energy Sciences, the fiscal year 2017 Budget Request includes $398 million, $40 million below fiscal year 2016. The Request will continue to support research to understand the behavior of matter at high temperatures and densities and to develop fusion as a future energy source. The Budget Request also includes $125 million for the U.S. contribution to the ITER project, a major fusion research facility being constructed by an international partnership of seven governments. The Department submitted in mid-February an interim report to Congress on the status of ITER, and we are scheduled to deliver a report in early May with recommendations related to the project.

Investing in High Performance Computing to Support Frontier Science

The Budget Request provides $663 million for Advanced Scientific Computing Research (ASCR), $42 million above the fiscal year 2016 enacted level, to support re-

search in advanced computation, applied mathematics, computer science and networking, as well as development and operation of high-performance computing facilities.

Under this program, DOE has implemented the President's Executive Order on National Strategic Computing Initiative through a multi-year joint program between the Office of Science and NNSA to achieve capable exascale computing. As part of the President's national initiative, DOE announced a $200 million supercomputer award for Argonne National Laboratory, part of a joint Collaboration of Oak Ridge, Argonne, and Lawrence Livermore (CORAL) initiative to develop supercomputers that will be five to seven times more powerful than today's fastest systems in the United States.

The fiscal year 2017 Budget includes $190 million across three Office of Science programs, joined by $95 million in NNSA, to accelerate development of capable exascale computing systems with a thousand-fold improvement in performance over current high-performance computers in support of the President's National Strategic Computing Initiative. Within the Request, the Office of Science will transition exascale funding to a formal Exascale Computing Project, which will follow DOE project management guidelines under DOE Order 413.3b. The Budget also provides $46 million to re-compete the SciDAC partnerships, with new activities to include accelerating the development of clean energy technologies.

The Request funds research on high-performance computing applications unique to the biomedical research community, including $9 million for the President's BRAIN Initiative, in close coordination with the National Institutes of Health. This funding will bring to bear DOE national laboratory capabilities in big data analytics, modeling and simulation and machine learning to support biomedical research challenges in cancer and BRAIN. In other DOE science programs, the Request also enables development of accelerator applications, including advanced proton and ion beams for the treatment of cancer, in coordination with NIH.

ENERGY RESEARCH, DEVELOPMENT, DEMONSTRATION, AND DEPLOYMENT

The fiscal year 2017 Budget Request provides a programmatic level of $6.6 billion for energy research, development, demonstration, and deployment activities, of which $5.2 billion is discretionary funding—an increase of $928 million from fiscal year 2016. The Request supports a diverse portfolio of energy technologies, including renewable electricity, energy efficiency and advanced manufacturing, sustainable transportation, fossil energy, nuclear energy, and a modernized grid.

DOE recently completed the 2015 Quadrennial Technology Review (QTR), a systems-based analytical foundation to inform program research priorities across DOE's entire portfolio of energy and science programs by examining the most promising research, development, demonstration, and deployment (RDD&D) opportunities across energy technologies to effectively address the nation's energy needs. The 2015 QTR builds upon the first QTR conducted in 2011 by describing the nation's energy landscape and the dramatic changes that have taken place over the last 4 years and identifying the RDD&D activities, opportunities, and pathways forward to help address our national energy challenges.

Improving Cost and Performance of Renewable Electricity Technologies

DOE's fiscal year 2017 Budget Request for Energy Efficiency and Renewable Energy (EERE) invests $621 million in renewable energy generation technologies, an increase of $143 million from fiscal year 2016. Innovations, favorable policies, and other factors have led to significant cost and performance improvements across the spectrum of renewable energy technologies, as documented in Revolution . . . Now[1] report. To name a few examples, the cost of utility-scale photovoltaic solar power fell 59 percent from $5.70 per watt in 2008 to $2.34 per watt in 2014; power purchase agreements for wind power fell 66 percent from 7 cents per kilowatt-hour in 2008 to 2.4 cents per kilowatt-hour in 2014; and the median installed price of residential photovoltaic solar power fell 51 percent from $8.80 per watt in 2008 to $4.30 per watt in 2014.

The Request provides $285 million, an increase of $44 million, to continue the SunShot Initiative on a path to achieve solar cost parity without subsidies by 2020. The Budget includes $156 million for Wind Energy, an increase of $61 million, to continue efforts to achieve a 16.7 cents per kilowatt-hour cost target for offshore wind by 2020, including $30 million for offshore wind demonstration projects and $25 million to establish an Offshore Wind R&D Consortium.

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

The Budget Request provides just under $100 million, $29 million above fiscal year 2016, for geothermal technologies, including $35 million to select the final site and team for FORGE, a field laboratory for enhanced geothermal systems, beginning with a down-selection from five to three teams.

The Request also provides $80 million for water power technologies, a $10 million increase, including $25 million to continue the HydroNEXT initiative focusing on innovative, low-cost water diversion technologies to enable new stream reach hydropower, to progress to a cost target of 10.9 cents per kilowatt-hour by 2020 from small, low-head new stream developments. The Request also includes $55 million, $11 million above fiscal year 2016, to support marine and hydrokinetic technologies, including a grid-connected open-water test facility and development of concepts for revolutionary wave-energy converters.

Improving Energy Efficiency and Advanced Manufacturing Technologies

The fiscal year 2017 Budget for EERE includes $919 million, $198 million above fiscal year 2016, to invest in the development of manufacturing technologies and enhanced energy efficiency in our homes, buildings and industries.

In 2015, DOE issued 13 final energy efficiency standards as part of the Administration's goal to reduce carbon pollution. Standards issued to date will achieve cumulative reduction of 2.3 billion metric tons cumulatively by 2030. To accelerate innovation in energy efficiency and manufacturing programs, DOE continues to fund R&D at the Manufacturing Demonstration Facility, funds continuing work at the Critical Materials Institute, and is implementing a total of five Clean Energy Manufacturing Institutes in fiscal year 2016 as part of the National Network for Manufacturing Innovation.

The fiscal year 2017 Budget Request provides $14 million in EERE for the sixth Clean Energy Manufacturing Institute and $25 million to establish a new Energy-Water Desalination Hub to serve as a focal point for enabling technologies for de-energizing, de-carbonizing, and reducing the cost of desalination.

The fiscal year 2017 Budget provides $169 million, an increase of $83 million, for emerging technologies that reduce building energy consumption, including $40 million for an R&D effort to transition to refrigerant technologies with low global warming potential, and the Budget provides $15 million for a new metropolitan systems initiative to use new sensing, communication and computation capabilities to create actionable information for decision-makers on clean energy issues. The Request also provides $230 million, an increase of $15 million, to support weatherization retrofits to approximately 35,700 low-income homes nationwide; $70 million to support State energy offices; and $26 million for a new Cities, Counties, and Communities Energy Program to provide support to local governments, public housing authorities, non-profits and other stakeholders to catalyze more extensive clean energy investments in revitalization efforts.

Advancing Sustainable Transportation

The fiscal year 2017 Budget provides $853 million in discretionary funding, $217 million above fiscal year 2016, for sustainable transportation including vehicle, bioenergy, and hydrogen and fuel cells technologies.

In fiscal year 2016, DOE will achieve high-volume modeled costs for batteries of $250 per kilowatt-hour—down from the current cost of $289 per kilowatt-hour—towards a goal of $125 per kilowatt-hour in 2022 as part of the EV Everywhere Grand Challenge. EERE will initiate SuperTruck II, with up to four new competitively awarded projects to improve freight efficiency of heavy-duty vehicles. The programs will achieve at least 1.15 billion gallons per year savings from Clean Cities' initiatives and fund, with the Departments of Agriculture and Defense, three commercial-scale biorefineries to produce military specification drop-in fuels.

The fiscal year 2107 Budget includes $469 million for vehicle technologies, $159 million above fiscal year 2016, including $60 million to fully fund the multi-year SuperTruck II program to double freight truck efficiency by 2020, and $283 million, an increase of $102 million, for continuing the EV Everywhere program to enable domestic production of plug-in electric vehicles that are as affordable and convenient as gasoline vehicles by 2022. The Budget provides $279 million for bioenergy technologies, $54 million above fiscal year 2016, including $52 million to continue R&D efforts on converting cellulosic and algal-based feedstocks to bio-based gasoline and diesel.

The fiscal year 2107 Budget Request includes an additional $1.3 billion mandatory proposal for DOE to expand investments in low-carbon transportation technologies and fueling infrastructure as part of the Administration's 21st Century Clean Transportation Plan. The proposal for DOE would invest $500 million in clean transportation R&D, $750 million in regional fueling infrastructures for low-

carbon fuels, and $85 million in the deployment of clean vehicle fleets for local governments and first responders.

Crosscutting Innovation Initiatives for Energy

The Request for EERE includes $215 million for new crosscutting innovation initiatives to enable the acceleration of clean energy innovation and commercialization in the United States by strengthening regional clean energy innovation ecosystems, accelerating next-generation clean energy technology pathways, and encouraging clean energy innovation and commercialization collaborations between our National Laboratories and American entrepreneurs.

The Request includes $110 million to support Regional Energy Innovation Partnerships, a new competition to establish regionally-focused clean energy innovation partnerships around the country. These regionally focused and directed partnerships will support regionally relevant technology-neutral clean energy RD&D needs and opportunities to support accelerated clean energy technology commercialization, economic development, and manufacturing.

The fiscal year 2017 Budget Request also includes $60 million for a Next-Generation Innovation funding opportunity to accelerate next-generation clean energy technology pathways by supporting research, development, and demonstration (RD&D) projects with the greatest potential to change the trajectory of EERE core program technology pathways. The Request includes $20 million for a new Small Business Partnerships program to competitively provide technology RD&D resources to small businesses through the DOE's National Labs to support their efforts to commercialize promising new clean energy. The Request also includes $25 million for Energy Technology Innovation Accelerators that will leverage the technical assets and facilities of the National Laboratories to enable American entrepreneurs to conduct RD&D that leads to the creation of new clean energy businesses.

Expanding Transformational ARPA–E Programs

The fiscal year 2017 Budget Request provides $500 million for the Advanced Research Projects Agency—Energy (ARPA–E), which fills a unique role in identifying scientific discoveries and cutting-edge inventions and accelerating their translation into technological innovations. Of this, $350 million is requested in discretionary funding, $59 million above the fiscal year 2016 enacted level, to fund additional early-stage innovative programs as well as to exploit the technological opportunities developed in previous ARPA–E programs.

ARPA–E has achieved considerable results to date. Through early 2015, 141 ARPA–E project teams have completed funded work. Thirty four ARPA–E projects attracted more than $850 million in private sector follow-on funding, and over 30 ARPA–E teams formed new companies. Eight companies had commercial sales of new products resulting from ARPA–E projects, and more than 37 ARPA–E projects partnered with other government entities for further development. At the annual ARPA–E Summit being held this week, we will be announcing updated numbers demonstrating further success with ARPA–E's portfolio of projects.

The fiscal year 2017 Budget Request will expand support for the current core portfolio of early stage innovation programs, including the release of 7–8 funding opportunity announcements (FOA) for new focused technology programs. Possible areas of focus for these FOAs include advanced sensors and analytics for energy management and improved light metals production to transform vehicle lightweighting. The Request also supports the continuation of the Innovative Development In Energy-Related Applied Science (IDEAS) FOA, which provides a continuing opportunity for the rapid support of early-stage applied research to explore innovative new concepts with the potential for transformational and disruptive changes in energy technology. Across all activities, ARPA–E will continue to emphasize supporting commercial readiness for highly successful projects.

In addition, the fiscal year 2017 Budget Request includes a new legislative proposal for the Advanced Research Projects Agency—Energy Trust, which provides $150 million in fiscal year 2017 and a total of $1.85 billion in mandatory funds over 5 years to add a new focus on innovative systems level development that will deliver larger, more rapid benefits to the economic, environmental, and energy security of the United States. These projects are of a different character than can otherwise be funded with annual discretionary appropriations, and include, for example, potentially transformative technologies facing significant technical challenges in scale-up, projects that integrate multiple technical advances, and projects that address system-level transformation of energy cycles. The proposed new mandatory spending authority will accelerate transformational changes on energy systems.

Revitalizing the Nuclear Fuel Cycle

The fiscal year 2017 Budget Request provides $994 million for Nuclear Energy, $8 million above the fiscal year 2016 enacted level, to help meet energy security, proliferation resistance, and climate goals. These funds will to support the diverse civilian nuclear energy programs of the U.S. Government, leading Federal efforts to research and develop nuclear energy technologies, including generation, safety, waste storage and management, and security technologies.

In 2015, the program funded the second 5-year program of the Consortium for Advanced Simulation of Light Water Reactors (CASL) Hub and new R&D programs for two advanced reactor technologies, pebble bed and chloride fast reactors. The fiscal year 2017 Budget Request provides $73.5 million for ongoing R&D in advanced reactor technologies and continued R&D support for light water reactors (LWR), $59 million for accident tolerant fuels, and $35 million for LWR sustainability. Funding is also requested to continue the GAIN initiative to provide streamlined access for advanced reactor developers to access the world-class nuclear energy R&D capabilities at the national laboratories. The Request includes $89.6 million to continue funding for a cost-shared cooperative agreement for licensing technical support of a small modular reactor design, including support for a small modular reactor design (SMR) certification application to the Nuclear Regulatory Commission (NRC) by December 2016, for application review by the NRC, and to continue development of permit and license applications for the first domestic SMR deployments.

In 2015, DOE's nuclear energy program awarded a contract for a deep borehole field characterization test and issued an Invitation for Public Comment to initiate the dialogue on a consent-based siting process to support a consolidated commercial used fuel storage, a permanent repository and a separate disposal path for defense waste. The Request continues implementation of the Administration's Strategy for the Management and Disposal of Used Nuclear Fuel and High Level Radioactive Waste by providing $76.3 million, an increase of $53.8 million, for integrated waste management system activities in the areas of transportation, storage, disposal, and consent-based siting. The Request includes $39.4 million for consent-based siting, including $25 million for grants to States, Tribes, and local governments. The Request also includes $26 million to complete characterization of a field test borehole and to initiate drilling.

Enabling Fossil Energy to Compete in a Low-Carbon Energy Future

The Budget Request provides $600 million for Fossil Energy Research and Development ($240 million of which is available through repurposing of prior-year balances), $32 million below the fiscal year 2016 enacted level, to advance research and development in carbon capture and storage, advanced energy systems, cross-cutting areas, and fuel supply impact mitigation.

In fiscal year 2016, DOE is reaching several milestones in its support for carbon capture, utilization and storage (CCUS). DOE completed funding of two large-scale industrial CCUS projects that are in operation to demonstrate the feasibility and economics of carbon capture on an ethanol facility and the technology for carbon capture on a hydrogen production unit. Through cost-shared cooperative agreements, DOE is supporting two large-scale, coal-based CCUS demonstration projects utilizing coal gasification and post-combustion carbon capture technologies, with construction to be completed in 2016.

The fiscal year 2017 Budget Request provides $50 million, an increase of $20 million, to support initial construction of three large-scale pilot projects of advanced, second generation, post combustion carbon capture technologies critical to reducing cost and increasing efficiency of CCUS technologies. The Request includes $24 million to initiate the design and construction of a supercritical carbon dioxide (CO?) pilot plant test facility at the 10 megawatt-electric (MWe) scale, and $31 million to initiate design of a natural gas combined cycle (NGCC) demonstration facility employing CCUS technology.

The budget includes the reallocation of funding from CCUS demonstration projects that have not reached financial close to fund other projects and new initiatives, including the use of $240 million in prior-year balances.

Also in support of CCUS technologies, the President's fiscal year 2017 Budget Request makes available $5 billion in proposed investment and sequestration tax credits for qualified commercial CCUS projects. These tax credits are complemented by an existing $8.5 billion available through DOE's loan guarantees for advanced fossil energy projects to help provide critical financing to support new or significantly improved advanced fossil energy projects, and additional mixed-use authority for loan guarantees in the fiscal year 2017 Budget that can be used for advanced fossil and other technologies.

Expanding Technology Commercialization and Deployment

Significant advances have been made in recent years in commercializing and deploying innovative technologies have been made. In 2015, DOE received 30 out of 100 R&D Magazine awards for outstanding technology developments with promising commercial potential, and the Administration announced new investment commitments from the institutional investment community of $4 billion for deployment of clean energy technologies. The renewable energy production tax credits were also extended by the Congress in December 2015.

To expand the commercial impact of DOE's portfolio of research, development, demonstration, and deployment activities in the short, medium and long term, DOE established the Office of Technology Transitions (OTT) in 2015 to oversee and advance DOE's technology transfer mission. The fiscal year 2017 Budget Request provides $8.4 million for the OTT to expand the commercial impact of the DOE portfolio of activities. The Request provides for coordination of technology-to-market activities across the Department and the implementation of the Technology Commercialization Fund (TCF), approximately $20 million in fiscal year 2017, to catalyze seed-stage funding for collaborations with private sector partners on high potential energy technologies at the National Laboratories. The Budget Request for OTT also supports implementation of the Clean Energy Investment Center (CEIC) to provide better information on investable opportunities resulting from DOE R&D.

DOE's Loan Programs Office, in its role accelerating the domestic commercial deployment of innovative and advanced clean energy technologies, has maintained a financially sound portfolio of loans and loan guarantees. The $32 billion portfolio of loans, loan guarantees, and conditional commitments has been supported by $18 billion in financing from project sponsors, and 22 projects with DOE-backed loans and loan guarantees have now successfully completed construction and initiated operation. DOE has received new applications seeking over $20 billion in Advanced Technology Vehicles Manufacturing (ATVM) and Title XVII loans and loan guarantees.

The fiscal year 2017 Budget Request supports the Department's continued oversight of more than $30 billion in loans, loan guarantees, and conditional commitments, as well as its administration of remaining loan and loan guarantee authority to finance projects in the areas of advanced nuclear energy, renewable energy and efficient energy, advanced fossil energy, and advanced technology vehicles manufacturing. The fiscal year 2017 Request also proposes an additional $4 billion of mixed-use loan guarantee authority for innovative energy projects that reduce greenhouse gas emissions.

The fiscal year 2017 Request also includes $23 million for the Office of Indian Energy, $7 million above the fiscal year 2016 enacted level, to support DOE's partnership with the Department of the Interior to address the need for clean, sustainable energy systems on Indian lands through expanded technical assistance and grant programs.

Enabling Secure, Modern, and Resilient Energy Infrastructures

The Department's energy programs also support a secure, modern and resilient energy infrastructure, including for the electric power grid. The fiscal year 2017 Budget Request continues a focus on this mission by providing increased investments in the electricity grid of the future.

DOE has also taken major steps in implementing the Grid Modernization Initiative, supported by a Grid Modernization National Laboratory Consortium comprising 400 partners, including the release of DOE's new comprehensive new Grid Modernization Multi-Year Program Plan and the announcement of a $220 million funding opportunity for the National Labs and partners.

