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DOE MODERNIZATION: LEGISLATION ADDRESSING DEVELOPMENT, REGULATION, AND COMPETITIVENESS OF ADVANCED NUCLEAR ENERGY TECHNOLOGIES

TUESDAY, MAY 22, 2018

House of Representatives

Subcommittee on Energy

Committee on Energy and Commerce

Washington, D.C.

The subcommittee met, pursuant to call, at 10:00 a.m., in Room 2123 Rayburn House Office Building, Hon. Fred Upton [chairman of the subcommittee] presiding.

Members present: Representatives Upton, Barton, Shimkus, Latta, Harper, McKinley, Kinzinger, Griffith, Johnson, Long, Bucshon, Flores, Mullin, Hudson, Walberg, Duncan, Walden (ex

officio), Rush, McNerney, Peters, Green, Doyle, Castor, Welch, Tonko, Loebsack, Schrader, Kennedy, and Pallone (ex officio).

Staff present: Mike Bloomquist, Deputy Staff Director; Samantha Bopp, Staff Assistant; Daniel Butler, Staff Assistant; Kelly Collins, Legislative Clerk, Energy/Environment; Margaret Tucker Fogarty, Staff Assistant; Adam Fromm, Director of Outreach and Coalitions; Jordan Haverly, Policy Coordinator, Environment; Milly Lothian, Press Assistant and Digital Coordinator; Mary Martin, Chief Counsel, Energy/Environment; Drew McDowell, Executive Assistant; Brandon Mooney, Deputy Chief Counsel, Energy; Mark Ratner, Policy Coordinator; Peter Spencer, Professional Staff Member, Energy; Danielle Steele, Counsel, Health; Austin Stonebraker, Press Assistant; Hamlin Wade, Special Advisor, External Affairs; Everett Winnick, Director of Information Technology; Andy Zach, Senior Professional Staff Member, Environment; Priscilla Barbour, Minority Energy Fellow; Jeff Carroll, Minority Staff Director; Rick Kessler, Minority Senior Advisor and Staff Director, Energy and Environment; John Marshall, Minority Policy Coordinator; Alexander Ratner, Minority Policy Analyst; Andrew Souvall, Minority Director of

Communications, Outreach and Member Services; Tuley Wright, Minority Energy and Environment Policy Advisor; and C.J. Young, Minority Press Secretary.

Mr. Upton. Good morning, everybody. Sorry I am a few minutes late. Good morning. And welcome to our hearing to discuss four very important legislative proposals to address and advance our nation's nuclear energy policy.

You know, as we have heard throughout Congress, our nation's international nuclear leadership is eroding. Last week, a report by Bloomberg New Energy Finance found that nearly a quarter of our nation's fleet of nuclear power reactors are at risk of early closure in the next couple of years.

These 24 at-risk reactors total over 6 percent of the total electricity generated in the U.S., about how much electricity is consumed in Michigan and Illinois combined. And if we are going to get serious about an all-of-the-above energy strategy and the value of a diverse, clean energy portfolio, the implications of this threat cannot be ignored.

The decision to close a nuclear power plant is irreversible. We know that. Reactors cannot be re-licensed to produce power once they cease operation. And if the projected retirement of nuclear energy is realized, the fleet's significant loss will lead to a ripple effect throughout the nuclear supply chain.

Fuel cycle facilities, that underpin both commercial and national security needs, lose critical capacity. And technology services that provide world-class simulation to modernize and maximize nuclear safety will look to other global markets that have growth potential. The next generation of nuclear engineering and scientists would dry up as educational institutions can no longer continue to support the necessary facilities and programs. International leaders in the nuclear field made clear, made clear to this subcommittee a couple months ago that these cumulative repercussions will weaken our national security standing and, if it continues, would require a generation of sustained federal commitment to rebuild.

I don't see that the outcome is inevitable. The thoughtful proposals that we are going to examine today provide directed solutions to address these multi-faceted challenges.

H.R. 1320, sponsored by Representatives Kinzinger and Doyle, brings budgetary discipline to the NRC and improves transparency and predictability for civilian nuclear companies. Under current statutory requirements, the NRC recovers about 90 percent of its total budget from NRC

licensees. As a result, my Southwest Michigan ratepayers help fund the NRC to regulate, license, and oversee the commercial nuclear industry. The Kinzinger-Doyle bill also lays out basic expectations that align with the NRC's established tradition of adhering to the organization's Principles of Good Regulation.

Congressman Johnson's discussion draft discusses the global competitive challenges for the nuclear supplier community. When provided a level playing field, I am confident American know-how and technological leadership is the best in the world. However, nuclear companies backed by foreign governments, which don't necessarily share our values, artificially subsidize our competition. The motivation behind these actions is clear. Mr. Johnson's bill will improve the ability of our companies to compete, and win, in international markets.

Imagine designing a new car that is cheaper, safer, and gets triple the fuel mileage from anything that we see on the road today, but when the vehicle is ready to hit the road, there is just no gas to fill up the tank. Nuclear innovators face just that challenge.

Advanced nuclear technologies offer a wealth of

promising benefits. However, for these designs to become reality, a certain amount of advanced nuclear fuel must be available for the first movers. Congressman Flores' legislation helps address this obstacle by directing DOE to undertake specific actions to provide what is known as high-assay low-enriched uranium. The time to begin addressing this problem is now in order to have the advanced fuel available when it is needed.

The fourth bill, bipartisan legislation from Congressmen Hudson, Peters, Wilson, and Norcross, directs the Secretary of Energy to identify the key components for a pilot program that could capture the energy security benefits of future nuclear technologies to support critical national security infrastructure.

This morning we are going to hear from the Department Energy on the first panel, including the Office of Nuclear Energy and NNSA. We are also going to hear several expert perspectives on the second panel.

I look forward to that discussion and at this point would yield to the ranking member of the subcommittee, Mr. Rush from Illinois.

[The prepared statement of Mr. Upton follows:]

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137 ********** INSERT 1 **********

Mr. Rush. Well, thank you, Mr. Chairman. Mr. Chairman, thank you so much for holding this important hearing today on legislation addressing the development, regulation, and competitiveness of advanced nuclear technologies.

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

I look forward to working with the majority as we proceed through regular order. And I believe that we will be able to come to a strong, bipartisan agreement on most, if not all of these bills.

Today, Mr. Chairman, I support the discussion draft offered by Mr. Flores of Texas which would simply direct the Secretary of Energy to establish a program to support the availability of high-assay low-enriched uranium, or HA-LEU, for commercial use. We have learned that there are several companies looking to design and license advanced nuclear reactor technologies utilizing uranium-235 isotopes enriched

at levels greater than 5 percent and less than 20 percent. Some of these companies identified significant challenges associated with assessing HA-LEU.

And I believe Mr. Flores' discussion draft will address some of these concerns and make HA-LEU more accessible with the right safeguards. Also, it is important, Mr. Chairman, that the discussion draft offered by a group of bipartisan members, including two from this subcommittee, Mr. Hudson of North Carolina, and Mr. Peters of California. This bill would require the Secretary of Energy to develop a report on a pilot program to site, construct, and operate micro-reactors at critical national security locations.

Mr. Chairman, I am also inclined to support some of the objectives of H.R. 1320, which will amend the NRC fee recovery process associated with the advanced reactor regulatory framework, while also limiting internal funds available for corporate support costs and capping fees on operating reactors.

However, Mr. Chairman, I do have some concerns in light of the bill's provisions essentially repealing licensing assistance to foreign governments. Also want to better understand verification of repealing entirely mandatory

hearing while also implementing specific guidelines to review environmental impact statements and how these changes might impact public input.

Finally, Mr. Chairman, I also look forward to engaging today's witnesses on the discussion draft sponsored by Mr. Johnson of Ohio. This bill would, among other things, revise DOE's review of Part 810 process by expediting procedures for transferring civilian nuclear technology, including to foreign powers. Mr. Chairman, this proposal comes against the background of the current Administration's decision to renege on the U.S. commitment in the Iran deal, but also moving forward on potential talks with North Korea's volatile dictator on denuclearization issues.

So I look forward to hearing today's distinguished panel on both the challenge and the necessity of this legislation, as well as identifying possible unintended consequences.

I want to thank you, Mr. Chairman, and I yield back the balance of my time.

[The prepared statement of Mr. Rush follows:]

********** COMMITTEE INSERT 1 **********

Mr. Upton. The chair recognizes for an opening statement the chair of the full committee, the gentleman from Oregon.

The Chairman. Good morning, Mr. Chairman. Thanks for holding this hearing. This really represents an important component of our Department of Energy effort at modernization.

The bills we will examine today provide key ingredients to enhance a core national security and energy security mission for the Department, and of the nation: promoting the safe and peaceful use of nuclear technology. It is really important.

Congress first authorized the commercial application of atomic energy in 1954, when it declared the, and I quote, "development, use, and control of atomic energy shall be directed so as to promote world peace, improve the general welfare, increase the standard of living, and strengthen free competition in private enterprise." That policy remains as relevant today and as important as ever.

By any measure, atomic energy has already brought tremendous benefits to the nation; it has provided a baseload, emissions-free source of electricity that has powered homes and industry over the last half a century. It has provided an infrastructure for our national and international security, from the technologies and fuels for

our nuclear navy to the safety and security for civilian nuclear power the world over.

However, as everyone on this panel knows well, a confluence of factors -- abundant natural gas, power market designs, economic and regulatory burdens -- have inhibited the nation's nuclear energy over the past decade. The challenge confronting policymakers is how to preserve the beneficial use of atomic energy for future generations. Thoughtful, targeted legislative proposals today I think are a really good start.

The bipartisan bill from Representatives Kinzinger and Doyle establishes reasonable and predictable time frames for regulatory decisions so companies like Oregon-based Nuscale Power can develop business plans to commercialize new nuclear technologies, while also protecting future consumers from high regulatory costs.

The many regulatory requirements imposed by the Federal Government on special nuclear material are understandable due to the risk associated with unsecured radioactive sources, but this presents barriers to new market entrants, too. Congressman Flores' discussion draft will spur innovation by providing a solution to advanced nuclear fuel needs.

And the bipartisan discussion draft from E&C members Hudson and Peters and two members of the Armed Services Committee, Congressmen Wilson and Norcross, will help identify specific national security applications to capture the benefits of transformational nuclear reactor designs. For example, Idaho National Laboratory's remote location and critical defense programs may be an ideal location to construct and operate a resilient nuclear reactor.

And lastly, Congressman Johnson's discussion draft will help reduce barriers to competition facing our domestic manufacturing, vendors, and nuclear service companies. This is a critical conversation for this subcommittee and one we must not shy away from.

This morning's witnesses bring both extensive experience in public service and business acumen. And we thank you both for being here.

I want to welcome Dr. Brent Park, the recently confirmed Deputy Administrator for Defense Nonproliferation at the National Nuclear Security Administration. Dr. Park is responsible for critical national security programs that keep America safe. Dr. Park is joined on the first panel by Ed McGinnis from DOE's Office of Nuclear Energy. So we

appreciate your being here.

And the second panel this morning includes Melissa Mann, the President of URENCO, USA. URENCO is the only domestically-located, NRC-licensed facility to enrich uranium for commercial use. Ms. Mann brings a wealth of insight to this discussion on behalf of the U.S. nuclear supply chain industry.

And Southern Nuclear has assumed the leadership mantle on behalf of utilities to assess and develop advanced nuclear reactor designs. Nick Irvin leads those efforts for Southern Company and offers a hands-on testimonial of the rigorous process underway across the country to seek regulatory approval for promising first-of-its-kind technologies.

I also want to welcome back Jeff Merrifield, who has testified in this room many times, going back to his tenure as an NRC commissioner. He is now practicing law with a focus on advanced nuclear reactors and strategic counsel to energy companies. Jeff provides an abundance of experience to inform today's discussions.

There remains tremendous promise for America's nuclear technology. And we can ensure that promise through legislative reforms reflective of our committee priorities to

put consumers first, advance innovation, protect national security, and spur competition. I believe the four bills today align with those priorities.

So I look forward to and thank our members on both sides of the aisle for coming together for these initiatives. And I would be remiss if I didn't also thank the committee, and especially Mr. Shimkus, for the effort to get a permanent and interim nuclear waste storage facility up and running. He and I won the pool on the vote count in the House. We both independently predicted 340 votes would be achieved, and that was the number. Now we just need, you know, 100 in the Senate. Maybe 98 would do it.

So, with that, Mr. Chairman, we remain committed to moving forward on this energy front. And I return the balance of my time.

[The prepared statement of Mr. Walden follows:]

********** INSERT 2 **********

Mr. Upton. The chair would recognize the ranking member of the full committee, Mr. Pallone, for an opening statement.

Mr. Pallone. Thank you, Mr. Chairman.

Today's hearing will examine four bills addressing a range of topics relating to advanced nuclear energy technology. H.R. 1320, the Nuclear Utilization of Keynote Energy Act, introduced by Representatives Kinzinger and Doyle, builds upon a discussion draft that this subcommittee reviewed in 2016.

H.R. 1320 made several major changes to the Nuclear Regulatory Commission's budgeting process and fee structure. The bill caps corporate support costs at the Commission and puts a ceiling on the fee charged to each nuclear reactor. I appreciate the financial strain the nuclear industry is facing and the carbon free energy it provides, however, I am concerned that these budgetary changes could arbitrarily limit the resources the NRC needs and adversely affect its ability to do its job.

I also have questions about Section 7 of the bill which sets up an expedited time line for review of nuclear reactors at the NRC. The bill provides 24 months to complete a draft environmental impact statement and 42 months to complete the technical review process. Inflexible deadlines could jeopardize the environmental and safety review process for

more complex applications.

And I am also concerned with the provision in the section that requires NRC issue a construction permit to a nuclear facility even if an entity has filed a formal request for a hearing objecting to the project. Stakeholders should have the change to voice their concerns publicly before a project permit is issued.