The fiscal year 2017 Budget Request includes $262 million for Electricity Delivery and Energy Reliability, $56 million above the fiscal year 2016 enacted level, for grid modernization research to support a smart, resilient electric grid for the 21st century and the storage technology that underpins it, as well as funding critical emergency response and grid physical security capabilities. The Request provides $14 million to establish a new competitively-selected Grid Clean Energy Manufacturing Innovation Institute as a part of the multi-agency National Network for Manufacturing Innovation, to focus on technologies related to critical metals for grid application, and advances will be broadly applicable in multiple industries and markets.

The Request for Electricity Delivery and Energy Reliability also provides $45 million for energy storage R&D, an increase of $24 million, and $30 million for smart grid R&D. To fortify grid security and resilience, the Request includes $46 million to advance cybersecurity technologies and $18 million for infrastructure security and energy restoration activities. The Request provides $15 million for a new State energy assurance program that supports regional and State activities to continually

improve energy assurance plans, improve capabilities to characterize energy sector supply disruptions, communicate among the local, State, regional, Federal, and industry partners, and identify gaps for use in energy planning and emergency response training programs. The Request also provides $15 million to launch a new State distribution-level reform program for competitive awards to States to utilize a grid architecture approach to address their system challenges.

The Budget Request also includes $257 million for the Strategic Petroleum Reserve (SPR), $45 million above the fiscal year 2016 enacted level, to increase the system's durability and reliability and ensure operational readiness. The Bipartisan Budget Act of 2015 requires the Department to submit to Congress a Strategic Review of the SPR by May, 2016. The Act also authorized DOE, subject to appropriation, to sell up to $2 billion in SPR oil to fund SPR infrastructure modernization. The results of the SPR Strategic Review will inform SPR infrastructure modernization and shall result in an fiscal year 2017 budget amendment related to SPR modernization.

The fiscal year 2017 Budget Request provides $31 million for Energy Policy and Systems Analysis to continue serving as a focal point for policy coordination within the Department on the formulation, analysis, and implementation of energy policy and related programmatic options and initiatives that could facilitate the transition to a clean and secure energy economy.

EPSA also serves as the Secretariat of the multi-agency Quadrennial Energy Review (QER), and provides systems analysis to support this Administration's initiative. The Administration expects to complete the second installment of the QER in 2016, focused on the electricity sector.

The Budget Request also includes $84 million for the power marketing administrations, including the Western Area, Southeastern, Southwestern, and Bonneville Power Administrations.

Enhancing Collective Energy Security in Global Energy Markets

While DOE's work in global energy security is not a major budgetary issue, it is an important issue for the Nation. DOE has pursued an increased global focus on collective energy security— energy security for the United States and its allies—in the last several years.

For example, as part of this effort and supported by our Office of International Affairs, the G–7 recently reached an agreement to enhance cybersecurity assessments of energy systems. The fiscal year 2017 Budget Request supports DOE's efforts to enhance collective energy security by providing $19 million for the Office of International Affairs, which coordinates the Department's activities to strengthen international energy technology, information and analytical collaborations.

In the area of energy exports, DOE has released a two-part LNG export study for public comment evaluating the impact of increasing LNG exports from 12 billion cubic feet per day (Bcf/d) to 20 Bcf/d. The study will be used in the public interest evaluation of pending applications to export LNG to non-FTA countries. DOE also chaired the International Energy Agency Ministerial resulting in a plan to assess energy security implications of natural gas supply.

Following the North American ministerial in 2014, Canada, Mexico, and the United States have worked together to produce new integrated mapping and information products. The Budget Request for the Energy Information Administration provides $131 million, a $9 million increase, to build upon enhancements like these in carrying out EIA's data collection and analysis mission.

The increase will provide greater regional detail and analysis of petroleum data, enhance commercial building energy efficiency data. The Budget will also extend analysis of international data to include Canada-Mexico collaboration and Asia and expand collection of transportation energy consumption data.

NUCLEAR SECURITY

The President's 2015 National Security Strategy, the 2010 Nuclear Posture Review (NPR), and the ratification of the New Strategic Arms Reduction Treaty underscored the importance of the DOE's nuclear mission and the lasting mandate for DOE to maintain a safe, secure, and effective stockpile for as long as nuclear weapons exist. DOE advances the President's vision to eliminate and secure nuclear material, reduce nuclear stockpiles, and increase global cooperation.

The fiscal year 2017 Budget Request proposes $12.9 billion for the National Nuclear Security Administration (NNSA), $357 million above the fiscal year 2016 enacted level, to invest in our nuclear security by modernizing and maintaining our nuclear security enterprise, refurbishing and extending the life of our nuclear deterrent, reducing the threats of nuclear proliferation, and supporting the safe and reliable operation of our nuclear Navy. As part of an overall focus to modernize nuclear

security research and production infrastructure, the overall NNSA budget includes a total of $1.8 billion in proposed infrastructure investments, including $575 million for the new Uranium Processing Facility.

The Request for NNSA includes $413 million for NNSA Federal Salaries and Expenses for the salary, benefits, and support expenses of 1,715 Federal full-time equivalents (FTEs) to provide appropriate Federal oversight of the nuclear security enterprise responsible for managing and executing NNSA's weapons activities and nonproliferation missions.

Stewardship of the Nuclear Deterrent

August of 2015 marked the 20th anniversary of President Bill Clinton's announcement that the United States would pursue negotiations for the Comprehensive Nuclear-Test-Ban Treaty and maintain the U.S. nuclear arsenal without nuclear explosive tests. This was an important milestone for a science-based Stockpile Stewardship Program that successfully pushed the limits of modern science and engineering to maintain the stockpile without underground nuclear explosive testing.

The fiscal year 2017 Budget Request includes $9.2 billion for Weapons Activities, $396 million above the fiscal year 2016 enacted level, to build on these accomplishments as NNSA sustains a credible and effective nuclear deterrent while continuing to reduce the size of the active stockpile. The Budget Request supports the work, as laid out in the Stockpile Stewardship and Management Plan, of the science-based Stockpile Stewardship Program to ensure a safe, secure and effective nuclear stockpile in the absence of underground nuclear explosive testing through a sustained, long-term research program.

NNSA has achieved major accomplishments in that mission, such as substantial progress on its Life Extension Programs (LEPs), including those for the B61–12, W76–1, W80–4, and W88 Alt 370 with conventional high explosive (CHE) refresh. The Inertial Confinement Fusion Ignition and High Yield Program increased the number of experiments, or "shot rate," at Lawrence Livermore National Laboratory's National Ignition Facility from 191 in 2014 to 356 in 2015. NNSA received the first hardware delivery for Trinity, NNSA's next generation high performance computer, and completed the first subproject for the Uranium Processing Facility, Site Readiness, on time and under budget.

The fiscal year 2017 Request includes $1.3 billion for LEPs and major alterations (Alts), $38 million above fiscal year 2016. In particular, the Request continues timely execution of the B61–12 LEP and the W80–4 LEP. These are the first two steps in implementing the Nuclear Weapons Council-approved "3 + 2" strategy to consolidate the stockpile to three ballistic missile warheads and two air delivered systems, reducing the number of weapons in the deployed stockpile and simplifying maintenance requirements.

The Request provides $223 million to support completing production of the W76 by 2019 and $616 million to deliver the B61–12 first production unit by 2020. It also supports transitioning the W88 Alt 370 with CHE refresh to Production Engineering in February 2017 with $281 million and provides $220 million, an increase of $25 million, to maintain the schedule of the first production unit for the W80–4 LEP by 2025. The Budget Request also provides $69 million, $17 million above the fiscal year 2016 enacted level, to make progress towards meeting the President's commitment to accelerate dismantlement of retired U. S. nuclear warheads by 20 percent.

The Budget Request for Weapons Activities provides $2.7 billion for Infrastructure and Operations, $443 million above fiscal year 2016. The Request ensures no increase in the backlog of deferred maintenance. The Request will dispose of the Kansas City Bannister Federal Complex, and upgrade aging infrastructure to address safety and programmatic risks, improve productivity, and lower operating costs. The Request for Infrastructure and Operations also provides $575 million, $145 million above fiscal year 2016, to continue the phased approach for constructing the Uranium Processing Facility, including completion of the design and continued construction on approved subprojects. The request also provides $160 million to continue work on the Chemistry and Metallurgy Research Replacement project to support the plutonium strategy.

As part of the Office of Science-NNSA collaboration on the Exascale Computing Initiative, the Budget includes $95 million for exascale computing, $31 million or 48 percent above fiscal year 2016, to develop exascale-class high performance computing to meet the needs for future assessments, LEPs, and stockpile stewardship.

The Request for Weapons Activities also includes $283 million for Secure Transportation Asset, $46 million above fiscal year 2016, to continue asset modernization and workforce capability initiatives including conceptual design and systems prototyping of the new Mobile Guardian Transporter.

Controlling and Eliminating Nuclear Materials Worldwide

The fiscal year 2017 Budget Request includes $1.8 billion for Defense Nuclear Nonproliferation, $132 million below the fiscal year 2016 enacted level, to continue the critical missions of securing or eliminating nuclear and radiological materials worldwide, countering illicit trafficking of these materials, preventing the proliferation of nuclear weapon technologies and expertise, ensuring that the United States remains ready to respond to high consequence nuclear and radiological incidents at home or abroad, and applying technical and policy solutions to solve nonproliferation and arms control challenges around the world. Note that while the overall program level for DNN is down, the programmatic funding level in the fiscal year 2017 Budget Request is roughly flat with fiscal year 2016 due to the availability of prior-year carryover balances and termination of the Mixed-Oxide (MOX) Fuel Fabrication Facility Project.

DOE has taken major steps in the nuclear threat reduction missions. We recently issued the first nonproliferation strategic plan, Prevent, Counter and Respond—A Strategic Plan to Reduce Global Nuclear Threats,[2] to define and describe our missions.

Supported largely by the DNN program and capabilities, we also provided scientific technical analysis to support the U.S. delegation during the Joint Comprehensive Plan of Action (JCPOA) negotiations. Following finalization of the agreement, twenty nine scientific leaders deeply familiar with nuclear issues (familiar names such as Garwin, Drell, Dyson, Hecker, Richter, and others), focusing on the agreement's nuclear dimensions, wrote to the President: "This is an innovative agreement, with much more stringent constraints than any previously negotiated nonproliferation framework." These experts were referring to aspects of the agreement such as weaponization constraints and bans on nuclear weapons R&D that mark an unprecedented approach to such agreements—and highlight the critical role that DOE plays in providing unparalleled scientific and technical capabilities.

As part of NNSA's goal to minimize and, when possible, eliminates weapons-usable nuclear material around the world, we have also recently completed removal or confirmed disposition of fissile nuclear material, bringing the number of countries free of all highly enriched uranium (HEU) to 28, plus Taiwan. We have also down-blended additional HEU to achieve a cumulative total of 150 metric tons of U.S. excess, weapons-usable HEU.

And in the area of nuclear counterterrorism and incident response, NNSA realigned its counterterrorism and counterproliferation functions to more efficiently respond to nuclear or radiological incidents worldwide and to sustain counterterrorism capabilities through innovative technology and policy-driven solutions. The program continues to train and exercise to strengthen emergency preparedness and response capabilities, including nuclear forensics operations, domestically and worldwide.

Looking ahead, the fiscal year 2017 Budget Request will support continued successful execution of the mission to control and eliminate nuclear materials worldwide. NNSA will support the President's fourth and final Nuclear Security Summit in March-April 2016, continuing the President's aim to achieved tangible improvements in the security of nuclear materials and stronger international institutions that support nuclear security.

DOE and its national laboratories will continue to provide technical support to the International Atomic Energy Agency (IAEA), including to implement the JCPOA, and will remain highly engaged in providing training and technologies and other support to support the IAEA. The Request includes $13 million to support implementation of the JCPOA, including $10 million to support JCPOA material management activities and $3 million for technical and in-kind support for the U.S. interagency process and the IAEA.

In the area of plutonium disposition, the Budget Request will terminate the Mixed Oxide (MOX) approach and move to a dilute and dispose approach that will be faster and significantly less expensive than the MOX option. Specifically, the fiscal year 2017 Budget Request provides $270 million, $70 million below fiscal year 2016, to terminate the MOX Fuel Fabrication Facility, and an additional $15 million to pursue a dilute and dispose (D&D) approach that will disposition surplus U.S. weapon-grade plutonium by diluting it and disposing of it at a geologic repository. The Department will complete pre-conceptual design for the D&D option and begin conceptual design in late fiscal year 2017.

In other nonproliferation areas, the Request includes $272 million, $37 million above fiscal year 2016, to sustain emergency response and nuclear counterterrorism

[2] http://nnsa.energy.gov/sites/default/files/NPCR%20Report__FINAL__4–14–15.pdf.

capabilities that are applied against a wide range of high-consequence nuclear or radiological incidents and threats. It proposes $394 million for the Defense Nuclear Nonproliferation Research and Development program to advance technical capabilities to monitor foreign nuclear weapons program activities, diversion of special nuclear material, and nuclear detonations. The Request provides $341 million for Material Management and Minimization to support HEU and plutonium disposition, the conversion of research reactors and medical isotope production facilities from the use of HEU to the use of low enriched uranium (LEU) fuels and targets, and removal of excess HEU and separated plutonium. The Request also provides $337 million for Global Material Security to build international capacity to secure, and prevent smuggling of, nuclear and radiological material through equipment installations and upgrades, and capacity-building workshops and trainings. In addition, the Request provides $125 million for the Nonproliferation and Arms Control program to strengthen the nonproliferation and arms control regimes by enhancing international nuclear safeguards; controlling the spread of nuclear material, equipment, technology, and expertise; and verifying nuclear reductions and compliance with nonproliferation and arms control treaties and agreements.

Advancing Navy Nuclear Propulsion

Finally for NNSA, the Naval Reactors program continues its tradition of providing the design, development and operational support required to provide militarily effective nuclear propulsion plants and ensure their safe, reliable and long-lived operation. In carrying out this mission, the Naval Reactors program has marked many major accomplishments.

The program continues to provided technical support and 24/7 reachback support for the Navy's nuclear fleet of 73 submarines and 10 aircraft carriers. The program successfully achieved criticality in the first reactor of the new Gerald R. Ford-class aircraft carrier, and continued reactor plant design for the Ohio-class submarine replacement and advanced technology development in refueling of S8G land-based prototype reactor, including the insertion of new materials and technology for the Ohio-class submarine replacement. Naval Reactors also operated the MARF (Modifications and Additions to a Reactor Facility) and S8G land-based prototype reactors, delivering 2,832 trained nuclear operators to the fleet—a 17 percent increase over fiscal year 2014.

The Request includes $1.4 billion for Naval Reactors, an increase of $45 million from the fiscal year 2016 level, to support U.S. Navy nuclear propulsion. The Request provides $214 million to continue development of the Ohio-class submarine replacement reactor, and $124 million to continue refueling of the Land-Based Prototype reactor.

In support of necessary facilities for handling naval spent nuclear fuel, including the capability to receive, unload, prepare, and package naval spent nuclear fuel, the Request provides $100 million to complete design and initiate construction of a new Spent Fuel Handling Recapitalization Project at Naval Reactors Facility in Idaho.

MANAGEMENT AND PERFORMANCE

The fiscal year 2017 Budget Request provides $6.8 billion for Departmental management, performance, and related corporate support activities to position the Department to meet the nation's Manhattan Project and Cold War legacy responsibilities and to continue institutionalizing an enterprise-wide focus on improving the efficiency and effectiveness of DOE programs through the effective management of DOE's infrastructure and workforce.

Strengthening Project Management

The Department is aggressively pursuing implementation of a Secretarial initiative to improve project management. We have made progress to that end through several recent initiatives and reforms, including establishing independent project review capabilities within each Under Secretary organization, as well as a central Project Management Risk Committee (PMRC). We have also formalized the role of the Energy Systems Acquisition Advisory Board (ESAAB) and instituted process changes to ensure that the ESAAB takes a proactive role in reviewing major projects. In addition, we established a new independent office on project management oversight and assessments.

It is notable the Government Accountability Office (GAO) has narrowed the focus of its watch list to DOE's major projects, and we continue to work towards improving our implementation of those projects. The Department's continuing goal is to control costs to within 10 percent of the baseline estimate for at least 90 percent of our construction projects.

The fiscal year 2017 Budget Request includes several proposals to further implement these project management improvements. The Request provides $18 million for the independent office of Project Management Oversight and Assessments (PMOA). With senior management focus on DOE's total project portfolio, DOE will be able to hold contractors and programs accountable for large and at-risk projects, receiving early warning notifications and quarterly updates.

The Budget Request also includes $5 million to establish an independent office, similar to that at the Department of Defense, to set cost estimating policy and provide timely unbiased program evaluation analysis and cost estimation.

Cleaning up Nuclear Legacy Waste

The fiscal year 2017 Budget Request includes $6.1 billion for Environmental Management (EM), $99 million below the fiscal year 2016 enacted level, to address its responsibilities for the cleanup of large quantities of liquid radioactive waste, spent nuclear fuel, contaminated soil and groundwater, and deactivating and decommissioning excess facilities used by the nation's nuclear weapons program. The $6.1 billion Request includes $5.4 billion in discretionary funding and proposes $674 million in mandatory funding from the USEC Fund, for Uranium Enrichment Decontamination and Decommissioning (UED&D) Fund activities.

While difficult challenges lie ahead with some of our remaining Environmental Management projects, it is important to note that when the program started, there were 107 sites to be closed— and today we have cleaned up all but 16 sites. The remaining sites will not be simple to remediate, but we started with over 3,000 square miles to remediate, and only 300 square miles remain.

In our ongoing efforts to remediate our legacy sites, we have continued construction activities necessary to initiate direct feed of Low Activity Waste (LAW) at Hanford, and we have continued technical issue resolution of the Pretreatment and High Level Waste facilities at the same site. We have cleaned up and demolished more than 800 facilities at Hanford, and we have remediated over 1,200 waste sites along the River Corridor. At the Savannah River Site, we have closed the seventh waste tank, and we have revitalized the EM Technology Development and Deployment Program in response to a Secretary of Energy Advisory Board (SEAB) recommendation.

Looking forward, the fiscal year 2017 Budget Request includes $271 million to maintain critical progress toward resuming waste emplacement in the underground at the Waste Isolation Pilot Plant (WIPP) by the end of 2016. WIPP, the Nation's only mined geologic repository for the permanent disposal of defense-generated transuranic waste, suspended operations following a February 5, 2014 fire involving an underground vehicle and an unrelated radioactive release that occurred February 14, 2014. The Request for WIPP includes activities to resume waste emplacement operations by the end of 2016, including continued implementation of corrective actions and safety management program improvements, completion of Operational Readiness Reviews and commencement of waste emplacement operations. Activities include mine stabilization, mining, mine habitability activities in all underground areas, continued decontamination of contaminated areas, and upgrades, support for completion of repairs of New Mexico Roads used for the transportation of DOE shipments of transuranic waste to WIPP, and community and regulatory support. The budget supports the Central Characterization Project and maintains shipping capability between the generator sites and WIPP. The Request also includes funding to support progress in design of a new permanent ventilation system that is needed to support normal operations.

The fiscal year 2017 Budget Request provides $1.5 billion for the Office of River Protection, $86 million above the fiscal year 2016 enacted level, to support the Department's proposal to amend the Consent Decree between DOE and the State of Washington for completion of the Waste Treatment and Immobilization Plant and retrieval of waste from 19 Single Shell Tanks. The Budget Request would enable construction of a new facility to allow DOE to begin treating low level waste by the end of 2022, avoiding the need to wait for completion of other facilities affected by the technical issues. The Request continues construction of the low activity waste (LAW) facility, the analytical laboratory, and balance of facilities while addressing technical issues with the pretreatment facility and the high-level waste facility as well as support for the planning and design of the LAW pretreatment system at the tank farms.

The Request also provides $800 million for cleanup of the Richland Site. Cleanup activities include soil and groundwater remediation, facility decontamination and decommissioning, stabilization and disposition of nuclear materials and spent nuclear fuel, and disposition of waste other than the tank waste managed by the Office of River Protection. The fiscal year 2017 Request for Richland will provide for con-

tinued achievement of important cleanup progress required by the Tri-Party Agreement. The Budget Request for Richland supports completion of cleanup at the Plutonium Finishing Plant, planning and initiation of procurement in preparation for cleanup of the 324 site, and other activities. The decrease of $191 million from fiscal year 2016 is attributed to completed scope and facility modifications to prepare for installation of sludge removal systems for the K West Basin, as well as purchase of the engineered containers for sludge repackaging; and completion of remediation in the 300 area, 100K area and 618–10 trenches.

The Request provides $1.5 billion, $111 million above fiscal year 2016, for the Savannah River Site to support remaining construction and commissioning of the Salt Waste Processing Facility, processing 19 million gallons of salt waste and nuclear materials in H-Canyon, and site-wide infrastructure. The Request will ramp up commissioning of the Salt Waste Processing Facility to enable start-up in 2018. The Request devotes significant funding to support the Liquid Tank Waste Management Program, as the liquid waste tanks pose the highest public, worker, and environmental risk at the site. The Request also supports the Savannah River Site to operate H Canyon in a safe and secure manner, provides safe, secure storage for spent (used) nuclear fuel in L-Area, and supports continuity of K-Area operations to include maintaining K-Area to store special nuclear material safely and securely. The increase over fiscal year 2016 provides additional support leading to startup of Salt Waste Processing Facility in 2018; supports tank closure and bulk waste removal activities to meet fiscal year 2016 enforceable milestones; and provides additional funding for Salt Disposal Unit #7 design activities.

The fiscal year 2017 Budget Request includes $370 million, $32 million below fiscal year 2016, for the Idaho Site to support key requirements to continue progress in meeting the Idaho Settlement Agreement commitments. The Idaho Cleanup Project is responsible for the treatment, storage, and disposition of a variety of radioactive and hazardous waste streams, including removal and disposition of targeted buried waste sitting above the Snake River Plain Aquifer. The project is also responsible for removing or deactivating unneeded facilities, and removing DOE's inventory of spent (used) nuclear fuel and high-level waste from Idaho. The Request will continue retrieval and processing of transuranic waste via the Advanced Mixed Waste Treatment Project and the Remote-handled Waste Disposition Project. It will also support continued progress toward closing the tank farm, including continued treatment and disposition of sodium bearing waste and progress toward buried waste exhumation under the Accelerated Retrieval Project. The decrease from the fiscal year 2016 level is attributed to progress in treatment, packaging, and certification of Idaho Settlement Agreement remote-handled transuranic waste, delays in processing waste at the Integrated Waste Treatment Unit, and a one-time funding increase in fiscal year 2016 for procurements.

The fiscal year 2017 Budget Request provides $391 million for cleanup at the Oak Ridge site, including $178 million in proposed mandatory funding, to support direct shipments of Uranium Solidification Project material, continue design and construction of the Mercury Treatment Facility, continue contact- and remote-handled debris processing at the Transuranic Waste Processing Facility, and continue the K–27 Decontamination and Decommissioning project. The Request will maintain the facilities in a safe, compliant, and secure manner as well as operate waste management facilities. The Request will continue development of Comprehensive Environmental Response, Compensation and Liability Act documentation for the new On-Site Disposal Facility. The processing of legacy transuranic waste debris will continue at the Transuranic Waste Processing Center and technology maturation and design will continue for the Sludge Processing Facility Buildout project. Additionally, the Request supports direct disposition of Consolidated Edison Uranium Solidification Project material from Building 3019, assuming resolution of stakeholder concerns.

The Budget Request includes $323 million, including $258 million in proposed mandatory funding, to support the deactivation and decommissioning project at the Portsmouth Gaseous Diffusion Plant in Piketon, Ohio. In addition to supporting deactivation and decommissioning of gaseous diffusion plant facilities and systems, disposal of waste, small equipment removal, and other related activities, the request also includes funding for design and construction of a potential on-site landfill for the disposal of waste generated from the demolition of the Portsmouth Gaseous Diffusion Plant and associated facilities. In addition, the Request will continue the safe operation of the DUF6 Conversion facility that converts depleted uranium hexafluoride into a more stable depleted uranium oxide form suitable for reuse or disposition. The Request for the Portsmouth is supplemented by continuing transfers of uranium for cleanup services at the Portsmouth Gaseous Diffusion Plant.

The Request provides $272 million for the Paducah site, including $208 million in proposed mandatory funding, for a multifaceted portfolio of processing and clean-

up activities. In addition to ongoing environmental cleanup and DUF6 operations, the Budget Request supports activities to continue the environmental remediation and further stabilize the gaseous diffusion plant, including uranium deposit removal, facility modifications, surveillance and maintenance, and activities to remove hazardous materials. The Request supports the design of the Paducah potential On-Site Waste Disposal Facility project, if the project is selected as the appropriate remedy.

The fiscal year 2017 Budget Request includes $30 million to expand the technology development program through carefully targeted projects to develop and demonstrate new technologies and approaches tailored to the specific contamination issues at individual sites. The fiscal year 2017 Budget Request includes an emphasis on robotics research and development of test beds in support of DOE's cleanup mission.

Refinancing Uranium Enrichment Decontamination and Decommissioning

Continued progress towards decontaminating, decommissioning, and remediating the former gaseous diffusion uranium enrichment sites, and towards meeting our uranium/thorium reimbursement commitments, remains a priority for DOE. We have made significant strides at the Oak Ridge, Portsmouth, and Paducah sites, but we have an estimated $22–24 billion in remaining cleanup costs.

Throughout the history of these sites, the government has collected funds from the public and private entities that utilized the enriched uranium produced at the facilities to pay for operation, privatization, and cleanup of these three sites—some provided by utility fees, and others provided by Congress. Three government accounts— Uranium Enrichment Decontamination and Decommissioning Fund, Uranium Supply and Enrichment Activities Account, and the United States Enrichment Corporation (USEC) Fund—hold nearly $5 billion of these funds.

The fiscal year 2017 Budget Request proposes to make progress on our cleanup missions at Paducah, Portsmouth, and Oak Ridge, and the Title X Uranium/Thorium Reimbursement Program by harnessing some of these funds through a mandatory proposal to make available $674 million from the United States Enrichment Corporation Fund.

Through the Energy Policy Act of 1992, Congress authorized annual deposits to the Uranium Enrichment Decontamination and Decommissioning (UED&D) Fund from an assessment on nuclear utilities for 15 years—from fiscal years 1993 through 2007. The Budget Request proposes to reinstate these fees to offset proposed new mandatory spending for uranium enrichment cleanup. The Budget also includes $155 million of defense funding for deposit into the UED&D Fund, reflecting the shared responsibility of both industry and the Federal Government for these costs.

Investing in Departmental Infrastructure

The fiscal year 2017 Budget Request supports safe and reliable world class facilities by investing in new infrastructure in all mission areas and establishing a sustainable trajectory for the Department's existing infrastructure.

As part of our effort to manage the enterprise's infrastructure in a sustainable manner to support DOE missions, beginning in fiscal year 2016, we have implemented a policy to halt increases in deferred maintenance across the DOE complex. We have also taken steps to bolster DOE's enterprise-wide inventory by compiling the first uniform assessment of general purpose infrastructure at all National Laboratories and NNSA plants and sites through the National Laboratory Operations Board (LOB), and forming a LOB working group to assess and prioritize the disposition of excess facilities.

Building on these efforts, the fiscal year 2017 Budget Request continues a comprehensive program of infrastructure modernization and improved maintenance across the complex, including expanded funding for general purpose infrastructure projects. The Budget proposes, for example, $200 million for the disposal of the Kansas City Bannister Federal complex. Finally, we are seeking to improve the energy efficiency and sustainability of government facilities, including use of Energy Savings Performance Contracts.

Building and Supporting the Energy Workforce

DOE's continues to work to attract, manage, train and retain the best workforce to meet its future mission needs.

In support of managing the workforce and hiring new personnel, we have activated two Consolidated Human Resources (HR) Service Centers, at Cincinnati and Oak Ridge, as part of a new service delivery model to consolidate 17 current HR service centers to five, which should allow for a more efficient and effective HR model across DOE. The fiscal year 2017 Budget Request completes the HR Shared Services Centers consolidation and invests in implementing recommendations re-

sulting from a talent management study conducted in fiscal year 2016, which will help to develop a corporate approach to talent acquisition in order to consistently and effectively attract, develop, and retain the best workforce to meet mission needs.

The DOE Office of the Chief Information Officer (CIO) and related offices continue to build the information technology (IT) infrastructure in support of DOE's mission needs. DOE is expanding Multifactor Authentication Program for improved cyber security. The fiscal year 2017 Budget Request strengthens cybersecurity across the enterprise with an investment of $285 million, an increase of $23 million across 13 offices and the Working Capital Fund.

The $93 million fiscal year 2017 Budget Request for CIO, $20 million above fiscal year 2016, also supports several critical IT improvements, including implementation of Federal Information Technology Acquisition Reform Act (FITARA) requirements to provide a common baseline for roles, responsibilities, requirements, and authorities for the management of IT in Federal civilian agencies. The Request also includes efforts to modernize and further secure the Department's IT infrastructure, including core networking layers, data centers, and access technologies.

The Department has established a Labor-Management Forum to further encourage opportunities for collaboration and partnership between contractors and management.

The Department has established the Office of Energy Jobs Development, consolidating ongoing activities across the Department formerly coordinated via the Jobs Strategy Council. The Request includes $3.7 million to support the office and to compile survey data and deliver the energy jobs and workforce report that would detail job growth/shifts in the energy and advanced manufacturing industries; fill the gaps that currently exist in data gathering on renewable energy, energy efficiency, and advanced manufacturing jobs; and compile data on energy job skill needs of employers and public agencies.

ADVANCING DOE'S CRITICAL MISSIONS

In conclusion, the fiscal year 2017 Budget Request of $32.5 billion invests in its science and technology capabilities, its workforce, and its critical infrastructure to advance DOE's core missions.

The Request supports the Department's efforts in science and energy to enable a clean energy future through innovative lower-cost energy technologies; to support secure, modern and resilient energy infrastructure and emergency response capabilities; and to provide the backbone for discovery and innovation, especially in the physical sciences, for America's research community.

The Request invests in the Department's nuclear security missions to maintain a safe, secure, and effective nuclear deterrent without nuclear explosive testing; to modernize the nuclear security research and production infrastructure; to reduce global nuclear security threats; and to propel our nuclear Navy.

And the Request continues taking steps to further the Department's management and performance missions to clean up from the Cold War legacy of nuclear weapons production; to manage infrastructure in a sustainable manner to support DOE missions; and to attract, manage, train and retain the best workforce to meet mission needs.

Thank you, and I would be pleased to answer your questions.

Senator ALEXANDER. Thanks, Mr. Secretary. We have good attendance. We will go right to questions and take 5-minute rounds. But if Senators want to stay and ask a second 5-minute round of questions, we will provide time for that.

OFFICE OF SCIENCE FUNDING

Let me begin, Mr. Secretary. I am for doubling energy research, but that costs about $5 billion. I mean, if we doubled the energy research in the Office of Science, that would be going from about $5 billion to about $10 billion. Is that about right?

Secretary MONIZ. About 20 percent of the Office of Science budget is part of the Mission Innovation base.

Senator ALEXANDER. But generally speaking.

Secretary MONIZ. If the Office of Science as a whole were doubled——

Senator ALEXANDER. No, no, I am talking—the amount of Federal Government energy research is about $5 billion. Is that about right?

Secretary MONIZ. Well, we have $4.8 billion in DOE (Department of Energy) and $6.4 billion across the government.

Senator ALEXANDER. So it is about $5 billion in DOE. If we double that, that would be $10 billion, just the Energy part. We are talking here about where we find the money.

ENERGY SUBSIDIES

But we are subsidizing windmills for the 23rd year at $4 billion. Two decades ought to be long enough to turn that into a mature technology.

We have $24 billion in subsidies for oil and gas over the next 10 years.

Why isn't a place to get the money for doubling clean energy research by phasing out subsidies to mature technologies? Why shouldn't we do that?

Secretary MONIZ. Well, they are certainly different levels of maturity. The administration has supported the idea of reducing and eliminating many of the fossil fuel subsidies.

Senator ALEXANDER. What about the windmills? They do not produce much energy, and 22 or 23 years ought to be long enough to allow them to be competitive. That is $4 billion over 10 years right there.

Secretary MONIZ. Of course, we are very pleased, actually, with extensions of the wind and solar credits over a fixed time in the——

Senator ALEXANDER. I am saying if we got rid of them, we could use it for clean energy research. We have to set priorities somewhere.

Secretary MONIZ. The continuing incentive we think is very important. It is the combination of technology and deployment that right now is helping drive costs down quite dramatically.

Senator ALEXANDER. I do not think it is a very complicated equation. I think instead of tax credit for mature technologies to subsidize wind developers, most of that money goes to rich people who take tax deductions, and to subsidize oil and gas production, we could give tax credit for the R&D that you want and that would be one way to find the money.

NUCLEAR WASTE

May I ask you some questions about nuclear waste storage and whether there is a role for private storage options? Is it likely that the department will receive an application from a private entity that may be seeking a license, or that the Nuclear Regulatory Commission will be receiving an application from a private entity that would store used nuclear fuel?

Secretary MONIZ. First, the answer is yes, we certainly do see a role for private storage. My understanding is the NRC may be receiving an application this year.

Senator ALEXANDER. What are the benefits of private storage in terms of technical feasibility, schedule, cost, and management flexibility?

Secretary MONIZ. Well, the devil is in the details, but we think that private storage could have advantages in accelerated schedule potential, more flexibility, and also getting a confirmed cost up early. So I think there could be many advantages.

Senator ALEXANDER. Last year, Senator Feinstein and I included in the Senate energy and water appropriations bills language to clarify the department's authority to pursue private storage options. Do you support that language?

Secretary MONIZ. Yes, I do.

Senator ALEXANDER. Thank you. My own view is that we should proceed on all tracks at once toward a solution, to finding a place to put used nuclear fuel.

Number one in my book would be Yucca Mountain, although that is certainly not unanimous in the Senate, and we have a stalemate there. But we have said many times that even if we filled up Yucca Mountain, we would still need other storage sites. Is that not true?

Secretary MONIZ. Yes, it is. We have a request for information out across-the-board for storage and repository solutions.

Senator ALEXANDER. So Senator Feinstein and I, both on the authorizing committee and in the Appropriations Committee, supported measures to create new repositories. So Yucca Mountain, the new repositories that we have talked about, and then a third option would be the private storage opportunities we talked about.

As I understand it, they could be large enough to be a significant opportunity, these private commercial storage sites, to receive a large part of the used nuclear fuel that is today stranded at reactor sites that have been closed.

Secretary MONIZ. Yes, I agree with that.

Senator ALEXANDER. Thank you.

Senator Feinstein.

ENERGY SUBSIDIES

Senator FEINSTEIN. I was just saying, Mr. Chairman, to the staff that I think we ought to take a real look at those subsidies that have existed for more than 20 years. It seems to me that the new energy architecture ought to be able to prove itself in terms of its market acceptance within a 20-year period and not be continued beyond that. So I would agree with you on that point.

NUCLEAR WASTE STORAGE

I would like to ask some questions about the Texas privately owned and operated storage facility. The NRC told us that this facility could get a license and start operating with no additional action from Congress.

Do you agree with that, Secretary Moniz?

Secretary MONIZ. I certainly would take the NRC judgment at face value for the NRC. At DOE, our general counsel does believe we have authority to move forward with that.

My understanding is the private entities would sure like some of the clarity that Congress could bring to it, for example, the language you introduced last year.

Senator FEINSTEIN. I do not recall the language right now, but I think my point, and I think the chairman's point has been, if you can do it, why not go ahead and do it?

Secretary MONIZ. Well, again, I think getting clarity from congressional action, would I think help a lot with the private entities. But eventually, there will be issues that need to be clarified, such as how will liability be addressed, what are issues in terms of when does ownership convert to Federal hands, et cetera? So I think that is something we can work with.

Senator FEINSTEIN. Can you put that together and submit it, if you need to submit it? I do not think you need to submit it to the Congress. You could submit it I guess to the White House for approval. But I do not understand why this does not go ahead.

Every time we have some hope for a new nuclear waste facility, something stops it.

Secretary MONIZ. Well, we are in discussion. We have had discussions in the past with the Texas group, for example. As I said, we are very supportive of that going forward. The first step is getting to the NRC.

Senator FEINSTEIN. I guess I am beginning to feel inordinate frustration because the chairman, I, the chairman of the Energy Committee, three chairs, and the ranking of the Energy Committee, we put together a bill for a nuclear waste policy and it sits and sits and sits.

Yet we are supposed to go ahead and now go into the area of small, modular nuclear reactors, that also produce waste but no place for the waste. I think it just puts more and more people in jeopardy of one day an accident.

So I have said this probably two dozen times, if there is going to be a future, a real future for nuclear, there has to be a place to put the waste.

Now that we have one, and we know that you are cleared to go ahead and sanction it and work out the legal anomalies or difficulties, my thinking is that you should do just that.

Secretary MONIZ. Well, we are, in fact, evaluating and working on all the options going forward. As you know, I fully support the waste bill that you and your colleagues worked on. I think it is right on. And we need to move forward on the storage option, whether it is public or private, especially so that we can move the fuel from shutdown reactors quickly.