But despite my issues with those sections of the bill, I am supportive of setting a deadline for the NRC to finish its decommissioning rulemaking and removing advanced nuclear reactor work at NRC from the fee recovery requirement. I look forward to work with my colleagues on this bill as we move forward in the process.

The committee will also review a discussion draft from Representative Johnson that makes changes to the process by which the Secretary of Energy authorizes the transfer of unclassified nuclear energy technology and assistance to foreign countries. This is known as the Part 810 process. I appreciate that this process must function well for the U.S. to remain competitive in the commercial nuclear space, but the bill establishes a 30-day time frame for the secretary to approve the transfer of certain low proliferation risk

nuclear technologies to countries that are not nuclear weapon states.

Unfortunately, President Trump has put us on the path to upend the current dynamic of nuclear weapons proliferation across the globe. The president has walked away from the Iran deal. And now Saudi Arabia has said that if Iran restarts its nuclear program Saudi Arabia will itself pursue building nuclear weapons. And I am uncomfortable with expediting the review process of Part 810 at a time when there is so much global uncertainty on nuclear proliferation. This is not the right time to address this issue.

Next, the committee will consider a discussion draft from Representative Flores to accelerate the availability of high-assay low-enriched uranium. This is the fuel needed for most advanced nuclear reactor designs. It is not commercially available today. In order to ensure the fuel is available for advanced reactors once they are licensed and ready to begin producing electricity, the Federal Government will need to coordinate efforts within agencies and with the commercial nuclear sector. This is a worthy effort, and I look forward to working with the majority on this proposal.

And last, we have a discussion draft that directs the

Departments of Energy and Defense to develop a report evaluating the resiliency benefits of siting micro-reactors at critical DOE and DoD infrastructure sites. I believe this report will provide the committee with valuable information, and commend Representatives Peters and Hudson, as well as my New Jersey colleague, Representative Norcross, for taking up this important issue.

But finally, I want to thank, I do want to thank Priscilla Barbour who has provided invaluable support over the last year as an energy fellow on the minority committee staff. Priscilla is finishing her fellowship tomorrow and I wish her well on her future endeavors.

And then I would like to yield my minute to Mr. Doyle.

[The prepared statement of Mr. Pallone follows:]

********** COMMITTEE INSERT 2 **********

Mr. Doyle. Thank you, Mr. Pallone. And thank you, Mr. Chairman, for holding this hearing today. I appreciate the opportunity to discuss nuclear energy, which is a critical component of our nation's energy portfolio.

Nuclear energy provides nearly 40 percent of Pennsylvania's electricity, and employs thousands of skilled workers in Pennsylvania. This carbon-free, reliable baseload power is also an important factor in meeting our climate goals, which is why it is necessary to work collaboratively to address the issues confronting the nuclear industry.

I want to thank my colleague, Congressman Adam Kinzinger, for his leadership introducing H.R. 1320, the NUKE Act. This bipartisan legislation would take important steps to modernize the NRC's fee structure, study new opportunities for additional regulatory certainty, and look to future reforms that will ensure the NRC can continue to effectively protect public health and safety.

I would note that this legislation was originally entitled the NUKEPA Act, so I appreciate that the name has evolved so that it no longer poses a threat to the State of Pennsylvania.

Mr. Chairman, with that I thank you, and yield back.

[The prepared statement of Mr. Doyle follows:]

********** COMMITTEE INSERT 3 **********

Mr. Upton. The gentleman's time has expired. We are now ready to start our distinguished panel's testimony. We welcome Brent Park, the Deputy Administrator for Defense Nuclear Nonproliferation at the NNSA; and Ed McGinnis, Principal Deputy Assistant Secretary for the Office of Nuclear Energy at DOE.

So, welcome to both. And each, thank you for submitting your testimony in advance. It will be made part of the record in its entirety. And we would like you to spend five minutes each, no longer than that, to discuss the summary, at which point we will go to questions.

Mr. Park, we will welcome you first.

STATEMENTS OF HON. BRENT PARK, DEPUTY ADMINISTRATOR, DEFENSE NUCLEAR PROLIFERATION, NATIONAL NUCLEAR SECURITY ADMINISTRATION, U.S. DEPARTMENT OF ENERGY; AND ED MCGINNIS, PRINCIPAL DEPUTY ASSISTANT SECRETARY, OFFICE OF NUCLEAR ENERGY, U.S. DEPARTMENT OF ENERGY

STATEMENT OF HON. BRENT PARK

Mr. Park. Good morning, Chairman Upton, Ranking Member Rush, members of the subcommittee. Thank you for the opportunity to provide views on behalf of the Department of Energy's National Nuclear Security Administration on the proposed pieces of legislation. I appreciate the ongoing bipartisan efforts to address our nation's energy challenges.

First I would like to discuss the potential for DOE to establish a program to support the availability of high-assay low-enriched uranium, so-called HA-LEU. NNSA fully agrees with the committee that availability of HA-LEU is important, and recognizes the need that industry has expressed for researching and developing HA-LEU fuels.

Enriched uranium is required at various levels of enrichment and forms for national security and

nonproliferation missions, as well as an equalizer for production. Since the United States no longer has a uranium enrichment capability for these missions, the nation relies on inventory of highly enriched uranium material that is unblended to meet the enriched uranium requirements identified above. However, our supply is finite, and at present irreplaceable. Moreover, our current stores of HA-LEU will run out in the early 2040s.

To meet industry needs, NNSA will evaluate any specific requests from industry for this material alongside NNSA's ongoing needs for enriched uranium for defense and non-defense purposes.

NNSA supports the language in the bill regarding the development of a transportation package for HA-LEU, and exploring options to establish a domestic HA-LEU enrichment and production capability. NNSA strongly supports such an enrichment capability which we believe is essential in assuring a long-term supply of HA-LEU to meet the needs of the commercial industry, research reactors, and medical isotope products.

A second bill with NNSA components for discussion today pertains to DOE's authority under 10 C.F.R. Part 810 to

regulate exports of U.S. civil nuclear technology and assistance for peaceful purposes. Overall, this draft legislation will deliver useful and practical improvements of the regulatory process that is important to the nation's security and economic prosperity.

We appreciate the opportunity to come before you today as well as continue the discussion with your staff on any issues that may arise. The department seeks to ensure the highest operational standards are applied globally in such a way as to facilitate U.S. exports. The burgeoning international nuclear energy market provides a significant commercial opportunity for the U.S. nuclear industry, and the export of U.S. nuclear technology plays a large part in making sure U.S. industry remains an active player in this market.

In response to feedback from the U.S. industry and other stakeholders, we have taken a number of steps to simplify and update the Part 810 regulation, and have implemented significant improvements in the process for reviewing export applications. In addition to the department's recent implementation of the e810 electronic application system, the committee's legislation will further streamline the review

process in general, while maintaining strong nonproliferation controls on U.S. nuclear technology.

We agree that this legislation will empower the Secretary of Energy to authorize technology and systems exports in a more expeditious manner. I look forward to additional discussion with the committee.

In our view, this legislation will reduce processing times for applications involving certain reactor technologies and destinations that present a low risk of nuclear proliferation, and will provide the department with flexibility to recommend the secretary to delegate some application approvals to a lower level.

Another advantage the bill provides is the requirement for DOE offices to review Part 810 applications at the same time that they are being reviewed by the interagency whether they are performing these reviews expressly. We are happy to report that the department has already begun this process, and we are confident this is yet another step in the right direction.

NNSA recognizes that the effective implementation of our mission is to strengthen our strong partnerships with industry. NNSA needs strong energy partners to resolve the

critical national security issues that we face.

Thank you for the opportunity to testify before you today. And I, with my staff, look forward to future discussions of this draft bill. I stand ready to answer any questions you may have.

[The prepared statement of Mr. Park follows:]

********** INSERT 3 **********

Mr. Upton. Thank you so much.

Mr. McGinnis.

STATEMENT OF ED MCGINNIS

Mr. McGinnis. Thank you very much, Chairman Upton, Ranking Member Rush, and other members of the subcommittee. I am very pleased to appear before you today to discuss legislation addressing advanced nuclear energy technologies, including high-assay low-enriched uranium, which I will refer to in shorthand during my testimony as high-assay LEU.

Although the Administration is still evaluating your bills and has not taken an official position at this time, the department greatly appreciates the committee's interest in these topics and recognizes the potentially very important role high-assay LEU may well play in meeting our nation's energy and national security needs.

Over the last seven decades, the nuclear energy capabilities pioneered by the United States have served and supported our nation's energy security and, in turn, national security. In recognition of this vital role, the White House-led review of U.S. nuclear energy policy is underway, and we are already beginning to take steps to revitalize and expand our civil nuclear energy sector. The outcomes of the civil nuclear review will inform our approach to revitalizing this

553 critical sector.

554 While our nation's nuclear infrastructure, supply chain,
555 and manufacturing base have been significantly degraded, the
556 United States still leads the world in other key areas of
557 nuclear energy. In fact, we believe the most mature advanced
558 U.S. designs could potentially be deployed as early as the mid
559 to late 2020s by the private industry. This is where the need
560 for high-assay LEU arises.

561 Nearly all U.S. advanced non-light-water reactors under
562 development will require high-assay LEU, including advanced
563 micro-reactors. The advanced reactor community has stressed
564 the near-term need and importance of high-assay LEU for advanced
565 nuclear fuel, qualification testing, and for potential
566 demonstration reactors.

567 No commercial enricher currently provides high-assay LEU.
568 While current enrichment plants could be modified to produce
569 high-assay LEU, it is unlikely that a commercial capability
570 would be pursued without further indication of progress towards
571 deployment by advanced reactor vendors. The department
572 recognizes the industry's concerns regarding high-assay LEU
573 fuel, and we are taking a number of actions to support the
574 development of high-assay LEU in the near and longer term.

First, the department is working with industry to refine its near-term R&D needs for fuel development and qualification, particularly how much material is needed, when, and in what form, and also to understand more about projections for longer-term needs.

Second, we are leveraging our expertise in support of the technical aspects of commercial high-assay LEU infrastructure. The department is aware that high-assay LEU may be needed in various fuel forms by different vendors. On the transportation side there are no large scale shipments of uranium enriched above 5 percent. And the transportation packages currently used for these smaller shipments may not support commercial-scale operations.

Third, the department is reviewing materials across the DOE complex with an eye toward materials and processing options that may support some near-term industry R&D needs. Once industry needs in terms of quantities, forms, tolerances for impurities, and timing are known, the department can then evaluate specific requests from industry for material, alongside our ongoing needs for research, reactor fuel, and medical isotope production. Current department mission needs are supplied from our finite and diminishing supply of high-

enriched uranium.

In conclusion, the department is working closely with U.S. nuclear innovators to define the challenges to bringing the next generation of advanced nuclear reactors and power into the marketplace, and are embarking on a number of actions to support the development of a commercial fuel cycle for high-assay LEU.

We look forward to working with Congress, including in particular the subcommittee here, industry, and our partners across the department on defining and exploring high-assay LEU issues now and in the future.

And, finally, I would just like to say that we greatly appreciate the work and focus of this subcommittee on such important matters to our nation's energy and national security. Thank you very much.

[The prepared statement of Mr. McGinnis follows:]

********** INSERT 4 **********

Mr. Upton. Well, thank you both. And appreciate your kind words. And we do work, try to work in a bipartisan way in potentially all the things that we move through this subcommittee. And we look forward to working with you.

I would say as we talk about these bills, and the sponsors are here, we intend to move these bills. And there is a legislative process. We want your input. I know that you have not taken a formal stand with staff on any of these, but we would like your tech, A) your technical assistance, but also your continued input as these bills begin to move through the process. So if you can take that back to your department heads, that would be great.

Quick, couple of quick questions from my, my vantage point. You know, we know that according to the IAEA and World Nuclear Association data there are presently about 50 nuclear reactors under construction around the world, mostly in Asia. There are about 150 to 160 reactors on order or planned, and upwards of 300 that have been proposed. Almost all of that growth is in Asia, the Middle East, with a little bit in Russia.

Not a lot here in the U.S., I think primarily because of the cheap natural gas. We're seeing big advancements there in terms of improving it. I've got a facility in my district that

looks to break ground a little bit later this fall. And we have got a -- I have got a nuclear plant, it is like a plant that is looking to phase out now over the next couple years, the Palisades plant. And more power will have to be generated by other sources, whether it be renewable, gas, that type of thing.

So as the U.S. companies are competing primarily with China, Russia, France, South Korea, if we are unable to successfully compete and are excluded from those emerging markets, including the Middle East, will the dominance of China, Russia in these markets be beneficial to international nuclear security, nonproliferation, and nuclear safety? How will that all fit as we lose probably our leading role as we see the number of domestic facilities here in the U.S. actually be reduced without any real plans to finish construction.

The new plants won't make up for the ones that are being taken offline. How does that work with what is happening internationally?

Mr. Park. Thank you. First of all, I agree with your assessment that the U.S. needs to reclaim the leadership clearly. There is no question in your statement. And how we go about doing that is what is on the table for us to discuss.

I think we are taking your leadership and guidance from this committee to make sure we streamline many of these approval processes and so on. But we need to do better. I acknowledge that. And in terms of actually not playing in the theaters that you just talked about, many dozens of nuclear reactors being built and being designed and so on, we need to get into that world as quickly as possible and work closely with any other sectors to make sure we have a competitive edge.

Again, our -- as a nuclear physicist I am happy to share with you we actually have the edge on the nuclear technologies on the science and technology side, we just need to better transfer these proven technologies in a safe, secure -- in a safeguarded format. We are doing our very best at the moment.

Mr. Upton. Mr. McGinnis, do you have anything?

Mr. McGinnis. Thank you very much. I would say that the implications to the United States trending out of its nuclear leadership role, which most of the D and A still today around the world in nuclear technologies is from the United States and some great innovators, if we continue with this trend and if we don't find a way to re-vector into a sustainable growth potential, it goes far beyond electricity. Resiliency is really important. But when it comes to the global,

competitive, strategic state of play in nuclear with Russia and China, the implications go directly into our national security interests and not just our energy security interests.