We will work on that with you, obviously.

Senator FEINSTEIN. Not work with us. Will you move ahead and if the Texas operator has a good proposal that meets your concerns, will you move ahead with it?

Secretary MONIZ. Yes, if they are licensed by the NRC, we are completely prepared to work with them and move ahead, yes.

Senator FEINSTEIN. Again, the NRC told us that the facility could get a license and start operating with no additional action from the Congress.

Secretary MONIZ. But they have not filed for a license. We expect that to come later in this year. Until that happens, were a little bit limited, but we are certainly discussing this at length and getting prepared.

Senator FEINSTEIN. Thank you.

Thank you, Mr. Chairman.

Senator ALEXANDER. Thank you, Senator Feinstein.

Senator Graham.

MIXED OXIDE FUEL FABRICATION FACILITY

Senator GRAHAM. From one program to the next. Now let us talk about MOX.

Mr. Chairman, I think you have been kind enough to listen to my request to have a more in-depth study of this. Five minutes I do not think is going to do it justice. This is a monumental decision for the country and certainly South Carolina.

Mr. Secretary, last year, you had $345 million for construction of the MOX program, is that correct, in your budget?

Secretary MONIZ. Yes, sir.

Senator GRAHAM. This year, it was zero. Is that correct?

Secretary MONIZ. Yes, we proposed I think $275 million for starting termination.

Senator GRAHAM. To terminate the program. I just want the committee to look at this. This is a facility in South Carolina. You are welcome to come visit. We will be glad to host you.

In 2013, this is what it looked like. It was 56 percent complete, the actual MOX facility. In 2016, this is what it looks like today. It is a pretty mammoth place, 70 percent complete. The contractor says $3 billion gets us to where we need to be. We have spent $5 billion to date, and that is what we have for the $5 billion.

Now, the bottom line is, in 2010, we signed an agreement with the Russians to take the 34 metric tons of excess plutonium and put it through the MOX system, so it cannot be used for weapons in the future. Is that correct?

Secretary MONIZ. That is correct. If I may, I would just say, as you know, we do not agree with the numbers. And secondly, this is only one plant in the whole——

Senator GRAHAM. Right, there are two others. But you do agree that place is real?

Secretary MONIZ. Oh, I have been there.

Senator GRAHAM. We have paid $5 billion.

Secretary MONIZ. It is big.

Senator GRAHAM. It would be a hell of a basketball court.

Secretary MONIZ. It is big.

Senator GRAHAM. I do not know what we will do with it.

But the bottom line, now, in 2010 was the new approach you are talking about studied as an alternative to MOX? What is the new approach, very quickly?

Secretary MONIZ. The new approach is actually the old approach of dilution and disposal, as we have done for roughly 5 tons.

Senator GRAHAM. Was the old approach studied in 2010?

Secretary MONIZ. I do not believe so. I was not here at the time, but I do not believe it was looked at carefully. I think also in 2010——

Senator GRAHAM. So how can it all of a sudden be the best alternative when no one looked at it in 2010?

Secretary MONIZ. I think one of the issues is that in 2010, I think, first of all, the cost escalation was not fully appreciated. And frankly, the contractors have badly underestimated costs.

Senator GRAHAM. In 2016, the NDAA act said that you needed to rebaseline this project. Have you done that yet?

Secretary MONIZ. That is ongoing. The Army Corps of Engineers is doing that.

Senator GRAHAM. So in 2010, this new technology we are talking about today actually existed. Did anybody look at it and say this is better than MOX?

Secretary MONIZ. Again, I am speculating. In 2010, the issue was MOX was the program of record with the Russians. But again, the costs subsequently were recognized as being much higher.

Senator GRAHAM. So is the situation for MOX, we just missed it really badly on MOX, in terms of actual cost?

Secretary MONIZ. I think, yes. The cost, as you know, multiplied dramatically.

Senator GRAHAM. So how much did we miss it by? A thousand percent?

Secretary MONIZ. No, probably a factor of three, something like that.

Senator GRAHAM. So we missed it by a factor of three.

Secretary MONIZ. Probably.

Senator GRAHAM. Has anyone been fired?

Secretary MONIZ. Again, we should talk——

Senator GRAHAM. If you run a private business, and somebody created a project and you are $5 billion into it, and you find out it actually costs three times more than everybody thought, would you fire somebody?

Secretary MONIZ. Well, I did not say three times, by the way, from today, I meant from the original cost estimate.

Senator GRAHAM. Okay. Would you fire somebody?

Secretary MONIZ. Look, the contractor has had severe reassignments of——

Senator GRAHAM. I just want the committee to know the contractor would be willing to do a fixed-price contract.

Secretary MONIZ. Well, you and I discussed that with them at some point. And as we know, they came back in an unresponsive fashion.

Senator GRAHAM. Well, I disagree with you. But how much did the new technology cost?

Secretary MONIZ. We estimate probably around $15 billion lifetime costs.

Senator GRAHAM. How much time have you spent studying that?

Secretary MONIZ. Well, again, this is an old technology with essentially no technology risk.

Senator GRAHAM. The pathway forward for this new technology, do you have to get an agreement with the Russians before you can implement the new technology?

Secretary MONIZ. Yes, we have a well-defined, exercised, successfully——

Senator GRAHAM. How far along are you with the Russians?

Secretary MONIZ. We have had informal discussions, which have been positive. But frankly, until I think we have a signal in terms of which way we are going——

Senator GRAHAM. So we are going to change course and hope the Russians agree later?

Secretary MONIZ. Well, we are in a situation where the MOX——

Senator GRAHAM. Is that what you are saying?

Secretary MONIZ. The MOX approach has extreme uncertainties, the biggest one of all is finding $1 billion a year.

Senator GRAHAM. Well, it is not uncertain, it is just too expensive, you believe. It will work, won't it?

Secretary MONIZ. Presumably. There is a higher——

Senator GRAHAM. It works in France——

Secretary MONIZ. We assume it will work, of course.

Senator GRAHAM. [continuing]. Doesn't it?

Secretary MONIZ. It turns out that argument was used by the contractors mistakenly.

Senator GRAHAM. It doesn't work in France?

Secretary MONIZ. It works in France in a very different process under a very different regulatory regime, not using weapons plutonium, which brings in additional complications.

Senator GRAHAM. My time is up, but it seems to me that we started a project that apparently nobody knows if it even works. Somebody should be fired for that.

Secretary MONIZ. We expect it will work.

Senator GRAHAM. Well, okay. You are going to take this diluted material and put it where?

Secretary MONIZ. Well, we know that 13 tons certainly without permit or land withdrawal modifications, could be in WIPP (Waste Isolation Pilot Plant). And the first six tons from South Carolina——

Senator GRAHAM. Okay, where is WIPP?

Secretary MONIZ. That is in New Mexico.

Senator GRAHAM. Have you talked to Senator Udall about this?

Secretary MONIZ. We have had informal discussions, yes.

[Laughter.]

Secretary MONIZ. As with the Russians.

The first six tons, as I say, have long——

Senator GRAHAM. Informally, you may get about 20-something tons of plutonium blended down, so I want you to know that formally.

The stuff at Texas, where does it go?

Secretary MONIZ. I'm sorry?

Senator GRAHAM. Does it all go through this blended process, all 34 tons?

Secretary MONIZ. Well, the proposal would be that all 34 tons——

Senator GRAHAM. Does the $15 billion include all 34 tons?

Secretary MONIZ. Oh, yes. Yes, it did.

Senator GRAHAM. It did? Are you sure about that?

Secretary MONIZ. Well, I will check just to make absolutely sure. But——

Senator GRAHAM. I think you might want to check.

Secretary MONIZ. All right.

Senator GRAHAM. Finally, what legal changes would be necessary to change course? Would any changes in the law be required?

Secretary MONIZ. Changes of law? Well I am not the lawyer.

Senator GRAHAM. Have you talk to the lawyer?

Secretary MONIZ. What we know is the first——

Senator GRAHAM. Have you talked to the lawyer about what will happen——

Secretary MONIZ. The first 13 tons, as I say, no requirements——

Senator GRAHAM. There are 34 tons. I am not worried about 13. What about the entire 34 tons?

Secretary MONIZ. That is uncertain in terms of what would be required.

Senator GRAHAM. Thank you.

Senator ALEXANDER. Thank you, Senator Graham.

I am going to interject here. Senator Graham and I and the Secretary and Senator Feinstein all talked about this. This is a major decision that Congress has to deal with and that the administration needs to deal with. It does require more than a 5-minute opportunity to ask questions, even in a second round, so we need to schedule additional time, Senator Feinstein and Senator Graham and other members of the committee who may be interested, to deal with this responsibly.

We are talking about huge amounts of money here. You are suggesting it may be $1 billion a year, or a half billion dollars a year. We have spent a lot of time on it, so we need to spend more and take our stewardship very seriously. I have committed to Senator Graham that we will do that.

Secretary MONIZ. As always, I am happy, of course, to have that discussion.

Senator ALEXANDER. Thank you very much, Senator Graham.

Senator Coons.

NATIONAL LABORATORIES

Senator COONS. Thank you, Chairman Alexander and Ranking Member Feinstein. I appreciate your strong and bipartisan leadership of the subcommittee, and our chance to work together.

Secretary Moniz, thank you for your service, for your testimony, and for your very capable leadership of the department. I am going to touch on a series of issues that are across two priority areas and then ask you to respond with the remaining time.

First, on clean energy issues, thanks for your willingness to come to Delaware May 13 for our lab summit. As you know, I visited a number of the national labs, and I hope you will discover Delaware to be an open and supportive place that I hope will enter into some public-private collaborations that will benefit from the strength and reach of our labs.

Secretary MONIZ. The home of the first catalysis center at a university.

Senator COONS. Correct. I am thrilled, as always, with what you know about Delaware.

The independent review of national labs was released last December and had 36 general recommendations. I am interested in your views on whether Congress has an appropriate role and what it would be in terms of authorizing and appropriating some of those next steps.

CLEAN ENERGY

Second, just in terms of the midterm clean energy issues, you have placed a great priority on clean energy innovation. Many of us have supported the doubling of research investment called for

by the initial COMPETES Act. ARPA–E has made great strides. I was pleased to again be invited to speak at their summit.

In addition to ARPA–E, DOE has the energy hubs EFRCs and NNMIs, and there are now regional clean energy partnerships. I hope you will speak to them and how, as building blocks of the whole innovation pipeline, they fit into your overall plan.

And I hope you will talk about how we sustain something like the Mission Innovation commitment, a commitment to doubling investment in the clean energy transition.

JOINT COMPREHENSIVE PLAN OF ACTION

Additionally, in visiting the IAEA headquarters back in January, I was told that as the world's nuclear watchdog, they need a reliable, long-term source of funding to implement the JCPOA and to accomplish their broader nonproliferation goals. A recent GAO report said that IAEA faces potential budget and human resources challenges in order to take advantage of the searching, inspection, opportunities that the JCPOA opened.

How is the department helping the IAEA overcome these challenges? How are the national labs assisting in the recruiting, hiring, and training, which I understand to be a long and expensive process?

Ali Akbar Salehi, head of the Atomic Energy Organization of Iran, just announced that they will be using some of their sanctions relief to train their next generation of nuclear scientists. Is this something about which you think we ought to be concerned? And do you see that as an appropriate use of their funds?

Those are all my questions, and I welcome you using the rest of my time to answer them, as possible.

Secretary MONIZ. Okay, well, thank you, Senator Coons. I will have to be brief on each of them.

CRENEL REPORT ON NATIONAL LABORATORIES

First, on the CRENEL report, the congressionally charged report on the laboratories, first of all, I think charging that panel is indicative of the interest certainly in this group. I want to emphasize that the panel, first of all, endorsed strongly the idea that this laboratory system is very important.

Secondly, they also honed in on something that I completely agree with that, frankly, for a long time—bluntly, I would say from the end of the Cold War—there has been an increasing kind of transactional approach rather than a strategic approach to laboratory management. I think there is plenty of credit to go around.

As the committee acknowledged, we have made some real progress in terms of restoring this more strategic work with laboratories. I could describe examples. But we have a way to go, and we are still looking at it.

We have sent the report to Congress. We accept and will follow through on almost every recommendation. There are a couple that present some problems, but we stay in touch with the cochairs, and I think this has been a very, very good process. I can get more specific if you like off-line.

MISSION INNOVATION

In terms of Mission Innovation, you have kind of actually said at all, that there are certainly new thrusts, but I do want to emphasize an important strengthening of some of the very successful programs that have been working with universities and labs and industries.

ARPA–E

You mentioned ARPA–E, so there is a good example where, with approximately 200 projects now finished, 36 companies have emerged. The fact that in their open call last year a successful program was able to support only between 2 percent to 3 percent of the projects kind of suggests we are leaving an awful lot of innovation on the table.

CLEAN ENERGY

As we go into this world, putting aside one's view of specifics of the Paris agreement, the fact is every country in the world is committed to pursuing a clean energy future. That market, which has been booming, is going to boom even more. We should be there, keeping our innovation advantage in moving forward.

Senator ALEXANDER. Thank you, Senator Coons. We need to keep moving.

Secretary MONIZ. Okay, I can come to Iran later on.

Senator ALEXANDER. Senator Lankford.

LIQUEFIED NATURAL GAS EXPORTS

Senator LANKFORD. Thank you, Mr. Chairman.

And thanks for being here as well. I have a couple things just on multiple subjects here, so I will kind of rapidly run through some of these.

The Department of Energy is currently taking the applications for LNG (Liquefied Natural Gas) exports to non-FTA countries. That has been a process that is ongoing. Is there a set timeline at this point about how long it takes to go through an application process at DOE, those LNG exports?

Secretary MONIZ. No, there is no set timeline. However, I would——

Senator LANKFORD. What is a typical length of time to get an application done right now?

Secretary MONIZ. Recent experience has been weeks to a month, following FERC (Federal Energy Regulatory Commission) approval of the EIS.

Senator LANKFORD. Okay, so FERC first and then DOE, correct? So that has been a quick process. It has not been an issue?

Secretary MONIZ. I do not think so, no. Right now, we have no applications to actually work on, having come through FERC.

Senator LANKFORD. Okay, you have done the study of the 12 to 20 Bcf (Billion Cubic Feet) per day of exports. That is out for comment at this point. Tell me what you think the process is at this point with that study now that it is out, now that it has comments?

Secretary MONIZ. Well, actually, the comment period has now ended, so we are now going through the comments. Then we pre-

pare a response and then issue the report, either in its current or modified form.

Senator LANKFORD. Right. That is what I was trying to pick up, the timeline for that. When do you think that final report will be out there? Or modified report?

Secretary MONIZ. We have no fixed time, but I will guess that we are talking within a month or two.

Senator LANKFORD. Okay. Great. The findings at that point that I saw were marginally positive impact on the macroeconomics, no big issues, same as what it was with the earlier study as well. That was about 3 years ago.

GRANTS

Okay, let me walk through some of the grant issues. We are talking about a lot of increases in grant dollars. One of the questions that I always have is, how do we track that? Once you release a grant dollar out, for effectiveness, for use, how it is going, the diversity of the different groups that get it. So let me just ask a couple questions on it.

When you start to track through this, how do you evaluate the performance of the grant money? Do you have a set formula for that? Do you have a set of criteria that we are releasing these grant dollars for this particular project, and this is the end goal? Or is it more open than that? Basically, I am asking, how do we help look back on the money and say, the money was spent, was that spent wisely?

Secretary MONIZ. It actually varies by program. I will give just maybe two examples.

For example, we just mentioned ARPA–E. That is a case where the program managers are very active and engaged with the projects all along, monitoring success, guaranteeing early rather than late failure, if that is where it is going. Whereas in the Office of Science, if it is a university grant, it is more that the universities execute and produce their published papers and reports.

Senator LANKFORD. So what I want to be able to evaluate is, before the money goes out the door, we have a set of evaluation metrics that we know about this grant, whether it is going to a university or somewhere else. Are you confident at this point every one of these grant opportunities go out there with a way to measure success on these?

I understand this is research, so not everything turns out positive. I get that. That is why you do research. I am trying to figure out how we evaluate the metrics of this at the end. Do you feel confident that every one of these grant opportunities, regardless of how it goes out the door, has evaluation metrics?

Secretary MONIZ. Well, again, if we are not using metric in an overly formal sense, because it is done differently in each program, then I would say the answer is yes.

Senator LANKFORD. Okay, that will be one of the things I want to be able to track on it. How do you track, at this point, research that would be done by the public sector and research that would be done only by us? What we are trying to determine often is, what is the research that will not be done unless we do it cooperatively as a Nation, that would be beneficial to the Nation long-term, rath-

er than dipping into research that some corporation would have done, but they would be glad for the American taxpayer to pay for it instead? But if we pay for, great, they would love to have the research done, but we do not need to do that research, they would do it. Does that make sense?

Secretary MONIZ. Sure. I mean, that is part of the judgment of the research managers have to use. Although I would slightly modify it and say that sometimes the judgment is not just that it would not be done otherwise, but that we may feel that there is a major public benefit to an acceleration of it. Then we might do some cost-sharing to incentivize earlier work by the private sector.

Senator LANKFORD. Okay, so then at that point, we are helping the private sector do their research or we take it away from them, and we would take it on? If you are seeing something that is ongoing that the public sector is already doing and we can accelerate it?

Secretary MONIZ. Or they are not doing it yet, but we would like them to get into it and accelerate. That is where we are assigning the public benefit, in those cases. But again, in other cases, obviously, most cases, it is about something that would not otherwise be done.

In particular, the biggest criterion is capturing especially precompetitive work that one individual entity would not otherwise capture the benefits of and, therefore, would be reluctant to invest in it.

AGENCY-TO-AGENCY RESEARCH

Senator LANKFORD. Right. And the final issue, and I do not want you to have to answer this, because I am out of time on it, is the agency-to-agency. This is one of the areas I want us to provide more oversight as a committee to be able to ask just the basic questions. Could it be done? Is it being done by another agency? Could it be done by an outside agency, if the taxpayer doesn't do it, freeing up dollars for us to be able to do other things? And finally, good evaluation tools, so at the backside of it, we can evaluate how it was used.

To me, that is a philosophical oversight issue that we can take on as a committee, and I would look to be able to partner with you on the things that you have already learned that we can continue to use in the years ahead.

Secretary MONIZ. Okay.

Senator LANKFORD. Thank you.

Senator ALEXANDER. Thank you, Senator Lankford.

Senator Murray.

HANFORD SITE

Senator MURRAY. Thank you, Mr. Chairman.

Secretary Moniz, let me start with the Hanford site in central Washington. Year after year, I have found the President's budget to be shortsighted and inadequate when it comes to Hanford. This is really troubling because, as you well know, the Federal Government has a legal and a moral obligation to clean up Hanford and the other nuclear waste sites across the Nation.

Now I do appreciate your focus on the tank farms and waste treatment plant and implementing direct, low-feed waste to begin processing waste as early as 2022. But I find it unacceptable that the President's budget essentially robs Richland operations to pay for the Office of River Protection's waste treatment mission. It is really critical that we finish the job on all fronts.

I have a hard time seeing how that will get done when the administration has once again cut RL (Richland Operations Office) by $190 million. That is nearly double the amount that was cut last year.

With those kinds of significant cuts, how is the administration going to meet its legally binding commitments to the Tri-Cities community?

Secretary MONIZ. Well, certainly, as you say, Senator Murray, first of all, within a limited total budget, we are trying to make sure we address the priorities, including those areas that I think have the highest risk, which especially is liquid waste at a variety of sites.

Now coming to Richland, first of all, and I think you would agree, that we have made very substantial progress in the last year, certainly along the river corridor, for example. And the fiscal year 2017 budget will have major progress, complete the demolition of the plutonium finishing plant, move sludge from the K area away from the river, pumping the plateau, a lot of progress on the landfill.

Senator MURRAY. I appreciate that. But several of the high-risk projects that are close to the Columbia River and the City of Richland, specifically the 324 building and the 618–10 burial grounds, they are underfunded in the President's budget, despite this subcommittee's clear support for completing them.

So I want to ask you for your commitment that these critical projects will be funded, and if you could give me a detailed plan on how you are going to do that.

Secretary MONIZ. Sure, we certainly will do so. But I would emphasize that building 324, we are doing the procurements we need and will in fiscal year 2017, for the novel robotics technologies that we are going to need. So we can't just go in and move the dirt out until we develop the robotics.

But we hear you, and we will respond to that.

Senator MURRAY. Okay, well, we made a decision to focus cleanup on the reactors in the 300 area that is closest to the Columbia River and City of Richland. We have made great strides. But I really fear that this budget overall really foreshadows a decision by DOE to claim victory at RL and walk away from all the other cleanup RL is responsible for on the central plateau. RL still has a long list of cleanup on the central plateau, about 1,000 waste sites. We have 500 facilities, contaminated groundwater, all pose risk to the public, to the environment, and to the work force.

Every year that those are not addressed, DOE spends millions of dollars on surveillance and maintenance.

So it is really critical that we know we have a commitment to that and not set it aside as we try to get all the critical work done on that. So I just wanted to make that point to you today.

Secretary MONIZ. Yes. We are trying to prioritize the risks. But let's work together on that. We will come back with a plan.

COLUMBIA RIVER TREATY

Senator MURRAY. Okay. And finally, I want to ask you about the Columbia River Treaty. In December 2013, the administration was presented a regional consensus to modernize the Columbia River Treaty. It was a multiyear process involving our Northwest tribes and all of our stakeholders, and the entire Northwest delegation urged the administration to begin formal negotiations with Canada. But not a lot of progress has been made.

My constituents are really concerned about the impacts the change in administration will have on these negotiations, and I wanted to urge you today to push the administration to begin these formal negotiations with Canada, and I really hope that you will proactively raise the Columbia River Treaty when Prime Minister Trudeau visits the United States this week.

Secretary MONIZ. If I may say, Senator Murray, because we agree with you, and, as you know, Bonneville is our lead negotiator in that, that I met with Secretary Kerry last week, and we both agreed about the importance of pushing this along. There is a negotiator and we certainly would like to——

Senator MURRAY. We have had a negotiator for a while. We need this to get started, because we cannot afford to wait, once the new administration, whoever it is, to reeducate everybody, have new people appointed, and get it started. It needs to get started now.

Secretary MONIZ. Agreed.

Senator MURRAY. Thank you.

Thank you, Mr. Chairman.

Senator ALEXANDER. Thank you, Senator Murray.

Senator Hoeven.

Senator HOEVEN. Thank you, Mr. Chairman.

It is good to see you, Mr. Secretary. I saw you not too long ago, I think at our Energy Committee.

Secretary MONIZ. Sorry.

Senator HOEVEN. I say, I think we saw each other at our Energy Committee not too long ago.

Secretary MONIZ. Yes, we did.

Senator HOEVEN. So it is nice to have you back.

Secretary MONIZ. Thank you.

Senator HOEVEN. It is good to see you again.

CARBON CAPTURE AND SEQUESTRATION

I know this will surprise you immensely, but I am going to follow up on something we talked about there.

We have companies in North Dakota, as you know, having been to North Dakota are capturing CO_2 and sequestering it. You are at the Dakota Gasification Company where they are capturing. It is a coal-fired electric plant. Actually in their case, they convert coal to synthetic natural gas. But then they capture the CO_2, and we pipe it off to the oil fields and use it for tertiary oil recovery.

We have other companies with power plants, coal-fired electric power plants, now they produce electricity, not synthetic methane. But they are trying to develop and implement post-combustion car-

bon capture retrofits to existing plans greater than 350 megawatt equivalent.

Since you are a nuclear physicist, I know you understand that perfectly.

They are, in fact, working with a very outstanding organization, which I know you are also well aware of, and I think our chairman may be as well, the Oak Ridge National Laboratory located in the State of Tennessee.

So my simple question to you is, in your budget, you have $170 million proposed for large-scale, carbon capture sequestration demonstration projects. I am wondering if this would be the kind of thing that you would seek to participate in funding and developing in concert with some of our companies that are trying to lead the way forward with this post-combustion carbon capture technology, actually implementing it, and working with such outstanding organizations as the Oak Ridge National Laboratory.

Secretary MONIZ. I would like to associate myself with your quality statement about the Oak Ridge National Laboratory.

First, yes, first of all, we are continuing some large-scale capturing demonstrations. But as you have said, in the fiscal year 2017 budget, we want to emphasize getting into smallish pilot projects of more novel technologies, chemical looping, oxy-combustion, et cetera. I think what you are talking about sounds like——

Senator HOEVEN. This is oxy-combustion.

Secretary MONIZ. Yes, I believe, again, I do not know all the details, but I believe it involves oxy-combustion and supercritical CO_2, which we are also supporting in the fiscal year 2017 budget.

So again, I think what we need is to have perhaps a group come in and provide a briefing on exactly what the cycle is. If it is a novel cycle, then that will be a question of going through a proposal process with our group.

But we think this is a good time to really start pushing our next generation capture cycles.

Senator HOEVEN. But am I right, this is the kind of project that you are looking at using that funding for?

Secretary MONIZ. I do not know enough about it. From what I have heard——

Senator HOEVEN. You are not going to commit right here and now.

Secretary MONIZ. No, I am not. But it looks encouraging.

Senator HOEVEN. Good.

Secretary MONIZ. If it combines oxy and CO_2 supercritical, that is already an interesting cycle.

Senator HOEVEN. And the State of North Dakota is already working with these projects through our energy council, wherein the State participates through funding and other support as well as the University of North Dakota through the Energy and Environmental Research Center, which I think you have also visited.

Secretary MONIZ. I visited, and we support.

Senator HOEVEN. Okay, thank you.

Senator ALEXANDER. Thank you, Senator Hoeven.

Senator Udall.

Senator UDALL. Thank you, Chairman Alexander.

Good to see you again, Secretary Moniz. You are working hard on so many different issues, and many of them impact New Mexico, as you know.

CONTRACT TRANSITIONS AT THE NATIONAL LABORATORIES

We have two national security labs, Sandia and Los Alamos, that are doing very important national security work on preserving the stockpile and the capabilities.

As you know, these major programs include the life extension projects. There is an issue I want to raise there, because you have pending contract negotiations for both Sandia and Los Alamos. I am concerned about losing sight of the ball during these transitions.

Can we have your commitment you will work to ensure the transitions at the labs are as seamless as possible, and that we do not lose focus of the important national security work during this period?

Secretary MONIZ. Yes. And I can assure you that we are already thinking hard about that issue of the transitions.

Senator UDALL. Good. Thank you.

Secretary MONIZ. Of all the labs, actually, especially those in New Mexico.

Senator UDALL. Especially those, and I believe the one in California that the ranking member, Senator Feinstein, also——

Secretary MONIZ. I meant because of the contracts.

Senator UDALL. Yes, the contracts on those.

OFFICE OF TECHNOLOGY TRANSITIONS

Now you and I have visited, and you had a visit to New Mexico, on technology transfer. We were very grateful to have Jetta Wong, the director of DOE's Office of Technology Transitions, out to New Mexico last fall to meet with some of the laboratory personnel at Sandia and Los Alamos.

Expanding technology transfer I think is critical to maximize the economic impact of taxpayer dollars at the labs, so that innovations can move from the lab to the marketplace.

I support a permanent line item for the Office of Technology Transitions and its critical missions.

My question is, does $8.4 million in your request provide the resources needed to administer the technology commercialization fund and coordinate tech transfer initiatives across all 17 national labs? And does the OTT (Office of Technology Transitions) have the flexibility it needs to effectively match funds with private partners?

Secretary MONIZ. Well, first, we do think the $8.5 million, roughly, is sufficient for the office to do that. Of course, that is working with the technology transitions offices in the various laboratories.

There is one issue of flexibility where I am concerned. It is not about the matching funds per se, but the question about whether the technology commercialization fund must be spent exactly proportionally to each office's contribution versus allowing some more flexibility. Otherwise, it is very small, individual pots.

But that is one area where I would say it may be challenging.

Senator UDALL. If there is any help we can give on that, please let us know.

Secretary MONIZ. Great.

MISSION INNOVATION

Senator UDALL. I am also very interested in this Mission Innovation that I think you and I have spoken about, a new initiative to double funding in DOE's clean energy research portfolio over the next 5 years.

Could you tell us a little bit about that and how you see that moving forward to meet the energy challenges of the future?

Secretary MONIZ. Again, I think this is really about the highest priority right now in terms of moving forward in the energy space. It will both enhance critical programs that we already have. We have mentioned ARPA–E several times, but there are others, the Energy Frontier Research Centers at both laboratories and universities, the bioenergy centers, a whole set of them, the hubs, which are principally at the laboratories.

They will be within that new area. For example, we propose a significant expansion, actually a tripling of the Energy-Water Nexus Crosscut. That would include a new hub focused on desalinization, energy efficient desalinization, very important. We also have a large grid program, actually, the labs put together a grid program. And last year we committed over $200 million to lab-led programs on the grid.

But in addition, there will be some new thrusts, one of which I mentioned in my opening statement is we proposed $110 million to go toward new regional energy partnerships with the idea that that can stimulate innovation ecosystems across our entire country.

WASTE ISOLATION PILOT PROJECT

Senator UDALL. Great. I just wanted to double-check with you on the opening of WIPP. I understand that you have it on track to reopen.

Secretary MONIZ. We believe that we are on still on track for late this year, to begin placing TRU waste.

Senator UDALL. And one of the important things there is making sure that it reopens safely——

Secretary MONIZ. Absolutely.

Senator UDALL. [continuing]. In terms of the employees and everyone. As you know, that has been my main concern with WIPP.

But thank you very much for the job you are doing.

Mr. Chairman, I yield back.

Senator ALEXANDER. Thank you, Senator Udall.

Senator Shaheen.

Senator SHAHEEN. Thank you, Mr. Chairman. And thank you, Mr. Secretary, for being here this afternoon.

SITING AND PERMITTING ENERGY PROJECTS

The agency's 2015 quadrennial energy review calls for more public participation in the siting and permitting process for energy projects. We have two projects in New Hampshire that there is a great deal of concern about in the communities that they are going through. One is in the northern part of State called Northern Pass, which is a project bringing down waterpower from Hydro-Quebec.

The other is a gas pipeline that is going through the southwestern part of the State.

I just wonder if you can talk about the importance of public engagement in siting and permitting these kinds of energy projects, because I think it is fair to say that the people who are going to be affected by those projects feel like, while there have been public hearings and there is a process in place, many people do not feel like that process is really taking into account what their concerns are and has responded adequately to that.

So can you talk about that and also talk about whether there is more that FERC can do to address public concerns because they have, from the public perspective, a very opaque process for how they operate and what their decisions depend on.

Secretary MONIZ. I can certainly speak more about the DOE's approach. I certainly agree with the importance of input, including being sometimes patient, in terms of going through the process.

NORTHERN PASS

To take Northern Pass, I think the process has already resulted in changes in the proposal. I think it was 50 miles, roughly, more now going underground, which was a positive. That was filed. We have reopened public comment.

Frankly, I think there are four meetings this week in New Hampshire, public meetings on that. And frankly, we appreciated working with you and the delegation in terms of how the scheduling and locations would be optimally set.

So we will be getting the feedback from this week's meetings on Northern Pass.

With regard to FERC, I really cannot say too much in terms of how they might modify processes. I think you would have to ask Norman Bay.

ENERGY EFFICIENCY

Senator SHAHEEN. We have tried that.

I want to switch to energy efficiency, because I was pleased to see that the budget request includes strong funding for energy efficiency programs and EERE (Energy Efficiency and Renewable Energy).

As I know you are aware, because you are from New England, we have faced very high energy costs for decades in the Northeast. For many businesses, next to the cost of personnel and product costs, it is often the next highest cost of doing business in New England.

Secretary MONIZ. And a competitive question, therefore.

Senator SHAHEEN. Yes. One of the things that for many of those small businesses that has been very helpful has been their ability to be more energy efficient and to access assistance with that energy efficiency.

So can you talk about initiatives within EERE that will help small businesses as they are trying to facilitate the deployment of energy efficiency technologies?

Secretary MONIZ. Certainly, again, I really appreciate your strong focus on efficiency because, again, I have said it before, but I would like to repeat it, I have never seen a credible solution to

meeting our long-term goals without major demand-side contribution.

Senator SHAHEEN. Right.

Secretary MONIZ. So it is critical.

So we are working across-the-board. We are working with buildings, in particular commercial buildings. Things like the Better Buildings Challenge are critical. That has been tremendously successful. And it is really just using our convening power as opposed to budget. So this kind of branding and a critical requirement to share best practices, that is having a huge impact.

Of course, on weatherization for homes, we do propose a several percent increase in the budget. Another different direction—okay, I will mention first the R&D.

On the R&D, we propose a substantial increase in terms of the technology development for building efficiency. That has multiple aspects.

In terms of standards, I would note that we just put out a notice of proposed rulemaking on general service lamps. By the way, I also just did something for the NHL, who has made a huge move toward LEDs and other energy efficiency activities.

Senator SHAHEEN. By NHL you mean National Hockey League?

Secretary MONIZ. National Hockey League.

Senator SHAHEEN. I just want to clarify that. Right.

Secretary MONIZ. Believe it or not, the National Hockey League and NASCAR are two organizations that are really pushing hard on clean energy. We are working with them. With NHL, it is LEDs, refrigeration, and other kinds of issues.

But also I would note that in just the last year, this is quite relevant to small businesses and commercial enterprises, we put out a consensus standard done with the stakeholders as opposed to a more formal DOE rulemaking on commercial furnaces, the rooftop kind of boxes. That is a very big deal. It is the biggest efficiency rule that we put out, and it was done on a consensus basis representing the different relevant sectors.

So it is really across the board, from R&D to standards to convening and getting best practices shared.

Senator SHAHEEN. Thank you. I assume you would agree with me that it would be very good for us to pass the energy bill that is currently on the floor the Senate?

Secretary MONIZ. Maybe even a further strengthened one.

Senator SHAHEEN. Thank you.

Thank you, Mr. Chairman.

Senator ALEXANDER. Thank you, Senator Shaheen.

URANIUM ENRICHMENT DECONTAMINATION AND DECOMMISSIONING FUND

Mr. Secretary, Senator Feinstein asked you about the $674 million that the President's budget allocates from the USEC Fund, in fact, for cleaning up uranium enrichment sites in Tennessee, Kentucky, and Ohio. That $674 million is not now authorized for that purpose, is that correct?

Secretary MONIZ. Well, my understanding is that those are existing funds that have been put there—as I said, in 2000——

Senator ALEXANDER. No, I don't think that is correct. I think they are authorized for USEC. They are not authorized to clean up uranium enrichment sites.

Secretary MONIZ. I will correct this for the record, if it is incorrect, but I believe in 2000, there was specifically a designation of part of that fund for cleanup, for D&D.

Senator ALEXANDER. Staff says it is a small portion that never got used.

Secretary MONIZ. It was a small portion, but as a reminder, all of that fund bears interest, and it is now a very substantial amount.

Senator ALEXANDER. It is a substantial fund. But the bottom line I think, if we cannot use that fund, there are zero dollars in your budget for cleaning up uranium enrichment sites in Tennessee, Kentucky, and Ohio. Isn't that correct?

Secretary MONIZ. We certainly need to continue that work. And again, we proposed a way of going back to the initial concept, that the users pay with a very, very small fee.

Senator ALEXANDER. I think the answer is there is zero, unless we can use the USEC money, right?

Secretary MONIZ. Our proposal is to use the USEC Fund.

Senator ALEXANDER. Right. But I am not convinced that we have the authority to use it. So why have you not asked Congress to reauthorize the money so that we can use it for the purpose you intend?

Secretary MONIZ. Well, I think our budget proposal to the Congress——

Senator ALEXANDER. But it would require new legislation, would it not? I mean, wouldn't the Energy Committee have to reauthorize the use of the money for the purpose you now intend?

Secretary MONIZ. First of all, we have, of course, discussed this with the Energy Committee last week.

Senator ALEXANDER. But you have not sent them any legislation.

Secretary MONIZ. Again, I do not want to get onto shaky ground with that, in terms of what is needed. My impression is that certainly Congress could go forward with that fund, but it would require——

Senator ALEXANDER. With all respect for you, and you know I have a lot for you, I think you are already on shaky ground here.

Secretary MONIZ. I mean, we certainly can be forthcoming with a proposal for legislation.

Senator ALEXANDER. I think basically the administration has done something that other administrations have done for things they think Congress will find other money for. The Army Corps of Engineers is the second example. They know Congress cares about that because people care about it, so they underfund it, knowing that we will have to make up the money, which we did last year.

And you know that we have to clean up the uranium enrichment sites in those three States, so basically you put zero in the budget for it, knowing we are going to have to use discretionary money, and that means reduce other funding.

So I would ask that if you want us to use that, that you consider sending promptly up to the Congress a request for the authority to do it——

Secretary MONIZ. Okay.

Senator ALEXANDER. [continuing]. If it is needed. Let me go back——

Secretary MONIZ. We will follow up on that, Mr. Chairman.

CARBON USE AND REUSE

Senator ALEXANDER. [continuing]. To something we discussed privately before. I am not a scientist and I do not pretend to be, but my common sense is pretty good.

We are in a swivet in this country and the world over climate change and the need to produce carbon-free electricity. And we figured out a way in our power plants to get rid of sulfur, nitrogen, and mercury, and a number of other elements.