So it is vital that we begin building again. We have had an extraordinary run of our fleet, which is by far the most efficiently run in the world. And we still lead as the greatest innovators. We know how to disrupt and innovate like other industries we are witnessing in aerospace and others in the United States. Frankly, our competitors are hoping that we don't find and tap that innovation in this moment for nuclear.

I strongly believe we are at that point where we are in the process of disrupting the market, innovating right now. And so we have a great opportunity, and I want to say in large part because of the really unprecedented, I would say in my career, bipartisan support from Congress, including such as is reflected in this subcommittee. So thank you.

Mr. Upton. And before I yield there to my friend Mr. Rush, I want to insert into the record a report from the Atlantic Council titled "U.S. Nuclear-Power Leadership and the Chinese and Russian Challenge." And without objection, so ordered.

[The information follows:]

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703 ********** INSERT 5 **********

Mr. Upton. I yield to my friend, the gentleman from Illinois, for five minutes.

Mr. Rush. I want to thank you, Mr. Chairman.

Ambassador Park, you noted Secretary Perry's 2017 letter to this subcommittee detailing the agency's commitment to reducing processing time for application on the Part 810. You stated that DOE and NNSA have already made significant progress in improving efficiency and transparency on the Part 810 regulatory regime by implementing the Part 810 process improvement plan.

These improvements help to reduce the average processing time for a request under Part 810 from a high of more than 18 months to approximately 12 months. In light of this process improvement plan do you see a need for legislation such as the discussion draft that is before us today that will amend the Atomic Energy Act to include a process for authorizing the transfer of civilian nuclear commerce, technology, and assistance. And does this bill overlap with aspects of the improvement plan?

Mr. Park. First of all, I did a really detailed analysis of the previous help and guidance by the way. That is in concert with this committee that we have been developing PIP,

performance improvement plan. We actually had implemented many of your guidance in our planning by the way.

For example, as we are developing e810 for example, your example, we actually, I think we shared with your staff that the internal processing -- this is only an example by the way -- instead of waiting for State Department to do -- to wait for official assurance on operation requirements we actually do a parallel process, number one.

Number two, as it turns out that many of the things that we used to do in paper form, the industry partners did not know what kind of progress they were making with us, through e810 for example. If they are able to have a transparency into where are their packages and, you know, ask us how to speed things along and so on, there are a lot of improvements that we have made. We still need to do more.

But, again, there are enough of positive signs. I asked my staff to give me statistics on what kind of uses we have for e810. I am happy to report to the committee that the improvement of the usage has gone up substantially from last year to this year on month-by-month roll-out. 2017 to 2018 usage of e810 is 50 percent higher. It is too early to tell whether this will really seal the deal in terms of expediting

the approval process and so on and so forth.

But so far, indicators are that we are making a positive difference and we are training interested partners so they know how to work with us. So this is all being realized.

Mr. Rush. Right. So on the proposed legislation, will that enhance your ability or will that retract from your ability?

Mr. Park. So, I don't think I could comment on whether that would help or whatever. But I appreciate the fact that there are many, many useful guidelines out of this committee. So we will look for ways to work with the committee.

Mr. Rush. Thank you. I am going to ask you another question.

In your written statement you say that the advanced nuclear fuel that I mentioned, as written, may be a redundant position requirement and an initiative currently being conducted at your agency. You also note that allowing a consortium that includes industry members to determine who has HA-LEU from the department may present conflicts of interest or an unfair advantage to certain players in the emerging market. Can you briefly discuss both the redundancies that are found in this bill with regards to your current practice?

Also, what recommendation will you submit to help avoid the occurrence of conflict of interest or unfair advantage for industry members [unintelligible] HA-LEU?

Mr. Park. So, appreciate your thoughtful question.

As it turns out, I would not look at the word "redundancy" as a negative word. The fact that we actually have been working with your staff of this committee for quite some time we then implemented the redundancy of the word would come in the form of we heard you already. If the bill actually incorporates these guidelines, we are happy to absorb, follow the guidelines. But we have been doing quite a bit already in the form of we are actually working with any and other parts within DOE to collectively promise from industry partners.

We have some rough numbers that we got. But, again, we are actually incorporating that into our projections, as I shared with you in my oral testimony. Our supply would run out in early 2040s, so we are required to update our projections as we collect information from industry partners or other players. So to that extent "redundancy" is not a bad word, number one.

Number two, if that helps you.

Mr. Park. I yield my time.

Mr. Upton. The gentleman's time has expired.

Mr. Barton.

Mr. Barton. Thank you, Mr. Chairman. I don't have too many questions.

My primary question is about the discussion draft by Congressmen Hudson, Wilson, Norcross, and Peters about these micro-reactors at Department of Energy -- I mean Department of Defense facilities. I'm not real sure what a micro-reactor is. So I want a definition. And I also want to know who would have jurisdiction: would it be the Defense Department or would it be the Energy Department?

Mr. McGinnis. Thank you very much for that question. Micro-reactors, depending on who you talk to, define it by the power level. And one conventional range is 1 to up to 10 megawatts electric. Some companies are defining it 1 to 30, even in the kilowatt range.

But it is smaller, lower level than what is a conventional small modular reactor, number one.

Number two, this is a very interesting emerging technical sector that I am witnessing, we are witnessing right now in the United States with regards to micro-reactors. There are a number of exciting designs and companies in different parts of

the United States, some of which we are working with at the Department of Energy on supporting an appropriate technical role early stage on supporting the proving out of these micro-reactors.

In fact, we have an MOU with one such micro-reactor where they are targeting 2021 to have the first demonstration built at Idaho National Lab, just to give you a sense of how fast this is moving. These micro-reactors achieve -- I know about this from the fuel supply -- is they all, virtually all require high-assay LEU, maybe smaller amounts, but if they prove out the business line they are going to, they will be selling many of them.

Now, on the question of the Department of Defense and Department of Energy, what I can say is that we are certainly working with the Department of Defense. We are in communications with them. We are sharing our information and know-how on micro-reactors with the Department of Defense, more than one part of the Department of Defense. We are sharing information with them from the infrastructure side, the Assistant Secretary as well as from Army. And we see, frankly, great potential, significant potential with regards to the role and value of micro-reactors.

836 And I think, frankly, this could be one of those surprise
837 disruptive, very positively disruptive sectors that may, may
838 catch a lot of us by surprise in a very good way. And I am
839 excited about it.
840 Mr. Barton. I yield back.
841 Mr. Upton. Mr. Peters.
842 Mr. Peters. Thank you, Mr. Chairman. I appreciate having
843 this hearing today.
844 Nuclear energy technology is an important part of
845 increasing our zero mission energy sources. We need this
846 energy generation and the clean air standards it can help us
847 achieve. And for these reasons, and many more, I supported
848 research and development in next generation energy
849 technologies, particularly advanced nuclear development in
850 small modular reactors.
851 And I am one of the, with Mr. Hudson, one of the lead
852 sponsors of the draft bill before us today. And I appreciate
853 his work on that.
854 My bill would, our bill would direct the Department of
855 Defense and Department of Energy to work together in analyzing
856 how micro-reactors can bolster energy resiliency for national
857 security.

In my home district in San Diego and in the nearby region we have highlighted microgrids at Marine Corps Air Station Miramar. We have tested battery generation rucksacks at Camp Pendleton, and performed other energy development project partnerships between the Navy and the University of California at San Diego. DoD has been a willing and helpful partner in testing clean and innovative energy sources. It is not because they are tree huggers or doctrinaire environmentalists, but from their perspective energy resilience is a life and death question.

For instance, the fewer batteries that Marines have to carry, the more ammunition they can take in their pack; and that could be what saves their life in a firefight in a faraway country. It is a stark reminder of how energy resilience is critical. I think the partnership in this bill makes sense and I hope to see it advance quickly.

To Mr. McGinnis, I had a question about research funding. I am an advocate for early stage innovation and research support from the Federal Government. I wanted to just give you an opportunity to say if you think we are missing any areas of nuclear research and innovation, where we need to bolster that investment.

Mr. McGinnis. Thank you very much.

There, as indicated, we are in the process of revitalizing our nuclear energy sector. We made it clear that we have experienced great degradation, frankly, including in our test capabilities, whether it is not having fast neutrons for a fast spectrum reactor to be able to test those key components for the next class of reactors coming in, or advanced fuels, or whether it is other technical capabilities that we need as a key element of our nuclear sector.

So I can say, first of all, that the authorization language that we have seen today, and also the appropriations has been very important to support our efforts to revitalize. We don't just rely on Idaho National Lab, although Idaho National Lab is a flagship lab for nuclear energy, we are relying on Oak Ridge, we are relying on many of the others, and Lawrence Livermore and other labs. But if we are going to get back in the game we have got to get our fuel cycle R&D test capabilities back to where it belongs, back in a robust area.

We are on a good trajectory now. And all I can say is strong support is greatly appreciated as we work with a private/public posture where we are finding that sweet spot to support and dispatch the technical challenges that with our

labs and our capabilities that our U.S. industry can most benefit from.

So, thank you very much for the support. And we stand ready to follow additional laws that may come in that you are moving through.

Mr. Peters. Maybe I will just explore a bit more kind of what, what areas you might see us investing in, what particular areas in nuclear that you think offer promise?

Mr. McGinnis. One is, of course, the fast test capability is very important, having testing capabilities for the new class of reactors. We are experience -- we are seeing a lot through our new industry funding opportunity mechanisms where it also becomes an opportunity to hear from industry where they most need us. Whether it is testing, whether it is benchmarking data, simulation modeling and simulation, even supporting the NRC with our modeling and simulation and supporting their development of advanced guidelines, frankly, industry needs us to support them in the data and benchmarking as they go through certification. That is one of the biggest challenges for our new innovators.

But also, having the testing capabilities, just continuing to support our reinvestment in establishing our test capability

for both the front and back end and for reactors, fuels. And also, very important, if not most important, is our efforts to support the continued life and longevity of the fleet of reactors operating in this country now.

Mr. Peters. Thank you very much. And thank you, Mr. Chairman. I yield back.

Mr. Upton. Mr. Shimkus.

Mr. Shimkus. Thank you, Mr. Chairman.

Mr. McGinnis, I have a lot to go through so let's be efficient with our time if we can. Are you aware of an enrichment facility located in Eunice, New Mexico?

Mr. McGinnis. Yes, indeed.

Mr. Shimkus. Is that enrichment facility licensed by the Nuclear Regulatory Commission?

Mr. McGinnis. Yes, indeed.

Mr. Shimkus. In order to meet future demand for high-assay low-enrichment uranium, is that facility capable of making the material for commercial use? If so, to secure the appropriate modification to its NRC licensing basis?

Mr. McGinnis. I believe yes.

Mr. Shimkus. Are you aware of a recent GAO report that found DOE's cost estimate to develop new enrichment options

lacked credibility because it was not well documented or accurate?

Mr. McGinnis. I am aware of the GAO report in general.

Mr. Shimkus. And have made no judgment on being aware of the GAO report as far as accuracy?

Mr. McGinnis. I would have to get back with you on the specifics on my view on that.

Mr. Shimkus. It is just important because as you go forward if GAO's analysis is not accurate then we don't want to do our basis of decision making on that fact.

Based on the availability of U.S. enrichment capabilities for commercial use would you agree that the U.S. Government does not need to spend billions of dollars of non-defense money to subsidize government-backed competition to an existing operational facility?

Mr. McGinnis. I certainly don't support subsidies. But I think it is premature to say whether there would be a need for a second supply for enrichment. I can tell you that some companies have come to me strongly encouraging the support of at least two suppliers to have good, robust competition and pricing. Notwithstanding, though, we are very fortunate and very thankful for having that top world class facility in New

Mexico in the form of LES.

But the question is whether -- and I am just basing it on what we are hearing from certain industry -- whether that is the final end state if they end up establishing a cascade for high-assay LEU, or do you want to get to the point where you have a couple of suppliers, such as in the fuel fabrication business where you have pretty strong competition because -- and pretty good pricing because of that competition.

Mr. Shimkus. Well, you know, other pricing debates that we have in the other realm of fuel. So, also we want, we really want to be cautious about in this time of fiscal constraints. I do believe in competition. I do believe that that drives that through. But we have dealt with government subsidization of helping infrastructure to move to markets that weren't existing. Not saying that they needed competition, but there was no business plan or model for that.

So, again, I am just raising some concerns.

Dr. Park, if the United States funds a government-sponsored facility to support both defense and non-defense purposes would you be concerned that this could send conflicting messages to the international community about developing dual-purpose fuel cycle facilities?

Mr. Park. So U.S. segment has made a commitment to international partners, for example, when they downgrade from HA-LEU to lower level LEU we would provide the fuels because, as you say, it's going to be the right thing for us to do to minimize the risks of HA-LEU falling into the wrong hands. So we need to follow through on those commitments. And we also follow through on the medical isotope production efforts and so on.

The first example that I used is high performance reactors that require the use of HA-LEU and so on. So there are different examples. But to answer your question, it actually depends on case by case. We need to actually analyze the benefits and risks and then make appropriate recommendations. So I don't think that we could provide some general, overall, you know, response that this is what we are going to do. It really depends on who the players are, who are partners are, and so on, and other considerations that we need to fold in.

Mr. Shimkus. Yes, and I was listening carefully to my colleague Scott Peters from California. And when he was asking really Mr. McGinnis what other things, you know, he was trying to reach what other things should we be looking at? My point would be we need to look at the front end here to address the

international concerns and the commitments, but also the government being involved in an area where we may not need to be involved, and how much of those non-defense dollars which are always, we are scrambling for, goes to that when there is an available, looks like there will be an available commercial production facility already in place.

So those are my concerns. We have aired them out now publicly. And with that, Mr. Chairman, thank you. I yield back my time.

Mr. Upton. The gentleman yields back. The chair would recognize the gentleman from California, Mr. McNerney.

Mr. McNerney. Thank you, Mr. Chairman.