As a result, the air in Tennessee around the Smoky Mountains is a lot cleaner. You can actually see the Smokies. People like that.

We have not really figured out as well a commercially viable way to capture carbon and do something with it if it comes out of a power plant, out of a coal-fired power plant or out of a gas-fired power plant.

There is a limited mechanism we have for capture and sequestration, which could be available some places. But even if it is available, it is very expensive. And the process of carbon capture for any purpose is expensive.

Would it not be a huge priority for this clean energy research to see if we can reduce the cost of carbon capture and find some commercially viable use for what we capture? Wouldn't that permit us to use unlimited amounts of coal and gas, and reduce poverty around the world, and reduce the cost of electricity?

Secretary MONIZ. We totally agree. I think we are doing that. Maybe we could do more, but we are doing that across-the-board.

So first of all, again, the fiscal year 2017 budget specifically has the proposal for doing three novel technologies, obviously, with the hope that they would also be lower cost.

I do want to emphasize, even with conventional capture, the costs have been coming down with more and more use. And also the enhanced oil recovery, when the oil prices were higher, especially, provided a substantial offset against the cost. That is another issue lower oil costs have impacted.

So we are working on the front-end of different capture technologies, not just with different solvents but with different processes like chemical looping.

Then on the backside, one example of a hub is the one that is basically working on sunlight to fuels, which means sunlight plus water plus CO_2 to fuels.

Senator ALEXANDER. Is that the ARPA–E company?

Secretary MONIZ. No, no. This is a hub, combination of Caltech and Berkeley doing that. But I think ARPA–E also has a program for this.

The trick is the product has to be something with enormous use in the economy because of the magnitude of the CO_2.

Senator ALEXANDER. Right, I understand. You can turn it into limestone, but who needs that much limestone, or whatever it is.

My time is up, but it just seems to me that, from a commonsense point of view, that is the holy grail of clean energy research,

because if you can actually figure out how to make a commercially viable use of capturing carbon and then using it, holy smokes.

Secretary MONIZ. Mr. Chairman, I think, to me that is exactly the kind of big thing we would like to do in Mission Innovation.

And by the way, I think I can say that when Bill Gates uses a prime example, that is the one he uses.

Senator ALEXANDER. Senator Feinstein.

WATER DESALINATION

Senator FEINSTEIN. Thanks very much, Mr. Chairman. I have four questions, but the first one is kind of interesting.

I am a big believer in desal. I would like to see it go ahead. There are 27 proposals for the coast of California. I saw where you have a proposal for $45,100,000 for one of these hubs on desal. So I thought, well, is this to develop a third-stage membrane to improve the reverse osmosis process, and I took a look at the budget.

Mr. Secretary, let me tell you what this says: The Energy-Water Nexus Crosscutting Initiative, which draws on ideas—this is under this section—presented in DOE's report "The Water-Energy Nexus Challenges and Opportunities," is an integrated set of cross program initiatives that builds and deploys on a DOE mission critical data modeling and analysis platform to improve understanding and informed decisionmaking.

It goes on like that. I come to the end, I mean, I do not understand a single word in this. And yet, at least my approval has to go on this.

Why does your staff write budgets like this?

Secretary MONIZ. I will have to ask them.

[Laughter.]

Secretary MONIZ. If I could say it in English, $25 million of it will be the desal hub, looking at novel technologies. We will be looking at wastewater utilization, at the issues of how one moves water over large distances, all of which, of course, are quite relevant to California, for example.

Senator FEINSTEIN. Yes, but stop. I understand the big problem is that the energy coefficient is not positive, ergo the need for a better membrane, reverse osmosis membrane. So the needed research is to come up with what is called a third-stage membrane. So I wanted to see if this is it. But nowhere on page 62 is there any specific information as to what would be funded in this desal hub.

So I am sure not going to vote for it until I know what it is going to do, because I know what the need is for the third-stage membrane.

Secretary MONIZ. We will send to you a white paper.

Senator FEINSTEIN. Thank you. Well, that I can understand.

Secretary MONIZ. Right.

NATIONAL IGNITION FACILITY

Senator FEINSTEIN. Let me talk about the National Ignition Facility. It was supposed to have achieved limited controlled fusion burn, also called ignition, in 2012. Now I am told it will be as long as 10 years before ignition will be achieved, if ever.

The question is, what is the present status of the ignition effort? The last time I was there, they were not going for ignition. They were going for other things.

Can you share your view of the likelihood of NIF (National Ignition Facility) ever achieving ignition?

Secretary MONIZ. So I think it is important as a prologue to say that there is a lot of work, critical work, frankly, most of the stockpile stewardship work, without ignition, has made major contributions, especially in exploring extreme pressure regimes for weapons.

And also, the other piece of good news is last year there were a record number of shots, I think 350, if I recall correctly.

But on ignition, that has proved very elusive. They are still looking at different designs of targets to try to get there. I have to be honest. I cannot sit here and in any sense guarantee that it will reach ignition. I can say that it has provided extremely useful and important data for the stockpile stewardship program.

Senator FEINSTEIN. As you know, this is a very expensive program. If it is not going to reach its goal, which I understand it may never be able to produce fusion——

Secretary MONIZ. As I said, I certainly would not guarantee—yes, ignition or fusion.

However, frankly, I think it should have been phrased differently—I do not mean by you; I mean by them—because the real goal, the key goal, was exploring extreme regimes of pressure and temperature of relevance to nuclear weapons, and that has been done.

Senator FEINSTEIN. Well, I was here when Pete Domenici was on the committee and opposed this. We voted for it. And here we are 10 years-plus later, and it is not there.

Now here is another one.

I am sorry, may I take a couple minutes?

Senator ALEXANDER. Sure.

INTERNATIONAL THERMONUCLEAR EXPERIMENTAL REACTOR

Senator FEINSTEIN. ITER. If the United States remains a partner, the ITER project would require a yearly appropriation soon of between $250 million and $400 million. It is my understanding that such a funding level would make ITER the single most expensive Office of Science project on a yearly basis. Such a funding requirement would negatively impact our ability to invest in new or upgraded scientific facilities such as the light sources.

Today, in the fiscal year 2017 budget request, fusion energy science is the lowest priority of science programs. It was cut by 9 percent while other programs went up from 3 percent to 7 percent.

So the fiscal year 2016 bill requires you to make a recommendation to Congress by May 6, 2016, on whether the United States should remain a partner in the ITER project or withdraw. What is your current thinking?

Secretary MONIZ. Senator Feinstein, first of all, let me just note that while the total budget went down in fusion, the ITER request is up slightly, I think $10 million, at least provisionally until we make the May report. But a big part—I can say this now that I

am no longer recused. A big part of that is the elimination of the MIT program in that budget.

With regard to ITER, we will have a report in April that will be a key piece of information for the May report. I would say for sure that the management has really significantly I think been upgraded with Mr. Bigot as the director general.

But we have to see in April what the project review information is. Then we will get back to Congress in early May.

Senator FEINSTEIN. Well, this is an international program. I do not know why we need to participate, candidly. If we continue to do so, the costs are huge. I mean, I am really a doubting Thomasina there.

LOAN GUARANTEE PROGRAM

Let me ask you another one, and that is loan guarantee program number two. There is already $4 billion in loan authority tied to uranium enrichment. $2 billion of the enrichment loan authority is tied to the conditional loan guarantee with Areva, a French state-owned company. This conditional loan guarantee was made in 2010. In May, it will be 6 years.

To my staff's knowledge, and therefore, my knowledge, there has been no tangible action related to the Areva conditional loan in years.

The other $2 billion in uranium enrichment loan authority was previously widely viewed as tied to USEC, and USEC has gone through bankruptcy, and the department just closed the project in Ohio.

So question: Why not reclassify the existing $4 billion uranium enrichment loan authority for fossil and renewable energy rather than seek new loan authority?

Secretary MONIZ. Well, we would similarly need the authority of Congress to do that.

Senator FEINSTEIN. Is that your proposal?

Secretary MONIZ. No, our proposal was $4 billion of additional authority, but if one chose instead to try to relabel it—as you said, that is for fossil efficiency and renewables. The nuclear loan program does have considerable amount of remaining authority, but we do not have the authority to transfer that to renewables.

Senator FEINSTEIN. Could the chairman and I and you, could we sit down and discuss this?

Secretary MONIZ. Sure, I would be delighted.

Senator FEINSTEIN. Maybe at the end of the discussion, at least I will know exactly the pros and cons of this.

Secretary MONIZ. Yes. Yes.

Senator FEINSTEIN. Okay. We have yet to receive a proposal from the department as to how much crude oil the SPRO intends to sell in fiscal year 2017, for the purpose of SPRO modernization. When can we expect to see a budget amendment from the department proposing that sale?

Secretary MONIZ. We are working to get that as soon as possible. The report is due in May, and we would like to try to accelerate that. We are working hard at that. I cannot give you a fixed date, but we have every motivation to try to get that to you as soon as we can.

Senator FEINSTEIN. Yes, thank you.

Secretary MONIZ. And we would like to start that program in fiscal year 2017.

Senator FEINSTEIN. Okay.

What do you think the chances are that we could—are we wed to that loan guarantee of Areva? Nothing has happened. It is 6 years, no tangible action.

Secretary MONIZ. I cannot discuss an individual application, however——

Senator FEINSTEIN. It was for USEC.

Secretary MONIZ [continuing]. I would just note that right now the whole uranium enrichment market is, if anything, oversupplied, and I think there is not a strong commercial motivation right now.

Senator FEINSTEIN. Okay, so what you are saying is that we really do not need it, so I assume you will take some action to change that.

Secretary MONIZ. I will consult with the program in terms of what action we take.

Senator FEINSTEIN. Thank you.

Thanks, Mr. Chairman.

Senator ALEXANDER. Do you have any other questions?

Senator FEINSTEIN. No, that is fine.

Senator ALEXANDER. Thanks, Mr. Secretary. It seems to me that Senator Feinstein has raised some issues we need to pursue.

INTERNATIONAL THERMONUCLEAR EXPERIMENTAL REACTOR

The ITER decision, it may be a nice thing to participate in, but we have real, pressing budget priorities here that we are going to have a hard time meeting, and we are counting on you with your background to help us make a correct decision on that, not just whether it is something that might be nice, but whether it is more important than the other options that we have to fund.

URANIUM ENRICHMENT DECONTAMINATION AND DECOMMISSIONING FUND

Number two, that $674 million is a problem. You know that. I know that. If you really think you want to use some of that $1.8 billion to help pay for it, then we need to get resolved the authority to do that.

Secretary MONIZ. So we will follow your suggestion about presenting some language.

MIXED OXIDE FUEL FABRICATION FACILITY

Senator ALEXANDER. And three, Senator Feinstein and I both want to continue a deliberate focus on MOX. We have discussed it in-depth before. When we dealt with the uranium facility, we had a red team to take a look at it. It came back with a recommendation. We adopted the recommendation. We have a cap of $6.5 billion and a date of 2025, and we have a path toward getting there, so we have resolved that.

The MOX is a different kind of problem. You have recommended that we switch from one way of dealing with the plutonium to an-

other. Your red team, that separate red team, told us basically that the cost might save us $500 billion a year.

Secretary MONIZ. $500 million.

Senator ALEXANDER. $500 million a year. I have to get my b's and m's right. $500 million a year.

Secretary MONIZ. It may be $600 million or $700 million, actually.

Senator ALEXANDER. So you are saying it could be $500 million to $700 million or $800 million a year for many years that might be the difference in spending.

So we have an obligation to the taxpayer to address that question and to do it promptly. I think you are correct to try to address it in the budget, and we need to take sufficient time to deal with it.

We know that requires a discussion with Russia. We know that we have to have a place to put the plutonium. We also know that there is a place to put the plutonium today, as soon as WIPP opens, which you would expect to be later this year. Is that correct?

Secretary MONIZ. Initial operations.

Senator ALEXANDER. Initial operations. There is a backlog of material to go to WIPP, and the South Carolina plutonium would have to get in line. But my understanding is that all 13 tons of plutonium that are now in South Carolina could go into the WIPP facility once it reopens without changing the law and adding new land. Is that correct?

Secretary MONIZ. Correct.

Senator ALEXANDER. But that still leaves open the question of what to do about the entire 34 tons that we are obligated to deal with and what about an agreement with Russia.

So Senator Graham and others are right to want an answer to that. The taxpayers are going to want to know from us why we are spending $500 million to $800 million a year on something where we could have saved that much money, if that is true, and when we have very pressing other needs, for example, cleaning up uranium enrichment, clean energy investment, the Office of Science investments.

So I will be working with Senator Feinstein and Senator Graham and others who are interested to set up a scheduled discussion to permit us to deal with the MOX issue on a deliberate basis.

Secretary MONIZ. Great. I am certainly happy to work with you on that.

ADDITIONAL COMMITTEE QUESTIONS

Senator ALEXANDER. Well, the hearing record will remain open for 10 days. Members may submit additional information or questions for the record within that time, if they would like. The subcommittee requests all responses to questions for the record to be provided within 30 days of receipt.

[The following questions were not asked at the hearing, but were submitted to the Department for response subsequent to the hearing:]

QUESTIONS SUBMITTED TO DR. ERNEST J. MONIZ

QUESTIONS SUBMITTED BY SENATOR THAD COCHRAN

Question. The fiscal year 2016 Energy and Water Appropriations bill provided $62,100,000 for the Advanced Fuels program to continue implementation of accident tolerant fuels development. It is my understanding that implementing the second phase of DOE's proposed fuel Development plan, which follows the completion of Phase 1 this fall, would require an increase in funding of approximately $15 million. The Department's budget request for fiscal year 2017 reduces funding for the ATF program by $3 million.

Can you please explain to the Committee the why Department has not requested the necessary funds to this program?

Answer. The development of advanced light water reactor fuel with enhanced accident tolerance continues to be a high priority for the Office of Nuclear Energy. The Department is working toward the goal set by Congress after the Fukushima accident to install test fuel rods or an assembly in a commercial power reactor by 2022. The fiscal year 2017 Budget Request for the Fuel Cycle R&D Advanced Fuels subprogram balances work toward this near term goal with research on longer-term Advanced Light Water Reactor (LWR) fuel concepts, long term transmutation fuel concepts, cross cutting infrastructure development, and modeling and simulation support.

Phase 2 of the Accident Tolerant Fuel (ATF) program is planned to begin in fiscal year 2017 and will be a 6-year effort to develop and qualify a small number of the most promising concepts. The number of concepts under investigation in fiscal year 2017 and beyond will drop sharply relative to the number of concepts that underwent preliminary investigations in Phase 1 due to down selecting to the most promising concepts from Phase 1.

Question. Congress has been supportive of the Administration's efforts to promote the use of safe and clean nuclear energy, including Reactor Concepts Research, Development, and Demonstration (RD&D) program. The Committee and the Congress have continued to encourage the Department to support the development and evaluation of nuclear power technologies that are safer, create less waste, less costly, and more proliferation-resistant. It is my understanding that the Department recently awarded two contracts through the Advanced Reactor Concepts program.

Please detail for the members of this Subcommittee the projected cost of delivered power for each of these applications, in addition to the estimated amount and type of waste each applicant's reactor would produce.

Answer. The two awards issued by the Advanced Reactor Technologies (ART) program are at the early conceptual design phase, which limits the quantitative information available to accurately project costs of delivered power and waste generation. At this stage of development, one awardee's concept is indicating the potential for the costs of delivered power to be lower cost than conventional light water reactor technology based on innovative design features and, due to a liquid fuel form, it is expected to have a lower volume of waste than conventional light water reactor technology. The other awardee's concept draws heavily on NE's R&D program and is estimating higher efficiency electricity production that could contribute to a lower cost of power than conventional light water reactor technology, as well as a significant reduction in waste generation through the use of high burn-up fuel.

QUESTIONS SUBMITTED BY SENATOR MITCH MCCONNELL

Question. What are the Department's plans to continue the ongoing and vital environmental cleanup operations at the Paducah site following July 2017, when the current, 3-year deactivation contract is scheduled to end?

Answer. The Department has an active procurement for a follow-on contractor at the Paducah Site that will provide continuity for the environmental cleanup operations and facility deactivation. The draft Request for Proposal has been made available to the industry. We also held an Industry Day from May 17–19, 2016. The Department is actively executing a plan that will allow for a seamless transition to the next contractor.

Question. I have concerns about the lack of commitment for ongoing clean coal research in the President's fiscal year 2017 budget. For example, the President's budget proposes to reprogram $240 million out of the Fossil Energy Research and Development budget, which is currently committed to a clean coal project in its final stages of development. Congress explicitly appropriated funding for clean coal projects, like this one. Do you intend to continue funding this project to bring it to completion in the current fiscal year?

Answer. Following an extensive and careful review, DOE's Office of Fossil Energy (FE) determined that advancing any additional Federal funds would not substantively increase the likelihood of Texas Clean Energy Project (TCEP) or Hydrogen Energy California Project (HECA) success, and that no additional taxpayer funds should be put towards these projects. A recent DOE Office of Inspector General audit report reached a similar conclusion to FE's in regards to not advancing any additional Federal funds to the TCEP project. DOE previously suspended HECA project funding in January 2015 for failing to make sufficient progress—most notably, not securing an approved site for the sequestration of the site's carbon dioxide after more than 6 years of effort. President's proposed fiscal year 2017 budget would use around $211 million from TCEP project funds and around $29 million from HECA project funds to secure the required $240 million for fiscal year 2017 FE R&D budget.

QUESTIONS SUBMITTED BY SENATOR RICHARD C. SHELBY

Question. Domestic manufacturers of residential water heaters in the State of Alabama have recently expressed concern about the lack of a final rule from the Department of Energy (DOE) relating to new efficiency standards. While interim guidance and a subsequent rating became effective on July 13, 2015, the DOE has not yet published the final conversion factor associated with this rule.

It is my understanding that DOE is continuing to work on this matter and that this conversion factor allows manufacturers to correctly rate existing products using the newly-established universal efficiency descriptor, or UEF, without incurring the expense of physically retesting individual and multiple products. Moreover, this new metric also allows consumers to more effectively compare a broad selection of water heating products and their efficiency to ensure the most appropriate fit for their needs. Such a model was outlined by Congress in the American Energy Manufacturing Technical Corrections Act (AEMTCA), on December 18, 2012, which also directed the DOE to promulgate implementing regulations.

Secretary Moniz, does the DOE have a timeframe in which a final rule and conversion factor will be released? Secondly, can I have your assurance that an appropriate period of time, preferably at least 1 year to phase in all existing models, will be incorporated in any final regulation to avoid disruption in the marketplace and compliance under the new UEF?

Answer. The development of a mathematical conversion to a new efficiency metric from a prior metric is a complex task that must be given careful consideration in order to denominate standards and ratings in the new metric that are equivalent to those under the previous metric. This process requires a large amount of product testing and analysis, and an opportunity for stakeholders to provide comments, all of which can be time-intensive activities. The Department published a notice of proposed rulemaking (NOPR) on April 14, 2015 that proposed a mathematical conversion and accompanying standards denominated in the new efficiency metric. 80 FR 20116. The Department also convened a public meeting to discuss its proposed conversions as set forth in the NOPR, a meeting which generated significant stakeholder comment. After the publication of that NOPR, the industry trade association—the Air-conditioning, Heating, and Refrigeration Institute (AHRI)—provided additional test data to DOE to be used in the development of the mathematical conversion factor. During this period, DOE also conducted further testing of its own. Accordingly, DOE undertook a re-analysis to incorporate such additional data and is currently developing a supplemental NOPR that proposes a mathematical conversion factor and accompanying standards based on the expanded dataset. The Department plans to publish the supplemental NOPR in early summer and a final rule later this year.

EPCA contains requirements to ensure that manufacturers' products that currently comply with Federal standards remain compliant after the conversion factor is issued. Specifically, EPCA requires that a covered water heater must be considered to comply with the final rule and with any revised labeling requirements established by the Federal Trade Commission to carry out the final rule if the covered water heater was manufactured prior to the effective date of the final rule and complied with the efficiency standards and labeling requirements in effect prior to the final rule (42 U.S.C. 6295(e)(5)(K)). The Department plans to adopt an approach that would determine compliance consistent with the requirements of EPCA.

QUESTIONS SUBMITTED BY SENATOR LINDSEY GRAHAM

Question. Secretary Moniz—On March 3, 2016, in response to a question by Senator Cassidy about the contractor's commitment to the MOX project you said: "If I—may—if I may say precisely what the discussion was, the definition of fixed cost that came back was fixed cost unless we go over by a lot, and then you [DOE] pay. It's [the] truth." Later, on March 9, 2016, in response to my question during the Senate Appropriations Subcommittee on Energy and Water hearing, you commented on the contractor's commitment to a plan for fixed-cost pricing: "You and I discussed that with them at some point and as we know they came back in an unresponsive fashion."

It is my understanding that the contractor made you an offer on February 20, 2014 to provide fixed cost pricing, in exchange for DOE's taking responsibility for changes to project scope or design that are ordered by DOE. Are you aware of a last-best offer made to DOE by the MOX contractor—in writing—on February 20, 2014? Are you also aware, to quote the offer, that it would "allow [the contractor] to move as much as 100 percent of the scope into the fixed price 'Bucket' in the future? Finally, did DOE ever respond to the contractor's final offer, on February 20, 2014, in writing?

Answer. The Department is aware of the proposal that the MOX contractor sent to the Department in February 2014, but considered it unresponsive as it still contained exclusions and would at best cover only 75 percent of the remaining costs. This risk allocation is particularly important given the nature and extent of the remaining work to finish construction, startup, and operations of the MOX facility leaving approximately $10 billion subject to cost reimbursement, with no cost cap and potentially several billion in cost overruns as MOX Services has demonstrated on the work they are currently performing. In short this proposal did not meaningfully reduce risk to the Department since it moved additional scope into the fixed price category only after achieving milestones or triggers, many of which would not occur until the end of the project. We verbally communicated our rejection of it during discussions with the MOX contractor.

Question. Secretary Moniz—On March 1, 2016, during the House Appropriations Subcommittee on Energy and Water hearing, you stated that an analysis conducted by High Bridge Associates on the potential criticality problems at WIPP that may arise from packing 47 metric tons of plutonium at the facility, along with the transuranic waste that would go to WIPP, was evaluated by the Sandia National Laboratory. Can you provide me, along with the appropriate congressional committees, with a copy of the Sandia National Laboratory's analysis?

Answer. Yes, this analysis will be made available. A copy is provided for the record.

Question. Secretary Moniz—On February, 23, 2016 and March 1, 2016, respectively, you and NNSA Administrator Klotz hinted at the potential need for a secondary repository, other than WIPP, to accommodate the total 47 metric tons of plutonium. At the Senate Armed Services Subcommittee on Strategic Forces hearing on February 23, 2016, Administrator Klotz responded with the following statement regarding my question about where DOE would send the diluted Savannah River and MOX-bound Plutonium: "We would send it to either WIPP or a repository like WIPP." Similarly, on March 1, 2016, during the House Appropriations Subcommittee on Energy and Water hearing, you stated: "We're not saying that necessarily all of that [Savannah River and otherwise MOX-bound plutonium] goes to New Mexico." Given these statements, has the Administration identified potential states and sites for another repository? Where are these sites located? What work has been done to determine the viability to use alternate disposal sites?

Answer. In response to the Joint Explanatory Statement accompanying S. 1356, the National Defense Authorization Act for fiscal year 2016, the Department prepared a report that provides additional information relevant to these questions. The Department submitted the report to the Senate Armed Services Committee in May 2016.

Question. Secretary Moniz—In all of your recent testimony to Congress regarding the Plutonium Management and Disposition Agreement of 2000 (PMDA), you have referred to "informal discussions" with both the Russian government and with ROSATOM, the Russian-owned nuclear power company and government agency responsible for implementing the PMDA. It is acknowledged that, in order to uphold the PMDA, the abandonment of MOX and a move towards the "Dilute and Dispose" alternative would require prior approval by the Russians. However, there is much debate over whether the Russians would (1) be willing to come to the negotiating table and (2) want something in return. If Russia does not agree to move forward

with the Dilute and Dispose option, will the United States still proceed with this alternative disposal method?

Answer. The PMDA (paragraph 1 of Article III) clearly provides a path for the Parties to agree on methods of disposition that do not entail irradiation as fuel in reactors ("any other methods that may be agreed by the Parties in writing"). We expect that Russia will work with us as we pursue a different method to achieve what is a mutually beneficial goal, just as the U.S. supported Russia's reassessment of its plutonium disposition strategy a few years ago.

The U.S. Government has had an ongoing dialogue with Russian officials regarding the multiple analyses of plutonium disposition alternatives. The U.S. Government has requested formal consultations with Russia regarding the dilute and dispose method under the provisions of the PMDA. It is premature to discuss concerns with this approach before formal consultations begin.

Question. Secretary Moniz, while I disagree with your plan for cancelling the MOX project, I know you share my feeling that the Savannah River Site is a national asset in many areas, including national security and innovate technology. Please give me your vision for the future of the site over the next 5 years, and the next 10 years?

Answer. In support of the DOE Strategic Plan, the Savannah River Site (SRS) is in the process of developing a joint Office of Environmental Management (EM)/National Nuclear Security Administration (NNSA) site-wide Strategic Plan addressing focus areas of Nuclear Security, Environmental Stewardship and Science and Energy. Completion of the SRS Strategic Plan is expected by the end of calendar year 2016. The focus areas of the plan include high level waste cleanup (including commissioning and startup of the Salt Waste Processing Facility); management and disposition of nuclear materials; continued optimization of the Savannah River National Laboratory in support of EM technology needs; and national security (e.g., tritium requirements).

QUESTIONS SUBMITTED BY SENATOR JAMES LANKFORD

Question. The Department of Energy closed the public comment period for the study on exporting 12–20 bcf/day of LNG in February; this study found a "marginally positive" impact of higher LNG export volumes. When will the Department finish responding to public comments on the study?

Answer. The 2014 EIA LNG Export Study and DOE-commissioned 2015 LNG Export Study (together, "Studies") examined the effects of LNG exports from 12 to 20 billion cubic feet of natural gas per day (Bcf/day). The Studies and all comments were entered into the legal proceedings of all pending non-free trade agreement (FTA) LNG export applications. The Department will summarize issues raised in the public comments on the Studies and respond to these issues in the next final non-FTA LNG export order that would cause cumulative approved non-FTA LNG exports to exceed 12 Bcf/d.

Question. The latest DOE approval brought total authorized exports to 11.80 bcf/day, making it likely that the next application before the Department will breach the 12 bcf/day volume. When will DOE be able to act on applications that would bring the total above 12 bcf/day?

Answer. The Department has established a pattern of issuing final decisions on applications to export LNG to non-FTA countries promptly after FERC has issued an order denying rehearing requests on projects in which an environmental review was required and in which DOE was a cooperating agency. In these cases, DOE had begun work on the public interest review of these export applications while the environmental review of the project at FERC was ongoing. Accordingly, DOE has begun conducting public interest reviews of applications linked to proceedings at FERC that are currently pending a FERC final order on rehearing. These include applications by Lake Charles Exports, LLC and Jordan Cove Energy Project, L.P. In keeping with past practice, DOE expects to issue a final order promptly after FERC issues a final order on rehearing for either the Lake Charles or Jordan Cove liquefaction projects. If DOE authorizes the export volumes requested in one of these two applications, the total volume of approved, long-term LNG export authorizations to non-FTA countries would exceed 12 Bcf/d.

Question. DOE provides significant funding in the form of grants, particularly out of the Energy Efficiency and Renewable Energy account. This year DOE is asking for a 104 percent increase in spending in this area, bringing the EERE budget to $4.233 billion for fiscal year 2017. Congress and the Department have proper controls in place to ensure that the goals of these programs are being met and funds are not being used on projects that do not have a Federal interest.

What controls does DOE have in place to ensure that this money is spent on research that would not be done at universities or by the private sector without Federal involvement and investment?

Answer. Applied research areas are defined in both the DOE and EERE strategic plans, as well as the multi-year plans maintained by EERE technology program offices. EERE regularly hosts workshops and publishes Requests for Information to help further define and regularly update these plans. All DOE funding for university and private sector execution are competitively awarded through Funding Opportunity Announcements (FOAs). Elements of the process used for these awards include:

—Deputy Assistant Secretaries approve requirements for FOAs. Their formal approval review assesses every project relative to five core questions:
  —Impact—Is this a high-impact problem? If successfully developed it should make material contributions toward national energy goals.
  —Additionality—Will EERE funding make a large difference relative to existing funding from other sources, including the private sector?
  —Openness—Are we focusing on the broad problem we are trying to solve and open to new ideas, approaches, and performers?
  —Enduring Economic Impact—How will EERE funding result in enduring economic impact for the United States?
  —Proper Role of Government—Why is this investment a necessary, proper, and unique role of government rather than something best left to the private sector to address?
—Independent experts score proposals during the pre-award merit review process prior to selection and award.
—Statements of Project Objectives establish milestones and success metrics for each project. Progress and expenditures are managed through EERE's Active Project Management program.
—A peer review process provides objective progress reviews throughout a project's lifecycle and can inform program decisions going forward. EERE engages experts, including experts from industry and from other Federal agencies, to review our project portfolios for effectiveness, currency and impact.

Question. Does the Department have guidelines and metrics to evaluate the performance of grants once they are awarded? What are these metrics?

Answer. Yes, the Department has put in place the following processes to establish metrics and then evaluate the performance of financial assistance awards: Statements of Project Objectives establish performance milestones throughout the execution phase of projects. Those milestones serve as the project metrics for performance monitoring and management. Progress and expenditures are managed through EERE's Active Project Management program. Project managers assess performance against milestones, as well as cost and schedule, quarterly.

—Project managers are required to perform quarterly, written projects assessments, an annual site visit for applicable projects and at least two face-to-face meetings with performers each year.
—Invoice approval policy requires project manager confirmation of reasonableness and activity completion and separate contracting officer verification of cost allowability. Contracting officers perform final invoice approval.

Annual peer reviews provide objective performance reviews by experts not directly involved in the project's management. EERE engages experts, including those from industry and from other Federal agencies, to review our project portfolios for effectiveness, currency and impact.

Question. Does the Department have robust cross-agency coordination to ensure that another agency is not undertaking the same research, such as NSF, EPA, etc.?

Answer. Yes, EERE has very robust cross-agency coordination through a number of activities including Memorandums of Understanding (MOU), joint merit reviews and other activities performed as part of long-range program planning and annual project activities.

EERE engages with experts during development of our Multi-Year Program Plans and technology roadmaps to ensure we are only addressing the most pressing issues that require public investment. EERE engages industry and government experts prior to publication of Funding Opportunity Announcements through workshops, RFIs and pre-funding merit reviews. EERE does broad outreach to ensure that we access the most diverse set of experts.

EERE has also partnered with the Department of Interior on an MOU for hydropower, with the Department of Commerce for manufacturing, with the Department of Agriculture on biomass research, and with the Federal Highway Administration for the Smart City Challenge, as well as many other collaborative relationships

across government and industry. Specific examples of inter-agency collaboration include:

EERE launched the Manufacturing Innovation through Energy and Commerce (MITEC) pilot in four states—Georgia, Michigan, Ohio, and Virginia. The program will provide small businesses access to the advanced tools, technology transfer expertise, and research capabilities of the Department of Energy's (DOE) national laboratories and to the technical assistance and business development resources of the Department of Commerce's Hollings Manufacturing Extension Partnership (MEP), which is a program within the National Institute of Standards and Technology (NIST). This new interagency partnership strives to broaden the commercial impact of the DOE's national labs and equip American entrepreneurs and businesses with the resources and support they need to develop new products, commercialize clean energy technologies and expand into global markets.

—EERE and DOE partnered with the Department of Transportation (DOT) through an MOU on Smart Transportation Systems and Alternative Fuel Technologies to accelerate research, development, demonstration and deployment of innovative smart transportation systems and alternative fuel technologies.

—EERE collaborated with the U.S. Environmental Protection Agency (EPA) and SAE International to launch Green Racing, which uses motorsport competition to develop and test cleaner fuels and more efficient vehicle technologies that manufacturers can transfer to consumer vehicles.

—EERE's battery program collaborates extensively with the Interagency Advanced Power Group, EPA, NASA, the National Science Foundation, DOT and DoD.

Question. Nuclear energy could become more critical in our nation's energy mix should regulations like the EPA's 111b and 111d be upheld by the courts. Yet, only a handful of new reactors have been licensed by the Nuclear Regulatory Commission since 1979. What is causing the lack of new, approved nuclear energy projects?

Answer. There are several factors that have contributed to the lack of new nuclear project starts in the U.S. over the past few decades. One issue is that relative to other types of generation, nuclear plants have high capital costs (but they tend to have low O&M and fuel costs). The upfront costs of nuclear are high in part because the cost of commodities (such as steel and concrete) has increased, as has labor, and large, specialized nuclear components (such as steam generators and reactor coolant pumps). In addition, electricity prices in many regions are low, driven largely by low natural gas prices. U.S. utility decisions to add or replace electric generation capacity are based on these economics, and with the capital cost of building a natural gas plant significantly less than that of a similarly sized nuclear plant and with no projected rise in gas prices in the near future, nuclear power in some cases does not appear to be competitive to the domestic utility decision makers. This picture, however, can vary substantially by region: the competitiveness of nuclear depends on local factors including fuel and power prices, market structures, and policies.

Question. Each new reactor is estimated to cost between $5 billion to $7 billion. What is behind this considerable construction cost? What steps could be taken to lower this cost and bring more nuclear energy online?

Answer. Nuclear new build projects have become very expensive largely due to strict construction standards, increasing nuclear safety regulations, and high labor costs here in the U.S. and abroad. Safety features necessary for the current generation of reactors, such as massive containment domes and multiply redundant cooling and backup systems, make up a significant portion of such costs. The Department has taken steps to address the high cost of nuclear builds by supporting new designs that: (1) are more passively safe than designs in the existing fleet and require fewer redundant safety systems; (2) are constructed with modular components that are manufactured in factory environments and assembled at the construction site; and (3) are standardized (contrasted with the one-off designs of the past that have unique components and requirements) and are expected to result in consistency in construction, operation and regulation. The Department supported the development of two domestic Generation III+ large light water reactor (LWR) designs under the Nuclear Power 2010 program, and, as a result, four Westinghouse AP1000 reactors are currently being built in the Southeastern U.S. The Department is currently supporting the development of standardized, passively safe small modular reactors (SMRs), which could address many of the cost issues currently impacting the industry. SMRs are about a third or less of the size of the large LWRs; all components can be fabricated in a factory environment, which is expected to improve quality and reduce construction costs; and are sized to replace many of the aging fossil power generation plants that will be retired over the next decade. The Department expects the first SMR project to be constructed in the 2025 timeframe and is currently con-

sidering program options to continue to accelerate the commercialization of SMRs in the U.S.

QUESTIONS SUBMITTED BY SENATOR PATTY MURRAY

Question. Secretary Moniz, I remain concerned with the pattern I am seeing within the budget requests for Richland Operations (RL) at Hanford. The Administration made a decision to focus cleanup on the reactor areas and the 300 Area closest to the Columbia River and City of Richland, and you have made great strides with this cleanup under the 2015 Vision. However, I fear the fiscal year 2017 budget request, as well as last year's budget request, is leaving key projects in the 2015 Vision unfinished. Specifically, the 324 Building and the 618–10 burial ground projects have not been funded by the Administration 2 years in a row. While I recognize that we are operating in times of constrained budgets, I ask that you provide me a detailed explanation of DOE's rationale for advancing other work within RL's responsibilities instead of completing the 2015 Vision.

Answer. Richland's budget request supports continued cleanup progress at the Hanford Site, including the River Corridor. The Richland budget request is designed to maintain safe base operations; maintain surplus nuclear facilities; continue groundwater remediation; continue Plutonium Finishing Plant demolition, capping and demobilization; enable progress on River Corridor cleanup activities; and support K West Basin sludge removal progress in alignment with Tri-Party Agreement milestones. At this level, Richland will also fund limited work scope associated with infrastructure upgrades and site-wide essential services for Richland and the Office of River Protection.

Further, the fiscal year 2016 Energy and Water Development and Related Agencies Appropriations Act directed the Department to provide to Congress a report on its 5-year plan for the River Corridor Closure Project that explains any deviations from previously made agreements. This report is currently in development, and is anticipated to be submitted to Congress later this year.

Question. Similarly, I am concerned that with the 2015 Vision nearing completion, DOE will in turn slow cleanup work at RL and delay the projects RL is responsible for on the Central Plateau. Even with completion of work along the Columbia River, RL has much work to do on the Central Plateau, including remediation and demolition of 1,000 waste sites, 500 facilities, and contaminated groundwater. Many of these are highly contaminated with radioactive and chemical waste, posing a risk to the public, environment, and workforce.

Secretary Moniz, I strongly encourage DOE to develop and begin executing the next Vision for RL to address the critical Central Plateau cleanup work. Furthermore, I ask that you provide an outline of the Central Plateau cleanup plans covering at least the next 5 years and the funding needs to advance this work.

Answer. As directed by Congress in the fiscal year 2016 Energy and Water Development and Related Agencies Appropriations Act the Department is currently working on a report that will provide a 5-year plan for the River Corridor Closure Project that explains any deviations from previously made agreements. This report is anticipated to be submitted to Congress later this year. The Department is prepared to address additional questions regarding future cleanup activities, including Hanford's central plateau work scope, through a detailed briefing to you or members of your staff.