Just last week Mr. Flores approached me and asked me if I would support his bill on HA-LEU. And I think it is a good bill. I am glad to do that. But I do have a concern about proliferation. I think that is something that we all are worried about.

The world has changed in the last few months, and I am worried about where we are going with additional capabilities, especially if it is in the commercial sector. Could you address that, Mr. Park?

Mr. Park. Your concern is to certify everybody in this

room and throughout the government system. But, again, we have not relaxed reviews and assessments of how we share our nuclear technologies with our partners, international partners and so on.

Mr. McNerney. Were you to have more commercial control of that information?

Mr. McGinnis. From my perspective, and obviously Ed McGinnis actually should chime in, but again as the person responsible for issuing the safeguards aspect of sharing the nuclear technologies we first have to evaluate the whole big picture. It is a balancing act. Cannot delay forever.

Mr. McNerney. Right.

Mr. McGinnis. We cannot expedite without actually doing the right analysis so we know what the risks are and we need to mitigate those. And as far as country partnership and the -- what we are actually concerned about is more of with the technologies that we share with country A could be sent to somewhere else without our knowing. So safeguards is not one-to-one, it's actually one of many that we have to worry about.

So that is where my guys come in to do a very careful analysis working with the State Department and other interagency partners.

Mr. McNerney. Mr. McGinnis, do you see SMRs and micro-reactors becoming prominent in the next decade or two?

Mr. McGinnis. Yes, very possibly I do. And they offer many attributes that one does not see in the current class of reactors, from far more passive safety aspects. Some of these reactors will -- are designed to safely shut down even in the event of a complete loss of power indefinitely, or a complete loss of coolant.

Some of these reactors, micro and others, reactors are smaller source term, more manageable. Some of these have life of core where you do not need refueling such as every 18 months for a fuel reactor, so, or a large reactor.

But with respect to international I would just like to make one thing very clear in my view. I have worked international as the deputy assistant secretary for 11 years. There is no other country on this planet that has a higher standard, more stringent standard on nonproliferation and safety than us. I can assure you the Russians, the Chinese, and the others, they do not insist on the level of nonpro and safety, even in our current 123 and our Part 810 process and the others. We are very proud of it. And I think you will hear the U.S. industry continue to say that is a key aspect of

our product, that we bring the safest products and with the highest levels of nonproliferation.

Mr. McNerney. Well, I think the SMR promise is good. And I am looking forward to seeing that realized in our country. And I recognize, along with everyone here I think, that the industry is struggling at the moment. But how do we make it easier for the industry to prosper without harming the NRC's ability to regulate effectively?

Mr. McGinnis. Yes, indeed, that is the question. We, in my view, we want the most efficient process for the regulatory reviews. And we want the least costly but in a manner that does not compromise in any way, shape, or form the current standard of safety. That is our objective.

The Department of Energy is ready. We made it clear with the NRC and we continue to do it, make all of our capabilities, not only in simulation and testing, available to help them and help the vendors go through this process.

Mr. McNerney. Thank you. I yield back, Mr. Chairman.

Mr. Upton. Mr. McKinley.

Mr. McKinley. Thank you, Mr. Chairman.

Not long ago the Defense Science Board put out a report that said our grid system, our national grid system is fragile,

vulnerable, and near its capacity. And as a result of that, or perhaps influenced by that, DoD has been expressing more and more of an interest in using small nuclear reactors, and much like maybe Barton was talking about, the micro-reactors on plant or on bases so that they could be islands of independence from the grid, a fascinating concept with that.

Do you, do either of you agree with the Defense Science Board, with their conclusion? Because we have been having quite a few hearings about this grid reliability, about reliability and resilience, do you agree with their, their findings that there are problems with the -- with reliability and resilience?

Mr. McGinnis. I agree that resiliency is a huge issue. And it is only going to get more challenging if we don't get new baseload plants coming in, including nuclear.

I would also say there is still no other energy source on the planet that compares to the attributes of nuclear power: clean baseload, no refueling for at least 18 months. The new SMRs coming in they could possibly go four years or longer.

With regards to resiliency and micro-reactors and the 2016 Defense Science Board, we think it certainly, while we see that it is driving the Department of Defense in evaluating their

options with micro-reactors now for that very purpose of resiliency. Obviously, resiliency --

Mr. McKinley. If I could on that, I might disagree slightly with you on that, and that is your own department there -- excuse me, DOE has come out with its own report saying that actually to improve reliability and resilience it is nuclear and coal because of the storage, the capabilities of onsite storage and the lack of interruption of supply.

So you are saying you share that concern?

Mr. McGinnis. Oh yes, indeed.

Mr. McKinley. Let me go to the next issue that is a little bit more sensitive to this. Because I am fascinated with the nuclear industry. We don't have any plants in West Virginia but we did have a shipping port that was not very far from where I live and in my district.

But not long ago, it was just last October, The Hill came out with a report that talked about how Russia's Putin was trying to influence and get involved and take more influence, control over our atomic energy business in the United States. And he was using, according to the article, there was litigation over bribery, kickbacks, extortion, and money laundering, all that took place in and around sale of Uranium One and how we -

- how CFIUS apparently dropped the ball and allowed us to lose a lot of control of our uranium.

So with this issue of nuclear energy as much, how do we, how do we restore the confidence that we are not, we are not allowing a foreign entity like Russia to influence our nuclear energy field, given that the history. And I am curious, what has taken place internally to reverse the damage that was done under the previous administration as a result of this?

Mr. McGinnis. I would say first of all it is very important to have a diversity of supply. In the United States there is about 5 percent of the uranium that comes from U.S. uranium mining miners. That is an historic low.

For enrichment, apart from LES, again which we appreciate for an enricher in the United States, but the fact is we have zero American-owned enrichers.

With regards to supply, between 17 and 20 percent of all the enrichment that comes into our nation's 99 reactors comes from Russia. There is a suspension agreement that limits them to go where they cannot supply more than 20 percent. That suspension agreement is slated to end in 2020. The Department of Commerce is following that very closely.

I can't speak to the details of what you said, but I can

say that it is very important for us to have a balanced and diverse supply, including strong supply capability for the front end, as was mentioned, for fuel supply in this country.

Mr. McKinley. And my time has expired. So I just going to ask you if you could please, could you stop by my office? I would like to have more of a conversation about this, how we -- what are the next steps that need to be done.

Thank you, and I yield back.

Mr. Upton. Mr. Green.

Mr. Green. Thank you, Mr. Chairman, and Ranking Member Rush for holding this hearing.

We are discussing these four important bills that deal with various aspects of domestic nuclear energy. As a fuel source, nuclear energy generates 20 percent of our domestic power and constitutes over 60 percent of the country's clean energy. While renewables have grown by leaps and bounds in recent years, I think it is important to remember that nuclear generation is the original environmental friendly source of power generation.

While most of our fleet is under strain from economic factors, the legislation we are discussing today has the potential to reshape our focus and bring our nuclear fleet into

the 21st Century. I particularly want to thank my friend Congressman Doyle for working on language to address the burden that our NRC fee structure places on plants.

Mr. Park, Mr. McGinnis thank you for being here today. I would like to talk about my friend Mr. Flores' bill, the Advanced Nuclear Fuel Availability Act. This legislation is aimed at addressing many of the challenges faced by the high-assay low-enriched uranium fuel, HA-LEU, or HA-LOW. I don't know how, in my Texas accent.

Mr. Park, would you talk about enriching process is different compared to the typical uranium?

Mr. Park. If you are talking about HA-LEU or H-A-L-E-U, right now the only way we can do it is by downblending from the aging stockpile that we have. Right now we can only enrich up to 5 percent. The HA-LEU is over 5 percent, below 20. So you need more work to get to HA-LEU, yes.

Mr. Green. In 2016, the Office of Defense Programs began working to establish domestic uranium enrichment capability in time to establish a supply of need for tritium production. What is the current domestic capacity for this production? And what do you expect the DOE capacity to be going forward when it comes to HA-LEU?

Mr. Park. So, right now our current projection is we will run out of tritium production capacity in about 20 years or so from today. 2038 is the projected time line. So we are actually in the Office of Defense Programs at NNSA is in the process of looking at the options to see if we can actually produce our own enrichment enriched uranium for tritium production. And what we are looking for is industry partners working with Ed McGinnis and others to actually share with us their requirements.

It might be possible for us to fold in that requirement on top of DOE. We are actually very anxious to look for purpose of opportunity with the industry partners. And so it is in progress.

Mr. Green. What are the challenges that transportation of this highly enriched uranium lead to in comparison with the typical levels of enrichment?

Mr. Park. So, obviously the 5 percent is the LEU. When you go to higher level of enrichment it requires totally different containers, transportation methods, and so on and so forth. And the quantity -- and this is worth pointing out, and I'm going to hand it over to Ed to talk about this -- quantity we are potentially facing is much larger than we ever faced.

It requires a different look at the -- a bit of R&D on top of it.

Mr. Green. Mr. McGinnis?

Mr. McGinnis. Yes, indeed. In fact, transportation is key. I would like to express appreciation for this subcommittee and the bill to address the issue of transportation. I think it is time, very timely to look at it now. We need to plan in advance to support, hopefully, a successful advanced reactor fleet coming in through the pipeline with new high-enriched or high-assay LEU fuel.

As Dr. Park said, right now we are relying on a limited and ever-decreasing supply of high-enriched uranium. Ultimately there are a couple of additional pathways one can secure that supply. And the most traditional way is through enrichment.

And as Dr. Park said, the department of -- well, the NNSA side of the Department of Energy is looking at it from defense requirements primarily in tritium production. So that time line I would suggest -- and this is part of the challenge -- we may have a much earlier time line in the commercial sector, maybe as soon, as I indicated, mid-2020s where the commercial sector will need high-assay LEU. When you get that, you also

not just need enrichment cascades, but you are going to need conversion, you are going to need fabrication, you are going to need actually new NRC license packages, transportation packages. So there is quite a lot to be done.

Mr. Green. One last question. Do you think --

Mr. Shimkus. [Presiding.] The gentleman's time has expired.

Mr. Green. -- the legislation addresses these challenges?

Mr. McGinnis. I would say that I appreciate the focus. We do believe that it addresses the challenges. And we stand ready to work with the subcommittee.

Mr. Green. Appreciate the Chairman.

Mr. Shimkus. Pretty sneaky getting that last question in there.

The Chairman now recognizes the gentleman from Illinois, and one of the authors of this legislation, Mr. Kinzinger, for five minutes.

Mr. Kinzinger. Thank you, Mr. Chairman. And thanks for your leadership on this issue as well. And thanks for holding today's hearing.

As many of you know, my district is home to four nuclear

power plants. And I continue to be deeply concerned that we are ceding U.S. global leadership in the nuclear space. I introduced H.R. 1320, the NUKE Act, with Congressman Doyle to make common sense reforms in the NRC recovery structure, fee recovery structure. And I am pleased to see it included.

I still like NUKEPA, but in the spirit of our founding fathers and compromise, I was happy to relent on that.

Section 2 of Congressman Johnson's bill requires the Secretary of Energy to report on all legal, regulatory, and commercial barriers imposed on our domestic nuclear industry. Compare those to our foreign -- compared to our foreign competitors and recommend ways to improve our global competitiveness.

Dr. Park, as part of your confirmation process you stated that you would continue to work with American companies so that they may engage in civil nuclear commerce around the world. Based on your previous experience, as well as your initial impressions leading NNSA's Defense Nuclear Proliferation Office, have you identified some of the actions that inhibit competitiveness at the U.S. nuclear industry?

Mr. Park. So the standard practice asked me that. As I mentioned earlier, we look at the big picture and we do the

best we can. And now the challenge is that the world is evolving so fast, as it was stated, in the last four months alone the world changed. And that there are new actors coming in to have more nuclear power and so on and so forth. And I need to recognize the fact that our policies, and procedures, and processes are a little bit behind time at times, and that we need to find a way to accelerate it and make it more meaningful so that we can apply the latest standards.

So I would not necessarily call them deficiencies. That is how our system works. But at the same time I appreciate your involvement and the committee's engagement so we can actually better implement the guidelines you might give to us.

Mr. Kinzinger. Thank you.

Mr. McGinnis, you have heard me speak about the DOE's Nuclear Energy International Program. Could you offer some preliminary observations about how our foreign competition, specifically the Russians and the Chinese, use state-backed resources to strategically use their civilian nuclear programs and undercut our interests?

Mr. McGinnis. Indeed they do. And they use the full breadth of resources that they can draw on from their respective governments. I have seen it firsthand with Rosatom in Russia

and the Big 3 utilities in China.

The competition, one cannot overstate how foreboding and how challenging it is for American companies to compete against states. That is the fact. That bring -- they bring financing. They bring a deep, deep coffers for training, for resources. In many other areas we are working really hard to try and support in our own -- let me back up and say what we don't want to do is try and compete and be seen like a Russian company, like a Chinese company. We believe we are far more innovative, far more appealing. We bring our systems, our safety and security. So we do believe we can compete and win.

But it takes strong government support and advocacy from the United States. And it takes -- and I think we need to all be, you know, just always continue to say we need to try and do better, in our efficiency for our regulatory reviews, for our license reviews. We need to continuously try and maintain the high level of safety while making it as easy as possible for these companies that are already in a formidable position to be able to complete and win.

Mr. Kinzinger. Let me ask you, and I am sorry to do this, but put yourself in the sick and twisted mind of Vladimir Putin. What would be the reason you would want government support for

the nuclear industry? What is your 10 or 20 year goal in that? What do you want to see a world that looks like X?

Mr. McGinnis. Well, in just my own opinion, again having worked with Rosatom employees for quite some time in a competitive way, first of all they want to dominate the nuclear sector. I don't think, at least my colleagues, I have had difficulty with my Russian company colleagues seeing the virtue of competition. It is more of a monopoly objective.

Mr. Kinzinger. And let me ask you more specifically, do you think Vladimir Putin looks at this as an economic benefit to his country or a national security benefit and ability to spread influence of Russia?

Mr. McGinnis. Oh, so my first point was economically or sectoral-wise dominating as much as possible, but strategically nuclear energy goes well beyond, certainly in foreign countries, well beyond just electricity on the grid. So when one wins a commercial nuclear deal for a reactor, it is a 100-year relationship. It is a unique leverage point one has with those foreign countries. And it is, frankly, coveted by our competitors from a strategic perspective.

Mr. Kinzinger. Thank you. And thanks, Mr. Chairman, I yield back.

Mr. Shimkus. The gentleman's time has expired. The chair now recognizes the gentleman from Pennsylvania, Mr. Doyle, for five minutes.

Mr. Doyle. Thank you, Mr. Chairman.

Dr. Park, I appreciate the department's commitment to streamlining the processing times to export nuclear-related goods under the Part 810 process. International markets represent a critical opportunity for domestic nuclear companies and their suppliers. And the ability to export these products remains important for U.S. companies. These opportunities can mean hundreds, even thousands of jobs, for hardworking Americans.

My question is, how is the NNSA working with other agencies to ensure that this trade can continue to support American jobs without violating the NDAA review requirements and without posing a threat to national security? And more specifically, can you provide more information on the agency's overall strategy with regards to exports to China?

Mr. Park. So, when it comes to China there is a very specific requirement under NDAA 2016 that requires OD&I review. And it gets very difficult. So I would be more than happy to provide additional information.

When it comes to NNSA doing its job to help accelerate the appropriate sharing, peaceful use of nuclear technologies and so on, I think that with this committee's help and assistance and guidance I think we have got the right frame of mind in terms of what we can do. For example, as I stated earlier, there is federal processing. In other words, we don't wait for State Department to achieve, to get the country assurance on safeguards. We actually do the processing as if it is a done deal and we converge at the end.

So instead of doing things in serial or the sequential manner, we do things in parallel at the same time. This new e810 process that we have adopted that you encouraged us to pursue, is being more what I call a transparency to all the users. They know what the package is. It is actually worth repeating a couple more times because instead of -- in the past they didn't know where their package was in the approval process. But now they can actually call us.

You know, some of the stories that my staff have been sharing with me, for example. You know, a couple of them got to know how to use the e810 system. It took them a while, but now they are thinking, the program managers are sitting in the back or they help because they can actually move things along

much faster than ever before. And these are repeat users that we are talking about. And I am happy to report to you, again, roughly 15 percent of the users from the commercial sector using our e810, I think that number would grow.

And so there are some really good signs with the e810 process. And, again, I need to caution all of us, you know, much of the delay does not come from our side. But, again, we have to wait for country assurances which State Department sometimes that takes a year or more.

Mr. Doyle. I would appreciate you corresponding with our office. We'd like to get a better sense of the strategy with regards to China. And I would appreciate that.

Mr. Park. Yes.

Mr. Doyle. Mr. McGinnis, I am glad to see your department's commitment to nuclear energy. We all know that investments in research in advanced nuclear technology are important, and in addition to supporting our existing fleet. I am concerned, though, that the president's fiscal year 2019 budget has proposed to reduce funding for nuclear energy by cutting $259 million below the FY 2017 enacted level.

Do you think that reforming the NRC fee structure could reduce the downward pressure on nuclear plant operators?

Mr. McGinnis. With regards to the -- thank you very much for the question. I respectfully would need to defer to the NRC as an independent agency on the fee structure. But I will say overall, obviously as indicated earlier, the fees are a significant factor in many U.S. companies attempting to get their technologies licensed and their operation license received. So it is a very significant factor.

And so we certainly support the most efficient, least costly pathway to the highest standards of safety that makes us world class products that we have to provide, so.

Mr. Doyle. Let me ask you this, too. I do think that energy markets currently consider carbon, the carbon-free attributes of nuclear energy. And we have seen state policies that take these attributes into account. And I want to -- do you support states' ability to properly account for these attributes?

Mr. McGinnis. Certainly respect the states' decisions to do, to decide how to do that. That is the states' rights. And so we approach it from a resiliency perspective, trying to address the structural issues that, frankly, at times don't price, or don't price the value of resiliency.

But with regards to states, certainly we respect that

approach to support their electricity sources.

Mr. Doyle. Thank you. I yield back, Mr. Chairman.

Mr. Upton. [Presiding.] Mr. Long.

Mr. Long. Thank you, Mr. Chairman.

Mr. McGinnis and Dr. Park, I have got a question for both of you. Dr. Lyman's testimony suggests that any country that has access to light-water reactor technology is just a step away from becoming a nuclear weapons state. However, his testimony neglects to mention International Atomic Energy Agency and international safeguards that are in place in addition to the U.S.'s capability to monitor nuclear fuel cycle programs around the world.

Would you please describe the respective roles of NNSA and the Office of Nuclear Energy in supporting the IAEA program?

Mr. Park. So, yes. NNSA does work closely with IAEA. In fact, we provide much of the technologies to IAEA and train them, and in terms of light-water reactor and so on and so forth.

Any nuclear technology that actually produces plutonium we care about, we worry about. And there are no exceptions. As I stated earlier, we actually look for these partners and how they actually protect the materials, spent fuels, or whatnots,

to make a determination as to what kind of arrangement we could have. But, again, there is no one-size-fits-all approach that we have.

But, again, the light-water reactor, the fuel does have plutonium built in, so we need to worry about the results. We cannot ignore that aspect.

Mr. Long. Mr. McGinnis?

Mr. McGinnis. Yes. The Office of Nuclear Energy also works closely with the IAEA and also the NNSA. And we do commit a significant amount of funds for that work, including for safeguards, and security, and safety ultimately, both directly and indirectly.

I would say one other point. And this is my view, it is just reality. We have these large state-owned suppliers. They are going to provide the choice if we don't provide an option to foreign countries that are considering nuclear energy. If we just say no, then they will very likely still proceed. And they will just proceed with another supplier with a lower level of safety and security. And we will also have lost a great number of other benefits, including a 100-year relationship with the highest standards of safety and security.

Mr. Long. Again for both of you, can you briefly describe

the U.S. programs to track and identify emerging international nuclear programs?

Mr. Park. So, obviously there is open literature. And we actually do track, you know, the progress being made across the world. And we have avenues as well that are more than happy to brief you at appropriate locations.

Mr. McGinnis. And we do participate in the materials tracking within the department, with NNSA playing a lead role.

Mr. Long. Well, would you agree with Mr. Lyman's assertion that any country that has access to nuclear energy can easily develop a nuclear weapons program, presumably without the international community's knowledge?

Mr. Park. So, as a physicist, is it a possibility? Yes. Is it likely? It is very difficult. Especially at the what we call the production scale, I hope our monitoring technologies, and our partnerships with IAEA, and our international partners we should be able to do a good job on who these actors might be.

And should I be concerned? Of course. But, again, we have adequate technologies to help us to monitor the situation globally. And, again, I am more than happy to provide you with additional information.

Mr. Long. Yeah, well that is what I would hope. And that is, that is what I would think. But I just wanted your opinion.

Mr. McGinnis, do you care to weigh in?

Mr. McGinnis. I do not believe it would be easy.

Mr. Long. Okay, thank you.

For you, Mr. McGinnis. In your testimony you mentioned the advancements around nuclear reactor design that are currently underway. Can you talk a little bit about these technologies and, if proven to work, how they can help revolutionize or revitalize, excuse me, revitalize our nuclear energy sector?

Mr. McGinnis. Thank you very much. Yes, we are in my view at the precipice of an entirely new, innovative phase in the U.S. nuclear energy sector. I don't say that lightly. We are seeing it happen right now.

The advance reactors such as the advanced SMR for the first time going through the NRC, receiving the first phase approval, including passive safety features, validates that they do not need any electric pumps or motors in order to be able to safely shut down because of the passive safety system. This is just one example of many of the advanced reactor designs that are coming out of the United States' nuclear innovation community

that offers a step change, step change improvement on what is already strong safety in our reactors, number one.

Number two is their versatility. We are witnessing reactors being designed that are unlike anything we have seen. We have reactors, advanced reactors that are designed to be able to go from 0 to 100 percent power in 60 minutes. That is load following. We haven't seen that with large reactors.

We have finance ability for the advanced reactors unlike what we have seen. Instead of $8 billion per unit, not including financing, we are talking maybe a billion, maybe a billion and a half for a substantial generating capacity.

We also have distributed opportunity where we have the opportunity now to place smaller reactors, modular scaled-up reactors in locations we never could do with a large reactor. So, product choice, versatility in application, desalinization or hydrogen production, this is an entirely new class of disruptive reactors, and that is why we are so excited about this.

Mr. Long. This is a very important hearing we are having here today. And I want to thank both of you for taking the time to be here and sharing your knowledge with us.

Mr. Chairman, I yield back.

Mr. Upton. The gentleman yields back.

Mr. Tonko.

Mr. Tonko. Thank you. Thank you, Mr. Chair. And thank you, gentlemen, for joining us and for your insights on these bills.

Administrator Park, Dr. Park, I have a few questions on the discussion draft that addresses the Part 810 process. It is my understanding that Section 3 would expedite the review process for, and I quote, "low proliferation risk reactor technologies." However, I do not believe that these technologies are defined in the draft.

Can you offer us a sense of what types of technologies would be captured by these low proliferation risk reactor technologies?

Mr. Park. Yes. So, obviously this is interagency effort. DOE does have a lead on determining what would go in the category, but at the same time we need to coordinate that review process with the other agencies, including State for example. Again, it's to a large extent a case-by-case. But there is no single category that says if it falls in the category it's great for all. It doesn't work that way.

Really because one agency appreciates or gives us

flexibility at the same time as different challenges. But what is in the middle is country assurance. And that actually changes the calculation by the way. If it is a country that we have a 123 agreement with, it is straightforward. But, again, if it is not one of those countries, or China, India, or other countries it is very difficult. So we need to look at it from what I call a totality or big picture perspective.

So to that extent you can actually categorize as light-water, low-risk, et cetera, but it really depends on who the recipient are.

Mr. Tonko. Thank you. Currently, would those Part 810 reviews qualify as low proliferation risks?

Mr. Park. I need to get back to you. I don't, basically don't have specifics on.

Mr. Tonko. Okay, thank you. Does the Part 810 process look just at the technology or also the conditions within the potential partner country? That is to say is the current review process the same for each potential partner country?

Mr. Park. I also need to get back to you because it is quite different from, you know, case to case. So maybe it might be more appropriate for us to give you solid data with a sample, with great examples as to what we are doing for several

countries so you have appreciation for the challenges that we have.

Mr. Tonko. Okay. And you will forward that to us?

Mr. Park. Yes.

Mr. Tonko. Your testimony mentions that currently the lengthiest part of the review is the time it takes partner countries to provide the required governmental nonproliferation assurances. Can you give us some examples of these assurances?

Mr. Park. So, we actually apply conditions so that they can actually enjoy U.S.-developed technologies. But these conditions require that they do not share with the third parties, and they do not actually modify without conditions and so on. It goes on and on and on.

Oftentimes the host countries or the recipient countries when I think about this because there are obviously ramifications for they sign up for some things without fully understanding. But so it's along that line that satisfies.

Mr. Tonko. But are these assurances different for each export partner country?

Mr. Park. To a large extent. There is variation, obviously. As, for example, countries that we have a 123 agreements went through the review process with us at the

highest level, so they know the what I call boundary conditions as to how to receive our U.S.-developed technologies.

But, again, when you leave that small group of countries, which is 20-some-odd countries, the rest of the world still needs to go through the category process, how they respond to our requests and so on. We do a lot of hand holding but there is a limit as to how much we can do. We cannot speak for those countries.

Mr. Tonko. My understanding is that the discussion draft would allow DOE to continue the review while it waits for the State Department to secure the assurances. Would this bill reduce or limit the time it takes for the State Department to secure those given assurances?

Mr. Park. It is a separate process, somewhat decoupled. At the same time because of our experience working with our international partners and our industry partners who are actually trying to export the technologies, I think we can actually give them the right answers. It is up to them whether to take them or not. But, again, we can actually show them what steps they need to take. And, again, this is open to test, if I can use that phrase.

Mr. Tonko. But do you think there should be limitations

on how long the State Department might have to obtain these assurances?

Mr. Park. So, it also depends on whether we have agreement with a country. I would stress, as was stated, that it really depends on what kind of assurance they provide us to safeguard our technologies.

The biggest fear I personally have is our technologies go into wrong hands and we don't have any assurance that we know what they do with that technology that we have transferred. Safeguards concerns are monumental in what we do, even in the 810 process.

Mr. Tonko. So those limitations are -- could be critical.

Mr. Park. Yes.

Mr. Tonko. With that, Mr. Chair, I thank you and yield back.

Mr. Upton. The gentleman yields back.

Dr. Bucshon.

Mr. Bucshon. Thank you, Mr. Chairman.

The Department of Energy's public/private partnership with Nuscale Power which followed a similar effort that led to the licensing and construction of Southern Company's new nuclear reactors has proven to be a successful model to address a costly

regulatory approval process for new nuclear technologies. Congressman Flores' legislation builds on that model with a public/private partnership for advanced nuclear fuel needs.

Mr. McGinnis, DOE's Isotope Program includes an industry consortium to help meet specific needs, material needs of californium-252, which is used for an assortment of industrial applications. This consortium could be a model for the consortium in Mr. Flores' bill.

Has your office discussed how the Isotope Consortium could apply to an advanced fuel program?

Mr. McGinnis. Thank you very much. Isotope production is very important. There are certainly applications for advanced reactor technologies. But with regards to the lead for isotope production, that is both within the Office of Science and also NNSA. So if you don't mind, respectfully I may ask Dr. Park. I don't know if you have any refer -- anything you want to say on the isotope production.

Mr. Park. If it is appropriate we will get back to you because it involves yet another member within DOE family, and they do more of that work. And isotope production that we are responsible for is really just purifications for medical isotopes or in R&D, so.