Question. Secretary Moniz, I appreciate the commitment DOE has shown to protecting the Hanford workforce and addressing the risks associated with chemical vapors in the tank farms. We owe the men and women who work at Hanford the highest safety standards.

In February 2015, DOE released an implementation plan for the "Hanford Tank Vapor Assessment Report" (Report) which is split into two phases to address the 47 recommendations within the Report. It is my understanding that $61 million was provided in fiscal years 2015 and 2016 funding and that the fiscal year 2017 budget request includes $33 million to support the implementation plan.

Secretary Moniz, I commend the actions DOE has already taken. However, I understand the workforce remains on supplied-air respirators and to date no new personal protective equipment has been deployed for use by the workforce. Can you please provide status report on the implementation plan and what progress DOE has made to date? Has Phase 1 been completed? And when does DOE expect to begin Phase 2? Finally, I ask that you continue to make funding the implementation plan a priority as you develop the fiscal year 2018 budget request.

Answer. In February 2015, a Vapors Implementation Plan was issued by Washington River Protection Solutions LLC to address the vapor issues in the Hanford

tank farms. DOE's Office of River Protection expects Phase 1 of the plan to be completed by the end of fiscal year 2016. Presently, the Office of River Protection and, Washington River Protection Solutions, are testing application of an integrated suite of advanced monitoring and detection technology and software to the Hanford tank farm area. These technologies include infrared cameras, portable area sensors equipped with multiple chemical sensors, in-stack and area vapor detection equipment and portable meteorological stations. Because these technologies need to be tailored to the hazards encountered in the tank farm area, bench scale testing has been completed and a pilot scale test will be conducted in the A and AP Tank Farms this summer. Full scale deployment with the appropriate adaptation will occur after the pilot.

Bench scale testing can be described as testing conducted under laboratory conditions, using simulated vapors, while pilot scale testing will be integrated testing conducted at the A and AP tank farms to determine the effectiveness in the natural environment. While some of these technologies have been used in other industries, they are used in configurations that may be different from those anticipated to be needed in the tank farm environment; hence, testing is necessary to confirm their effectiveness for this application.

Question. The Texas Clean Energy Project (TCEP), funded under the Clean Coal Power Initiative (CCPI), is a first-of-a-kind commercial power plant that will employ innovative technology to capture 90 percent of the plant's carbon emissions. I understand that several contracts and agreements, including a key engineering, procurement, and construction contract, have been finalized by TCEP since December 2015 and that TCEP could reach financial close this year. To achieve this, Summit Power Group of Seattle, Washington, the developer of TCEP, recently requested $11 million in obligated funding under CCPI program. This previously awarded CCPI funding would be matched with at least $4 million in private cost-share contributions. This request has been denied by the Department.

Secretary Moniz, while I recognize it has taken longer than planned for TCEP, like many projects in the CCPI program, to reach financial close and begin construction, I respectfully request that you reconsider this decision given TCEP's recent progress. Further, I ask that you provide a full explanation on the Department's initial decision to withhold funding this project.

Answer. Following an extensive and careful review, DOE's Office of Fossil Energy (FE) determined that advancing any additional Federal funds would not substantively increase the likelihood of Texas Clean Energy Project (TCEP) success, and that no additional taxpayer funds should be put towards the TCEP project. A recent DOE Office of Inspector General audit report reached a similar conclusion to FE's in regards to not advancing any additional Federal funds to the TCEP project. DOE recently extended the no-cost TCEP cooperative agreement through July 1, 2016, so project developers have additional time to secure alternative sources of financing.

Question. Switching gears to the Bonneville Power Administration (BPA). Throughout my career I have worked to ensure BPA maintains the flexibility it needs to provide reliable, low-cost power in the Pacific Northwest.

Congress explicitly gave BPA its own Federal authorities to carry out administrative and operational functions in a business-like manner consistent with sound business practices and Federal guidelines.

Secretary Moniz, I appreciate your work to date in respecting BPA's authority to set policies that support the Pacific Northwest and its ratepayers. However, as we move to the end of this Administration and a time of transition, I ask for your assurances that DOE will continue to recognize BPA's unique authorities.

Answer. The Department appreciates the unique role that BPA plays as a Federal electric utility working in a commercial energy market. The Department also recognizes that BPA carries out its commercial business primarily pursuant to Federal statutes specifically applicable to BPA. The Department recognizes that the Federal authorities in these statutes cover many administrative and operational functions, to be carried out using sound business principles.

The Department will continue to respect the Federal laws specifically applicable to BPA, and will assure that any necessary Secretarial delegations of authority or Department directives to the BPA Administrator remain consistent with these Federal authorities.

QUESTIONS SUBMITTED BY SENATOR JEANNE SHAHEEN

Question. I think that you will agree that the country is currently witnessing significant transformations in our electricity production. In New England, for example,

we are seeing a steady shift to natural-gas fired generation and more and more generation from renewable and demand resources. These changes have brought with it a large number of proposed projects to build and expand the region's upon current natural gas pipeline and electricity transmission infrastructure.

We have two projects in particular that require Federal siting: Northern Pass, a proposed electric transmission line, which requires a Presidential Permit from DOE since the line would cross the international border into Quebec; and the Kinder Morgan Northeast Energy Direct gas pipeline project that currently has an application pending with the Federal Energy Regulatory Commission (FERC).

Through the application process for both projects, I have regularly heard from many of my constituents in New Hampshire who are frustrated about the lack of information from DOE and FERC about the review process, and their belief that public input play only a minimal role in the review and approval process for energy infrastructure projects.

That's why I read with interest the recommendations in your agency's 2015 Quadrennial Energy Review (QER) that echoed the concerns of Granite Staters and called for more public participation in the siting and permitting process. Specifically, the QER recommends that the agency deploy initiatives that:

—prioritizes meaningful public engagement through coordination with state and local governments; and

—establishes regional and state partnerships to better engage impacted communities.

Can you discuss the importance of public engagement in the siting and permitting process for energy infrastructure projects, and what actions has DOE implemented, or will implement in the future, to meet the QER recommendations?

Answer. Public engagement is essential for the credibility of the siting and permitting process for energy infrastructure projects. The first installment of the Quadrennial Energy Review (QER), which focused on energy transmission, storage, and distribution infrastructure, identified early and robust stakeholder engagement as a recognized best practice that can reduce delays and improve projects. The QER found that Federal agencies, by conducting public outreach and engaging with diverse sets of stakeholders, can avoid, minimize, and mitigate issues that might delay a siting or permitting decision.

The Department is actively engaged in the implementation of recommendations from the QER related to the siting and permitting of energy infrastructure, which include:

—Prioritizing meaningful public engagement through consultation with Indian Tribes, coordination with state and local governments, and facilitation of non-Federal partnerships; and

—Establishing regional and state partnerships and co-locating dedicated cross-disciplinary energy infrastructure teams.

As a member of the Administration's Interagency Rapid Response Team for Transmission (RRTT), DOE works with eight interagency partners to improve the overall quality and timeliness of electric transmission infrastructure permitting, review, and consultation by the Federal Government on both Federal and non-Federal lands. The Administration created the RRTT in 2013, and following the QER's release, the RRTT has continued to apply a uniform approach to consultations with Tribal governments and to use Integrated Federal Planning to coordinate statutory permitting and review among Federal and state agencies. DOE also maintains an online dashboard listing the required permits; agency points of contact; milestones and due dates; and descriptions of progress for seven RRTT pilot projects.

RRTT initially focused on the selected pilot projects because, when constructed, they will help increase electric reliability, integrate new renewable energy into the grid, and save consumers money. The pilot projects are geographically diverse and cross through 12 states: Arizona, Colorado, Idaho, Minnesota, New Mexico, Nevada, Wyoming, Utah, New Jersey, Pennsylvania, Oregon, and Wisconsin. They were carefully selected from lists produced through American Recovery and Reinvestment Act-funded, independent, broad stakeholder processes led by the Western Electricity Coordinating Council in the Western Interconnection, and by the Eastern Interconnection States' Planning Council for the Eastern Interconnection.

The Department's Office of Electricity Delivery and Energy Reliability (OE), working in collaboration with interagency partners pursuant to Executive Order 13604 and the June 2013 Transmission Presidential Memorandum, sought public input on a draft Integrated Interagency Pre-Application (IIP) Process. The proposed IIP Process is intended to improve interagency and intergovernmental coordination focused on ensuring that project proponents develop and submit accurate and complete information early in the project planning process to facilitate efficient and timely environmental reviews and agency decisions. In February 2016, DOE published a Notice

of Proposed Rulemaking in the Federal Register (81 FR 5383) to amend its regulations for the timely coordination of Federal Authorizations for proposed interstate electric transmission facilities pursuant to Section 216(h) of the Federal Power Act. The proposed amendments are intended to improve the pre-application procedures and result in more efficient processing of applications. While the proposed IIP rule does not apply to electric transmission projects crossing the Nation's international borders with Canada and Mexico, DOE has and will continue to encourage potential applicants to engage in pre-application coordination activities with DOE, other agencies, and stakeholders.

DOE is also pursuing future actions to meet the QER's recommendations. The Fixing America's Surface Transportation (FAST) Act (Public Law 114–94) implemented many of the QER's siting and permitting recommendations. Among other things, Title XLI of the law establishes a Federal Permitting Improvement Steering Council, of which DOE is a member, to oversee the timely processing of permits and reviews. The law also enables agencies to recover reasonable costs for such activities and standardizes processes for resolving disputes. Additionally—and consistent with guidance issued in a September 2015 Memorandum for Heads of Federal Departments and Agencies (M–15–20)[1] from the Office of Management and Budget and the Council for Environmental Quality—the law requires expanded use of an online dashboard to track major infrastructure projects under Federal review. Use of the Dashboard will improve agencies' communication with project sponsors, enhance interagency coordination, and increase the transparency and accountability of the permitting process.

Sec. 41002 of the FAST Act also requires the interagency governance structure to issue annual best practice recommendations that (1) enhance early stakeholder engagement provided in public comments; (2) increase transparency; (3) reduce information collection requirements and other administrative burdens; (4) improve coordination between Federal and non-Federal governmental entities, including through the development of common data standards and terminology across agencies; and (5) create and distribute training materials useful to Federal, state, Tribal, and local permitting officials.

Many of the provisions included in the FAST Act align with the QER as well as ongoing Administration activities. The Department will continue its work to implement the various provisions and guidance to improve public engagement during Federal permitting and review processes.

Question. As a follow-up to the previous question, are there any priority actions Congress should be considering that would assist DOE in encouraging robust public participation in these permitting and siting processes?

Answer. The QER underscored the value of robust public participation and found that the local nature of permitting decisions requires close stakeholder interaction and appropriate knowledge of local resource concerns to be addressed in the permitting process. Collaboration between Federal agencies and state, Tribal, and local governments that share permitting and review responsibilities for infrastructure projects is essential to moving a project quickly and efficiently.

DOE continues to work with the Administration to build a robust infrastructure that safeguards communities and the environment while also strengthening the economy and creating new jobs. The Administration's ongoing efforts, as well as the permitting provisions contained in the FAST Act (Public Law 114–94), underscore the shared commitment of the Administration and Congress to improve the Federal permit review process for major infrastructure projects. As part of this process, DOE is committed to identifying ways to improve public participation and looks forward to continuing this work with Congress.

Question. Last year, at the 21st United Nations Climate Change Conference, President Obama and several world leaders launched "Mission Innovation", a landmark commitment to reduce greenhouse gas emissions by investing in public-private global clean energy innovation. The President's commitment to "Mission Innovation" and to new funding for a wide range of research, development, and deployment activities is significant and impressive.

How will "Mission Innovation" and other cross-cutting U.S. programs be implemented to maximize the public's investment, and what effect will Mission Innovation have on U.S. leadership in energy efficiency and clean energy?

Answer. Mission Innovation is a government-wide effort and will be coordinated and executed as such to help maximize investment and effectiveness. Within DOE

[1] Office of Management and Budget. "Memorandum for Heads of Federal Departments and Agencies: Guidance Establishing Metrics for the Permitting and Environmental Review of Infrastructure Projects." September 22, 2015 (M–15–20). https://www.whitehouse.gov/sites/default/files/omb/memoranda/2015/m-15-20.pdf.

specifically, Mission Innovation will build on the Department's track record of success in developing and implementing clean energy research, development and demonstration (RD&D) programs. With its world-leading national laboratories and through its current role as the international secretariat for Mission Innovation collaboration, the Department has a strong foundation on which to build its portfolio to help address domestic and global opportunities and challenges.

Over the next two decades, the global clean energy market will come to be measured in trillions of dollars, and the U.S. has the tools, the talent and the industry to lead this revolution. However, other nations are making substantial progress as well, spurred by the combined motivations of addressing climate imperatives and winning market share in the emerging clean energy economy. Supporting a government-wide 5-year doubling path for clean energy RD&D funding is critical to ensure the Nation's continued leadership in clean energy technology development and to keep the U.S. on the cutting edge of potential breakthrough technology research.

Question. President Obama has articulated a goal of doubling U.S. energy productivity. The Department of Energy, under your leadership, is working to implement policies that will put the U.S. on track to meet this goal.

What is the current status of U.S. efforts to meet this goal, and are there any priority actions Congress should be considering that would push the U.S. further along its path to meet this goal?

Answer. In response to the President's goal, the Department partnered with the Council on Competitiveness and the Alliance to Save Energy (the Partners) to launch the Accelerate Energy Productivity 2030 Initiative in the fall of 2014. Since the launch, the effort has further built awareness and engagement around the President's goal by showcasing business and policy strategies within the private sector and all levels of government that are driving improvements in energy productivity across economic sectors. The Partners led five events and a webinar series, collected 11 "Success Stories," and have received endorsements for the goal from over one hundred and thirty organizations to date. The Partners also released a strategic Roadmap (http://www.energy2030.org/roadmap) outlining a set of pathways and identifying specific actions that a broad range of stakeholders can take to help us achieve the national goal of doubling energy productivity by 2030. Moving forward, the initiative will focus on operationalizing strategies included in the Roadmap, connecting stakeholders with technical assistance resources, and hosting an executive roundtable. These efforts will further help identify emerging strategies and ultimately inform sound policy that will bolster energy productivity in the United States.

Between 1990 and 2015, the Energy Information Administration reports U.S. energy productivity rose by 58 percent. Current efforts must accelerate substantially, however, to push the U.S. further along its path to meet the goal of further doubling energy productivity by 2030. Congressional support for the President's Budget Request for programs directed at improved energy efficiency will help us build on the progress already being made in this area.

QUESTIONS SUBMITTED BY SENATOR CHRISTOPHER A. COONS

IRAN AND INTERNATIONAL ATOMIC ENERGY AGENCY

Question. When I visited the IAEA in January, I was told that the agency needs a "reliable, long-term" source of funding to implement the JCPOA and accomplish broader non-proliferation goals. A recent GAO report said the IAEA faces potential budget and human resource challenges as a result of the JCPOA. Can you describe how the DOE is helping the IAEA overcome these challenges? How do our National Labs assist the IAEA's recruiting and hiring, which I understand is a very long and expensive process?

Answer. The Department of Energy (DOE) provides technical support to the International Atomic Energy Agency (IAEA) and voluntary financial contributions to the IAEA through reimbursable work agreements with the Department of State in support of the IAEA's safeguards mission. With these financial contributions, the IAEA is able to hire Americans into cost-free positions for 3–5 year assignments in the IAEA's Department of Safeguards supporting technology development and evaluation activities, software development and analysis positions, as well as IAEA training programs. The IAEA also can purchase needed safeguards monitoring equipment with these funds. In-kind technical support includes development of safeguards technology and concepts, periodic expert consultations, training support for IAEA inspectors, and analysis of samples through the IAEA's Network of Analytical Laboratories.

DOE also maintains a program of safeguards human capital development activities at our National Laboratories to attract, train, and retain experts in nonproliferation and IAEA safeguards efforts. This program brings undergraduate and graduate students into the laboratories on internships and fellowships and sends laboratory specialists out into the university environment to give seminars and training classes. The over-arching goal of this program is to ensure that there is a pipeline of talented individuals working within the DOE complex to support the IAEA; in many cases these individuals take up short-term or permanent positions directly with the IAEA.

As mentioned above, DOE works to ensure there is a pipeline of capable safeguards practitioners in the National Laboratory system. In support of sending as many of these individuals as practical to Vienna to work with the IAEA, DOE and the Department of State provide funding to the IAEA to hire our laboratory experts on 3–5 year assignments throughout the Department of Safeguards. Brookhaven National Laboratory maintains a recruitment list of prospective applicants from the laboratory and university systems and ensures that those individuals are regularly made aware of employment opportunities.

Question. Ali Akbar Salehi, head of the Atomic Energy Organization of Iran, reportedly announced that Iran will use part of its sanctions relief to hire and train a new generation of nuclear scientists. How will this training affect Iran's nuclear program in the next 15 years? How will an increased number of highly-trained nuclear scientists allow Iran to expand its nuclear program after much of the JCPOA "sunsets" in 15 years?

Answer. The Joint Comprehensive Plan of Action (JCPOA) significantly constrains the research and development that Iran's nuclear scientists can pursue. At the same time, the JCPOA redesigns and dismantles a significant portion of Iran's infrastructure, effectively cutting off Iran's pathways to a nuclear weapon.

Without the JCPOA, Iran would have an unconstrained R&D program. The JCPOA establishes strict limits on advanced centrifuge R&D, testing, and deployment in the first 10 years, and after the initial 10 year period Iran must abide by its enrichment and enrichment R&D plan submitted to the IAEA under the Additional Protocol, and pursuant to the JCPOA, which will result in certain limitations on enrichment capacity and ensure only a measured, incremental growth in its enrichment capacity consistent with a peaceful nuclear program.

The JCPOA in no way authorizes, allows, or encourages future Iranian nuclear weapons activity, which will always be prohibited under the Treaty on the Non-Proliferation of Nuclear Weapons. Instead, the JCPOA provides unparalleled insight into every part of Iran's nuclear program. Certain transparency measures will last for 15 years, others for 20 to 25 years, and some will last forever—such as Iran's adherence to the Additional Protocol. With this transparency, if Iran tried to reverse course and break out, we would see it and have time to respond with a much greater understanding of their program.

We expect a gradual development process to take place with respect to Iran's nuclear program past year 10. We expect this process to be shaped in such a way that it continues to build the world's confidence that Iran's program remains exclusively peaceful.

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SUBCOMMITTEE RECESS

Senator ALEXANDER. Mr. Secretary, thank you for joining us today. The subcommittee will stand adjourned.

[Whereupon, at 4:20 p.m., Wednesday, March 9, the subcommittee was recessed, to reconvene subject to the call of the Chair.]