Mr. Bucshon. Yeah, if you can get a response back to the committee that would be great. I would appreciate it.

I yield the balance of my time to Mr. Shimkus.

Mr. Shimkus. I thank my colleague.

I just wanted to follow up on Adam Kinzinger's comments about the international aspect of this. I deal a lot with the Baltic countries, Eastern European issues, so I focus a lot on the Astravets plant being constructed on the border between Lithuania and Belarus. And I just want to highlight a couple issues on this.

The International Atomic Energy Commission recommended a six-step process to review building of nuclear power plants to prevent disasters like Chernobyl and also, recently, Fukushima. Belarus has chosen to skip four to six steps. That already identifies a concern.

The president of, when asked why they want to build this plant the president of Belarus said, "This is a," and I quote, "a fishbone in the throat of the European Union and the Baltic States." So it is not a power plant being constructed for energy security, energy efficiency, it is really economic warfare against Eastern European countries.

Nuclear power plants in sensitive areas should be

discussed within the Espoo Convention, which this is not. Nearly all of Lithuania is 300 kilometers of the plant, which means that if a disaster were to strike, long-term food consumption in the country could be affected, the drinking water could be affected.

But there is also concerns, again highlighting what Adam was trying to raise on the national security aspects of this. Incidents occurring and cast on Belarus' commitment to working with neighbors and ensuring the plant's safety. In 2016, six serious incidents occurred, and Belarus has failed to be up front with Lithuania about any of them. A 330-ton nuclear reactor shell was allegedly dropped from about 13 feet. This was two summers ago now, not last summer. Belarus did not reveal anything about the incident until independent media reported it, and then downplayed it.

Earlier, a structural frame at the site collapsed after workers, apparently under time pressure, filled it too quickly.

So, and this is all based upon a statement in the record I did for the Congressional Record on the floor just raising this issue. So the international concern, state-sponsored actors versus competitive marketplace do bring a point of needed discussion to this debate. So I appreciate that. I just

wanted to be additive to what Congressman Kinzinger has stated.

With that, I want to thank my colleague from Indiana and yield back to him.

Mr. Bucshon. Yeah, I yield back, Mr. Chairman.

Mr. Upton. The gentleman yields back.

We now recognize the gentlewoman from Florida, Ms. Castor.

Ms. Castor. Thank you very much. And thank you, Dr. Park and Mr. McGinnis, for being here today.

I am very passionate about the United States remaining a leader in technology and innovation, especially in nuclear energy. I believe the commercialization of nuclear technology can be positive in that expanding and exporting this technology can be beneficial to businesses here on our economy and on international security.

But I have concerns about the discussion draft that makes changes to DOE's Part 810 process. I believe the Secretary of Energy should have more discretion when reviewing authorization. But I question whether or not the legislation as drafted is as precise as it should be, actually providing a firm definition of low proliferation risk.

And then I am also concerned that the application time line for low proliferation risk reactor technology will be

untenable in the long run.

Dr. Park, can you share with us how DOE currently defines low proliferation risk?

Mr. Park. So with the -- because of the many different parameters in reviewing the applications, for example, again the biggest factor is the recipient country risk. It is not a simple formula that actually would work for us. So only as they fit in the certain categories, for example, as I stated earlier, if we already have established a relationship through 123 agreements we can go through a 5-week expedited process. It is not a big deal. We actually have done that before.

But, again, if you don't belong in that category it becomes much more difficult. We need to actually work with them so they know what we are looking for and they can provide responses that we need to have to make sure that our technologies aren't shared in a manner that is not appropriate.

So I do appreciate the fact that we need to find a way to expedite the processes. Again, we are somewhat limited in what we can do in terms of whether they already have an agreement with us or not. So, to that extent I would like to look for ways to work in these countries as best as we can so we can minimize, we can actually manage the risks in sharing U.S.

technologies with these countries.

I do apologize for giving you a roundabout answer, but it really depends on who the host countries are.

Ms. Castor. Mr. McGinnis, do you have a comment on that?

Mr. McGinnis. Just to say obviously the Office of Nuclear Energy as mentioned, the U.S. nuclear industry greatly relies upon this very important Part 810 process, as well as the two other export control authorities at the Department of Commerce and also NRC, as well as the 123. So this is a process, I think, that we are all collectively always trying to improve.

Ms. Castor. Maybe you can rally those folks to look at that, that portion of and definition.

Mr. McGinnis. Yes.

Ms. Castor. That would be helpful.

Mr. McGinnis. Will do.

Ms. Castor. Dr. Park, do you foresee any challenges with the draft legislation that could hinder the U.S. as a producer of commercialized nuclear technology?

Mr. Park. I don't see any showstoppers. If I can give you that as a response. The fact that the committee is very involved with us and asking our technical assistance and explications, we welcome it. We look forward to continue the

relationship. I think it is a positive step where we see many positive signs.

Ms. Castor. How about national security risk? I know you can't go into detail, great detail there, but are there any national security risks that could develop as a result of the changes made in the discussion draft?

Mr. Park. There are always possibilities and potentials. And I think we are comfortable, we are confident that we can actually mitigate some of those risks along the way. And again, the minimizing and managing risks is what we do on NNSA's side. And so far I think that we have a pretty good handle on how to move forward with this whole situation and as far as the process of technology sharing and so on and so forth.

But again, there are some things that just take time. And we appreciate your patience on it.

Ms. Castor. Sometimes time is important when we are talking about national security. But I, I believe that the U.S. has to remain the leader in nuclear technology. And as I mentioned before, there are many benefits associated with reforming Part 810, but there could also be unintended consequences. And that's what we need to focus on.

I want to ensure, I want to ensure that we are proactive

and efficient, as you said, when it comes to the commercialization of the nuclear technology. But we are counting on you and the experts out there to help poke and prod at this piece of legislation to make sure there are not unintended consequences.

Mr. Park. We will. And we will work with you.

Ms. Castor. Thank you. And I yield back.

Mr. Johnson. [Presiding.] The gentlewoman yields back. The chair now recognizes himself for five minutes.

Dr. Park, I understand that for many years the department allowed the secretary to delegate signature authority on Part 810 authorizations. And it was only recently that DOE's general counsel revised its previous interpretation to disallow this delegation.

Section 3 of my discussion draft simply clarifies in the Atomic Energy Act that the previous process was acceptable. So do you know if there were any delegations to your knowledge that involved unacceptable proliferation risk or created an unacceptable lack of visibility by the secretary's office over the proposed exports?

Mr. Park. So, my understanding is that there was not a delegation because of interpretation of the law, the way our

general counsel read the law. And it is not because of lack of the appreciation for our technical staff.

But again, we actually welcome this opportunity to delegate some of these "routine" things, although there is nothing routine about sharing nuclear technologies. But again, we appreciate it.

Mr. Johnson. But I mean back when they were, because it was previously delegation was allowed. So when delegation was allowed are you aware of any delegations that, that involved any unacceptable proliferation risks?

Mr. Park. I don't think there was any delegation in the past. That's my understanding.

I am more than happy to correct myself after this hearing and get back to you.

Mr. Johnson. Okay. Well, based on your understanding of the decision, was the legal interpretation made in any way because staff weren't qualified or able to appropriately consider the impacts of the specific application?

Mr. Park. Not at all. I think there is the highest confidence from the beginning of all the secretaries we have had on the individual qualifications and their judgment. It is a matter of how one read the law, and it is as simple as

that.

Mr. Johnson. Back to that first question. Would you, would you go back and take a look at that? Would you look and see if there were any delegations? Because it was my understanding that we used to do it that way and that there were. So I would like to clear that one up.

Mr. Park. We will get back to you.

Mr. Johnson. Okay, thank you.

Based on NNSA's review of the process, would enactment of this bill to revert to the previous delegation process have the practical effect of shortening the review process with minimal proliferation risk? Do you think it is a smart thing to do?

Mr. Park. One word answer: yes. And obviously, as a physicist I will give you a 10-minute answer which you don't need right now. But, again, I think there are enough good qualities in the proposed legislation, and we will work with you. I think this is positive. So, there are many things that we know how to fix. And this legislation will certainly help us to achieve that goal.

Mr. Johnson. Okay. All right.

Dr. Park, continuing on, could reverting to the pre-2005 process by which DOE can review an authorization in a concurrent

process as the State Department's required process, would that help reduce the overall time frame, approval time frame?

Mr. Park. Yes. The biggest challenge, again, is waiting for our partner countries to provide assurances. And there is just no simple way to get the answers.

At the same time, one of the things that we have been doing is that we actually give "credit" for these countries having 123 agreements with us. So there are some exceptions that allow us to accelerate the sharing the technologies. But, again, there are just a few dozen countries that we have a relationship with.

Mr. Johnson. Okay. All right. And would this change to the approvable process in any way reduce information that is reviewed, weaken the rigor of such reviews, or alter the various agencies that concur, consult on the authorization in a manner that could undermine our national security interests?

Mr. Park. So when I look at the positive side of this legislation it might actually help us because, for example, this online system would allow all the reviewers to actually look at each others' comments, for example, in real time. So I see potential positive changes that this system, this legislation will produce. But, also, we will look for

unintended consequences along the way. You don't want to hurry up too fast, too much on some of the review processes.

But, again, there are enough positive signs that we are really embracing this legislation.

Mr. Johnson. Okay. All right. Well, I will yield back my total of 21 seconds. And with that I think we have no colleagues on the left that want to ask questions.

Mr. Flores, you are recognized for five minutes.

Mr. Flores. Well, thank you, Mr. Chairman. I want to thank the witnesses also for joining us today. This is an important discussion and nuclear power is the ultimate admissions-free, green power source, particularly when it comes to the generation of baseload electricity. And so it is important for our country moving forward, not only for economic opportunity, national security, and also for the environment.

Earlier this year I asked both Under Secretary Menezes and you, Mr. McGinnis, about collaborating to develop a policy to provide high-assay LEU. NNSA officials also testified at both of these hearings. Thus far DOE and NNSA's input in this discussion draft has been limited.

Dr. Park's testimony notes that there are efforts underway relating to high-assay LEU, and I hope to increase our

collaboration as we work towards formally introducing this legislation.

Let's turn to a few questions. One provision in my discussion draft relates to the need to develop what is known as criticality benchmark data. This data is important to develop the underlying information to establish the necessary safe regulatory framework for the provision of nuclear fuels. Mr. McGinnis, can you succinctly describe the nature of this criticality information, why it is necessary, and what government or non-government facilities will be able to gather this type of data?

Mr. McGinnis. Thank you very much. The benchmarking data is very important for a number of reasons, including transportation and packaging. This, in part, is because the criticality issues where you have a higher level of enrichment, and so whether it is needing new NRC licensed transportation systems to be able to transport in the U.S. enriched fuel above 5 percent, much of the fuel that is anticipated to be needed will be as high as 17, 18, or 19 percent.

Mr. Flores. Right.

Mr. McGinnis. So the configuration, the way the materials is packaged. But a lot of this also is driven by what we are

waiting on. And that is waiting to get a better sense, even though we want to get as much data as possible, who are the first movers? And what are the types of reactors are we talking about or are we talking oxide fuel? And different reactors designs have different types of fuels.

Then there are other options for transportation as well, including in gas form.

Mr. Flores. Can we move to the next part of the question, that is, what government or non-government facilities will be able to gather this type of data?

Mr. McGinnis. Well, the Department of Energy -- first of all let me, again, recognize that the front end enrichment capacity is addressed, is being addressed fairly well in the U.S., particular by -- in particular by LES for the enrichment services. And I would say that the industry is poised to respond to additional needs, including high-assay LEU when they see the market coming and the customers coming in at a sufficient volume. So, in the meantime the Department of Energy does stand ready to make available its facilities to be able to do that data benchmarking, and other testing.

We are doing some now. We are working with industry now in order to get as much of a clear understanding of what types

of fuels are going to be needed when.

Mr. Flores. Okay. Dr. Park, you indicate in your testimony that you agree that advanced reactors will require HA-LEU. You note further that you will evaluate that need alongside the needs for our nation's defense programs. The question is are these two programs on the same time frame or different time frames?

According to your testimony there is ample fuel for weapons use available today. But it is unclear that there will be ample fuel for advanced civilian reactor use over the next ten years. Is it appropriate to suggest that DOE's civilian nuclear program should focus on the near term commercial needs while your office can look at the longer term defense enrichment requirements?

Mr. Park. So, as it turns out, even for the self-absorption program tritium production requirement that we need to start the work today because of the long lead time it takes to get the production up and running. So time is appropriate for us to collect the requirements from industry partners.

It doesn't necessarily mean we will incorporate the commercial sectors we find through our DOE. Our commitment is to review all possibilities and make sure we stretch every

dollar that we have to produce the enriched uranium. But, again, at the earliest moment we can collect and incorporate the requirements we will have a better idea as to what actions are available. If indeed we start with the enriched uranium enrichment then later it will stretch out into much longer and that will give us more options in terms of entertaining possibilities of supporting commercial sectors.

So it really depends on the requirements within --

Mr. Flores. It is possible our bill could help you in terms of our nation's defense needs, as well as taking care of HA-LEU for advanced, for the advanced sector.

Okay, we have run out of time. I will submit additional questions for the record. I appreciate those responses.

Thank you. I yield back.

[The information follows:]

********** COMMITTEE INSERT 4 **********

Mr. Johnson. The gentleman yields back. And I want to, seeing that there are -- I am sorry, I didn't see Mr. Griffith walk in. Mr. Griffith is recognized for five minutes.

Mr. Griffith. Thank you very much.

Mr. McGinnis, nearly a year ago President Trump announced the Administration was going to conduct a complete review of the nation's civil nuclear policy. Following your appearance before this committee in early February you were asked to provide information for the record regarding this ongoing review. Nearly three months after those questions were submitted to you we have not yet received a response from you or your team.

So, I would like to ask a few questions about this ongoing civil nuclear review, and I would request that you please answer yes or no so we have time to get to all of them.

As a principal on the National Security Council is the Secretary of Energy providing direct input into this ongoing review? Yes or no?

Mr. McGinnis. Yes.

Mr. Griffith. Are you aware if the review is engaging with other governmental agencies such as the Department of Commerce and the Department of State?

Mr. McGinnis. Yes.

Mr. Griffith. Are you aware if this review is receiving input from non-government stakeholders?

Mr. McGinnis. I cannot say yes or no on that one. I do not know.

Mr. Griffith. Okay, thank you.

Are you aware if the review intends to seek input from Congress to inform the review?

Mr. McGinnis. Again, I can't speak for the White House on whether they, when they plan, if they plan to give input.

Mr. Griffith. But input's a good thing from Congress, wouldn't you agree? Yes or no?

Mr. McGinnis. It's a good thing.

Mr. Griffith. All right. To the best of your understanding, and obviously this can't be yes or no, to the best of your understanding when do you expect the review to be completed?

Mr. McGinnis. I do not know the answer to that, other than the fact that I can tell you that we have attended quite a few meetings, very substantive. We have made significant progress.

And I can also say that our charge at the Department was

not to wait for any completion to be able to do things that we can do now, whether it is known guarantees, whether it is notice of proposed rulemaking, whether it is industry quotas or supporting the revitalization.

Mr. Griffith. And I appreciate that. And I hope included in that would be recommendations that you need legislative support. And that was the last of my series of questions as to the best of your understanding where the review makes specific legislative recommendations for Congress to consider. And I would hope that even if it is not finished, if you find one let us know, because we cannot operate on those suggestions if you don't give them to us.

Mr. McGinnis. And, respectfully, I would like to apologize for not getting those answers to you. I am fully aware of them. I have been part of that process giving the answers. But, unfortunately, it is taking longer than we had hoped for to get them back to you. We will get them back to you.

Mr. Griffith. Well, I appreciate that. I am glad we were able to clear this up a little bit today.

As this morning's hearing clearly indicates, as well as the dozens of other Energy and Commerce Committee hearings in

this Congress there is a strong bipartisan support to address key challenges confronting our nation's nuclear sector. And I hope the Administration will commit to working with us as we go forward.

Mr. McGinnis. Absolutely.

Mr. Griffith. Thank you very much. And I yield back.

Mr. Johnson. The gentleman yields back.

We are now pleased to recognize the gentleman from North Carolina, Mr. Hudson, for five minutes.

Mr. Hudson. Thank you, Mr. Chairman. I want to first thank Chairman Upton and Ranking Member Rush for holding this very important hearing. Thank both our witnesses for being here and taking so much time with us.

A number of studies have identified the potential benefits of applying advanced nuclear reactor designs to fill specific national security needs. Mr. McGinnis, you have talked a lot about the micro-reactors and sort of what you see in the future. I represent Fort Bragg, the largest military base in America. This is an issue that I am very interested in.

I believe it is critical that we have your input on how we can improve the safety and security of our soldiers in the field on military installations, as well as critical DOE sites

around the country. Mr. McGinnis, I asked for information regarding ongoing DOE and Department of Defense discussions on this topic back in February after a subcommittee hearing. And I am disappointed that I haven't gotten any response. I really wanted to get some of this feedback as we were developing my discussion draft.

I hope you will carry this message back to the department's senior leadership that this committee expects more timely and coordinated response in advance on our agenda because, again, we value your input and think it will improve the process.

Mr. McGinnis. Again I apologize. But I would like to reinforce the importance of micro-reactors as a key aspect potentially for resiliency and also, of course, security, establishing a secure energy supply chain by having indigenous generation on site. So there is tremendous potential value to having a micro-reactor potentially on site supplying power for a base or other federal or non-federal facility.

Mr. Hudson. I appreciate that.

And I want to thank Mr. Peters for working with me on the discussion draft. Our discussion draft asks a number of questions to help identify key components of how a pilot program might be developed. Briefly, Mr. McGinnis, are the topics in

this bipartisan bill the right questions to ask for Congress to make a fully informed decision on the framework of this pilot program?

Mr. McGinnis. Yes, indeed. In fact, I have been meaning to say how timely and how appropriate and, frankly, how important the issues that have been addressed, are addressed in these four pieces of legislation, are incredibly important. We are in a key moment in time to revitalize, and the support as we are seeing in this legislation, the issues that are going to be vital if we are to succeed.

Mr. Hudson. Thank you for that.

Are there any additional issues that we should be aware of relative to, particularly, my discussion draft?

Mr. McGinnis. Just to say, again, we are in a key moment in time. Industry needs all the help we can give them in the appropriate way to get back on a revitalized footing to be able to not only supply resilient power in the United States but to be globally very, very competitive. Thank you.

Mr. Hudson. I appreciate that.

Dr. Park, Congressman Johnson's discussion draft includes a section that creates an expedited process or procedures for low proliferation risk technologies. Will you please describe

how you envision the development and implementation of that process?

Mr. Park. As we have been building up the cases where we were able to, we are able to transfer technologies we would like to be able to copy that over as much as possible. But, again, there are challenges related to who the host countries are. So we still need to juggle both ends to make sure we actually provide technology assurances at the same time we do expedited process and approval. So it's a balancing act.

Mr. Hudson. Appreciate that.

Like the other sections of this discussion draft, these procedures will help enable our domestic suppliers to more effectively compete in the world market, as has been mentioned by my colleagues, while not impacting our national security interests, and allowing NNSA to focus on the applications that truly present national security risks. Do you believe this section will have that intended effect? Do you think we strike the right balance?

Mr. Park. I think it is on the right path.

Mr. Hudson. Great. I appreciate that. And with that, Mr. Chairman, I yield back.

Mr. Johnson. The gentleman yields back.

And now seeing that there are no further members wishing to ask questions I would like to thank our panelists, our witnesses for joining us here today. You are excused.

We will call up our second panel, if they would take their seats. These include Jeffrey S. Merrifield, partner at Pillsbury Winthrop Shaw Pittman; and Melissa Mann, President of URENCO; Nick Irvin, Director, Research and Development for Strategy in Advanced Nuclear Technology, Southern Company; and Edwin Lyman, Senior Scientist, Global Security Program, Union of Concerned Scientists.

And as soon as our second panel takes their seat, just for members' understanding and information, we will get through as many of these introductory or the witness testimonies as possible before we have to break for an anticipated vote sometime in the next 10, 15 minutes or so.

So, with that, Mr. Merrifield, would recognize you for five minutes.

STATEMENTS OF HON. JEFFREY S. MERRIFIELD, PARTNER, PILLSBURY WINTHROP SHAW PITTMAN LLP, ON BEHALF OF CLEARPATH ACTION; MELISSA C. MANN, PRESIDENT, URENCO USA, INCORPORATED, ON BEHALF OF U.S. NUCLEAR INDUSTRY COUNCIL; JAMES NICHOLAS IRVIN, DIRECTOR, RESEARCH AND DEVELOPMENT FOR STRATEGY, ADVANCED NUCLEAR, AND CROSSCUTTING TECHNOLOGY, SOUTHERN COMPANY; AND EDWIN LYMAN, SENIOR SCIENTIST, GLOBAL SECURITY PROGRAM, UNION OF CONCERNED SCIENTISTS

STATEMENT OF HON. JEFFREY S. MERRIFIELD

Mr. Merrifield. Thank you. Chairman, Ranking Member Rush, and members of the subcommittee, it is a pleasure to testify before a committee that I had the opportunity to be in front of when I was an NRC commissioner. I am here today as a senior advisor to ClearPath Action, although I am a full-time partner in Pillsbury Law.

Founded by businessman Jay Faison, ClearPath Action's mission is to accelerate conservative clean energy solutions. To advance the mission, ClearPath Action develops cutting-edge policy and messaging and works with policymakers and industry.

During my time at the NRC and in positions I have held

since then, I have had the opportunity to visit all 99 nuclear power plants in the United States, and over half of the 450 nuclear power plants around the world. I have been impressed by the commitment to excellence in nuclear power operations that I have seen at all the plants I have visited.

I would first like to turn to the matter of advanced nuclear reactors. These designs, which utilize high temperature gas, molten salt, and liquid metal, among other designs, range from micro-reactors of a few megawatts to large gigawatt-size reactors. While they represent a diversity of sizes and cooling methods, they generally possess enhanced safety features as well as improved economics when compared to existing reactors.

In a report issued by ClearPath in the Nuclear Industry Council in February, Pillsbury identified that of the over 50 advanced reactor designs in North America the vast majority of these are planning to use higher enrichments of fuel, typically between 8 and 19.75 percent. And some of these designs could come to the U.S. market by the mid to late 2020s.

As the development of a fuel supply and regulatory approval can take multiple years, work must begin immediately to ensure a sufficient supply of this high-assay low-enriched uranium.

Unfortunately, the Department of Energy, which has been a traditional supplier of these enriched levels of material, does not currently possess the high-assay enriched uranium or enrichment capabilities that are needed for advanced reactors as the current inventory is dedicated to other needs such as research reactors and the Navy propulsion program.

The draft legislation sponsored by Representative Flores is a positive step in the right direction to address the need for DOE to create an inventory of HA-LEU material, the need for criticality information to develop and license transportation packages, and the need for the NRC to develop an appropriate and timely licensing framework.

In addition to strongly supporting this legislation, ClearPath Action's written comments provide specific suggestions for improving this legislation.

We also support the draft legislation offered by Congressman Wilson to require the DOE to prepare a report on the potential deployment of privately-developed micro-reactors at DoD and DOE facilities. ClearPath's written testimony also includes a recommendation for strengthening this legislation.

The NRC has continued to make commendable progress in rightsizing its workforce and budget. ClearPath Action

2256 believes the Commission can and should take further steps to
2257 streamline its services consistent with the mission to protect
2258 public health, safety, and the environment.
2259 The legislation sponsored by Congressman Kinzinger and
2260 Congressman Doyle appears to be a common sense step to provide
2261 the agency with a funding mechanism that aligns its mission and
2262 costs. We applaud the provision that excludes fees for the
2263 development of the regulatory infrastructure for advanced
2264 reactor technologies. We believe this exclusion will allow the
2265 NRC to be appropriately prepared to review these technologies,
2266 yet avoid placing the cost burden for these preparations on the
2267 nascent developers of these promising designs.
2268 As it relates to the provision in the bill to require a
2269 study about the elimination of the Foreign Licensing
2270 Restrictions of Section 103(d) and 104(d) of the Atomic Energy
2271 Act, while I would prefer the outright elimination of the
2272 ownership requirement, I understand the rationale for
2273 commissioning a study and support it.
2274 Recently, the U.S. has had several perfectly good nuclear
2275 reactors shut down for economic reasons. Previously, Pillsbury
2276 was previously approached by several European utilities who
2277 were interested in purchasing U.S. nuclear reactors but were

prohibited from doing so. Eliminating this requirement could provide an opportunity to save these vital clean energy facilities through investment by friendly foreign utilities.

I would note that in 2008, British Energy's nuclear fleet faced similar financial hardships, and a decision to permit EDF to purchase these units allowed the continued operation of these clean UK energy assets.

We have reviewed the draft submitted by Congressman Johnson to facilitate the process by which DOE authorizes export of civilian nuclear technologies. We believe this legis -- we support this legislation and believe it makes an important step to further streamline the process for some applications submitted under 10 C.F.R. Part 50.10. That said, we remain concerned that the legislation only targets a limited portion of the nuclear technology export approvals process. We have submitted some specific suggestions for improvement in our written testimony.

Thank you. And we thank you for allowing me to testify on this important topic.

[The prepared statement of Mr. Merrifield follows:]

********** INSERT 6 **********

Mr. Johnson. Thank you, Mr. Merrifield.

Ms. Mann, you are now recognized for five minutes.

STATEMENT OF MELISSA C. MANN

Ms. Mann. Thank you, Mr. Chairman, Ranking Member Rush, and members of the subcommittee. We appreciate your leadership on nuclear energy issues. And it is a privilege to speak with you today about means of increasing the competitiveness of the nuclear fleet and advancing advanced technologies and infrastructure.

I am Melissa Mann.

Mr. Johnson. Ms. Mann, could you move a little closer to the mike, please. Thank you.

Ms. Mann. I am Melissa Mann, President of URENCO USA and the owner of the only operating uranium enrichment facility in the United States. But I am also here today as a member of the U.S. Nuclear Industry Council, whose 82 members represent the full breadth of the nuclear supply chain.

On behalf of the Council we salute the full committee and this subcommittee's laser focus on sustaining the current fleet and pushing forward advanced technologies. And we salute the multifaceted initiatives that are covered by the four bills under discussion today. I would like to focus specifically on Mr. Flores' discussion draft on what we now know we call HA-

LEU or high-assay low-enriched uranium.

The current nuclear fleet relies on a uranium fuel enriched to just under 5 percent in the uranium-235 isotope. And we have a fuel cycle that is able to process that material. But a comparable fuel cycle does not exist for many advanced designs because they require higher enrichment at levels above 5 but just below 20 percent.

There is a broad community of users who would benefit from HA-LEU supply. They include research and test reactors, including those currently fueled by the Department of Energy, both here and abroad.

It includes many advanced reactor designs and advanced fuels, including accident tolerant fuels.

It includes producers of targets for medical isotope production, and even existing light-water reactors who are seeking certain fuel reliability and cost performance enhancers.

A complete and sustainable HA-LEU fuel cycle would necessarily include three components: an enrichment facility; a conversion facility to take that material to the form of metal or oxide; and one or more fabrication facilities to manufacture the full type of fuel forms required.

2346 And there is a strong potential to develop the HA-LEU fuel
2347 cycle in the United States. The New Mexico enrichment plant,
2348 the technology that it uses is already capable of producing at
2349 the full gamut of HA-LEU enrichments. And only an NRC license
2350 amendment is required to bring that capacity to bear.
2351 Two fabrication facilities supporting NNSA missions
2352 already operate at much higher enrichment levels, demonstrating
2353 both the viability of licensing and operating at these greater
2354 enrichments.
2355 There is several, three in particular, critical fleet
2356 conditions that need to be met before we can move forward:
2357 First, it is imperative that you license and develop the
2358 enrichment, conversion, and fabrication capabilities
2359 concurrently, otherwise you will have critical gaps.
2360 Secondly, we need a predictable and streamlined licensing
2361 framework, and the regulator needs the appropriate resources
2362 to manage timely and contemporaneous reviews.
2363 And we have talked a little bit about nuclear criticality
2364 benchmarks. We need those both for the fixed facilities and
2365 for transportation packages. We are also seeking clear NRC
2366 guidance on physical protection, security, and material control
2367 and accountability.

2368 And, finally, those companies that are making investments
2369 in HA-LEU facilities need to be assured of a reasonable return
2370 on investment. A consortium-based approach to full operation
2371 would be, as envisioned by this discussion draft, a good step
2372 in that direction.
2373 I am speaking about these recommendations not just as a
2374 member of the fuel cycle. My company is also a designer of a
2375 small micro-reactor, 10 megawatt thermal high temperature gas-
2376 cooled design that itself relies on HA-LEU. What we know is
2377 that without fuel, reactors don't run. And that is perhaps the
2378 most significant aspect of the discussion draft, that it
2379 recognizes the need for collaboration, because unless the users
2380 of this material, the fuel cycle itself, the department, and
2381 the NRC effectively hold hands and jump forward together we
2382 won't be able to reap the benefit of these designs.
2383 Thank you.
2384 [The prepared statement of Ms. Mann follows:]
2385
2386 ********** INSERT 7 **********

Mr. Johnson. Ms. Mann yields back. Mr. Irvin, you are now recognized for five minutes. And if I could remind our witnesses votes have just been called. We are going to get through both of your testimonies. Don't want to cut you short but we will not hold it against you if you speak fast.

STATEMENT OF JAMES NICHOLAS IRVIN

Mr. Irvin. Shouldn't be a problem as I am from Alabama, sir. We speak pretty fast in the south.

Thank you for the opportunity, Mr. Chairman, thank you, Member Rush, to appear before you about this very important topic of advanced nuclear technology. My name is Nick Irvin. I am the Director of R&D at Southern Company. And I have responsibility for developing advanced reactor technology, as well as supporting our efforts to modernize the licensing framework for those technologies.

At Southern Company we talk a lot about providing our customers with clean, safe, reliable, and affordable energy. And for me personally that is a very important concept in that I believe that access to energy is foundational to maintaining a high quality of life for every human on this planet.

In addition, I was raised in a home where continuous learning is -- was a requirement, and not only to be a continuous learner but to also put that learning to good use. And so, to work at a company like Southern Company that provides energy but also provides a strong focus on innovation makes me one of the lucky ones.

When it comes to innovation, a very important component of innovation is collaboration. And a very important collaboration that we have maintained for the entirety of our history in R&D is a strong relationship with the Department of Energy through public/private partnerships. We believe public/private partnerships are essential to help manage the transition of new technology, particularly in the energy space, from concept to deployment and where the technology and financial risks become married in that process.

To that end, we currently operate as a contractor to the Department of Energy, developing an advanced reactor in collaboration with a company called TerraPower where we are in year two, approaching year three, of a 5-year agreement to advance that technology towards deployment in the mid-2030s. We believe it is an important technology that has a potential to not only advance the components of the advanced reactors that we think about, nominally safety, baseload electricity, but also do so in a very cost competitive way, which is important, again, to protect the interests of our customers.

Additionally, we are working in partnership with the Department of Energy on a project called a licensing modernization project. It is an effort to reflect the

differences in the nature of these advanced reactors and how the regulatory approach needs to be modified so that we can be efficient and effective in regulating those to the same standards as we currently regulate the light-water reactor fleet.

As we look at the four bills that were presented from the subcommittee, we feel like they are all very supportive and aligned with our mission goals and our activities at Southern Company. Specifically, this idea of an efficient and effective regulator is a critically important component to maintaining the competitiveness of nuclear reactor technology in the nuclear industry, both domestically and globally. We do see nuclear energy as a global market. And as a consumer of nuclear technology, we see the vital importance of having a healthy supply chain in order to maintain access to those, those components and technologies here domestically.

And given that the market domestically is challenged, the international markets may maintain that foundation from which we need to build advanced reactors.

Given the prior comment about a global market, we can't miss the opportunity to take advantage of near-term opportunities such as the ones identified in the bill discussing

micro-reactors as it relates to resiliency with the Department of Defense. We think these micro-reactors can be deployed in the near term, and do provide a great opportunity to, for lack of a better term, pilot the entire, the entire concepts necessary to deploy advanced reactors in a very measurable way, given their size and scale.

And then as was previously mentioned, none of these machines operate without fuel. And so, access to HA-LEU is a critically important component that I do believe it is time to begin working towards if we want to support early or mid-next decade either deployment of micro-reactors, or demonstration reactors, or some other technologies.

Again, I appreciate the opportunity to provide comments and look forward to your questions.

[The prepared statement of Mr. Irvin follows:]

********** INSERT 8 **********

Mr. Johnson. Thank you, Mr. Irvin.

Dr. Lyman, you are now recognized for five minutes.

STATEMENT OF EDWIN LYMAN

Mr. Lyman. Thank you. On behalf of the Union of Concerned Scientists I would like to thank the chairman, ranking member, and other members of the committee for the opportunity to testify today.

UCS supports DOE investment in nuclear energy research and development, but with a focus on increasing safety and security of the once-through cycle.

In the near term we see promise in projects such as developing accident tolerant fuels for current light-water reactors. But our analysis to date has not identified any advanced reactor design that offers clear safety and security improvements over today's light-water reactors.

So, it is in that spirit that I would like to comment on the four bills today.

We support the discussion draft on advanced nuclear fuel availability. We think it makes sense for an assessment to be made of the availability or the likely availability of HA-LEU. And that will help to assess the viability of advanced reactor declining in mid-term. But the acquisition of HA-LEU should be closely tied to realistic projections of the need for the

material.

A couple of additions. We think that the study shouldn't evaluate the larger nonproliferation implications of the production of HA-LEU. Even though HA-LEU is low-enriched uranium and cannot be directly used in nuclear weapons, the material does pose proliferation security concerns and if there is going to be expanded production and use of that material, as well as the potential for exports of reactors that would use it, and foreign customers, we think that that is not -- that evaluation has not been made yet, and it should be.

On H.R. 1320, we oppose most aspects of the bill because we do not support so-called streamlining of licensing that might lead to shortcuts in the approval of advanced reactors without fully resolving the safety and security concerns that are unique to these new designs.

On the nuclear energy competitiveness discussion draft we share a lot of the concerns that we have heard today about the definition of lost proliferation risk technology, and how that must be evaluated within the context of any export, especially today.

And I would just like to clarify the record. My testimony did not say that it is easy for a country to misuse a light-

water reactor to produce plutonium for weapons, however, it is not out of the question. In fact, the technology for processing has been available now publicly for many decades. So you can't discount that. And you need to consider the risk of breakout -- that is, throwing the IAEA inspectors out and using the facilities you have to make weapons rapidly -- in any export consideration.

Finally, on the issue of micro-reactors, we do not share the optimism for the promise of these facilities, especially for Department of Defense sites and energy resilience. We think that the military should cast a skeptical eye on the stories that they are being told about how these reactors are going to be so safe and secure they can't melt down, and especially how they can provide resilience. In fact, any nuclear reactor really requires electrical power to operate safely, and the only way these reactors could provide power and disconnect it from the grid is in what is called island mode, which is not well established in any designs.

So, I would urge that the study include an assessment of the safety and security, and the potential applications for the safety of U.S. military personnel and usability of military facilities if there were a safety, or security, or sabotage

incident that would lead to large-array large release.

I hope these observations are useful. I welcome your questions. Thank you.

[The prepared statement of Dr. Lyman follows:]

********** INSERT 9 **********

Mr. Johnson. Thank you, Dr. Lyman.

The committee will now stand in recess until after votes. And we will reconvene and begin our rounds of questions. Thank you.

[Recess.]

Mr. Johnson. The hearing will come to order. And the chair will now recognize himself for five minutes for questions.

Mr. Merrifield, your testimony notes that the discussion draft's expedited process for low proliferation risk technologies could be improved. How can the legislation find the right balance between having a defined set of technologies that would clearly be directed under the new process while still providing flexibility going forward that future innovations are not limited?

Mr. Merrifield. Well, I think, Mr. Chairman, there are a couple aspects that we would focus on. One is obviously how you define low proliferation technologies. And we, it is our view that defining that, those technologies, commercial nuclear reactors other than those which are designed to utilize mixed oxide fuel would be a common sense way of doing that.

We have a, you know, obviously, very stringent process with the NNSA here in the United States, as well as IAEA, which

looks very closely at countries that operate those, those reactors. That is a solid and common sense framework that provides I think an appropriate level of protection.

As it relates to the U.S. governmental process, I think one of the issues that really drags these things out right now is the interagency process. That, combined with the assurance processes is, as it is currently put in place, has really caused many U.S. companies which are exporting these technologies to really be put at disadvantage and they are having their applications really dragged out far longer than they need to be.

So, simplifying that process for obtaining those assurances potentially by having more standardized form of assurances we think makes a whole lot of sense. At the end of the day if we make it too hard to export U.S. technologies, people will go elsewhere to countries that don't have those concerns.

Mr. Johnson. All right. Well, thank you.

Ms. Mann, the legislation that I am proposing to reform DOE's Part 810 review process is meant to provide the U.S. nuclear industry at least a level playing field in the global nuclear marketplace, as in some countries, the suppliers are

primarily, if not exclusively, government-owned vendors.

In your experience can you tell me how has, how has your experience been working with DOE on 810 applications? What have you experienced?

Ms. Mann. Thank you. So because our, our activity involves uranium enrichment we are absolutely caught entirely by the 810 system, and at the very highest level of the licensing restrictions for everything we do. You know, that process is not necessarily fun or painless, but we have found that the Department of Energy has been incredibly professional in working with us.

Now, do those approvals take longer than they need to? In many cases they do. That is partly due to the problem we have been talking about, getting the foreign government assurances. But we see that many of the reforms that have been made to date with electronic licensing, increased transparency, and accountability have been incredibly helpful.

But I do think that your draft makes some very useful recommendations: the delegation of authority, and looking at ways that you can improve what falls into the general license category, will definitely support American users.

Mr. Johnson. Okay. Well, what further needs to be done

to ensure that regulatory requirements don't have a chilling impact on U.S. exports of nuclear technology and assistance to those countries requesting it?

Ms. Mann. The balance between promotion and protection is always a tricky one. And as a company that does deal with very sensitive technology, that is the balance that we are always looking to have in place.

I think that, again, the transparency and the accountability in the process go far towards supporting that process. The recommendation that Commissioner Merrifield is making about a more standardized form of assurance helps. And whatever you can do to get those time frames down.

But I also note that the 810 system does something for the U.S. that we don't see our competitors having an advantage of, and that is the general license system. So, to the extent that we can improve that further, we will get better, you know, better gains.

Mr. Johnson. Okay.

Mr. Merrifield. Mr. Chairman.

Mr. Johnson. Did you want to comment?

Mr. Merrifield. Well, I was just going to say one thing I forgot to mention in our suggestion is also the notion of

reducing the number of agencies that need to concur. The DOE and NNSA are perfectly capable of doing the vast bulk of these. We ought to let them go ahead and do it and not necessarily need some of the others in the process.

Mr. Johnson. Okay. Nuclear power plants last a long time. And I would think U.S. engagement with those reactors around the world can help ensure many years of economic cooperation and peace. According to the IAEA, almost 200 gigawatts of new nuclear energy capacity are projected to be added throughout the world by 2050. These plants are going to be built.

Mr. Merrifield, in your testimony you mention that today the U.S. is but one of many highly competitive countries vying for a role in supporting the development of, development of operations of nuclear power plants overseas. Can you describe the type of competition U.S. suppliers face and the benefits of U.S. engagement in these opportunities around the world?

Mr. Merrifield. Well, it is --

Mr. Johnson. And I am already out of time. So if you can make it a quick answer I would appreciate it.

Mr. Merrifield. Yeah. It is very strong competition. You have got China and Russia, which are often very competitive

technologies with a lot of financing behind them. You have Korea, which has a demonstrated technology which is going to deploy four units in the UAE, which is a very aggressive competitor. And France has been very successful in a variety of other countries.

The U.S. has strong competition. We don't have the same economic tools behind us. We really do need all of the effort of the U.S. Government if we are to increase these U.S., these vital U.S. technologies.

Mr. Johnson. Thank you. I yield --

Mr. Merrifield. Oh, I was going to say these are 100-year relationships. That is what our competitors know and that is what we need to focus on.

Mr. Johnson. The long term.

I yield back the balance of my time, which I have none, and I recognize Mr. McNerney for five minutes.

Mr. McNerney. Well, I thank the chair. And I thank the witnesses. I apologize for missing your testimony. I was in another committee.

I am going to start with Mr. Lyman. What are the costs associated with fabricating HA-LEU through downblending of excessive highly-enriched uranium stocks as opposed to using

conventional or alternative fabrication methods?

Mr. Lyman. Well, I think until -- it is hard to tell because I have to cost to the alternative until the scope of the program has been established, as well as what it would take not only to -- what it would take really to support Ms. Mann's effort to acquire a capability to reconfigure plants and license them for producing HA-LEU.

So until that scope is recognized, there are a factors on the costs, so I couldn't say. But clearly if existing HA-LEU stocks are available, that downblending, depending on the quality of the source material, could be, you know, a competitive option I would think since --

Mr. McNerney. Thank you. What about the nonproliferation comments, could you expand on that a little bit?

Mr. Lyman. Yes. Well, in general HA-LEU, even though it is below the 20 percent enrichment threshold, it is only if you look at a material that is right below that threshold it only takes about one-tenth of the separated work to produce weapons grade uranium over 90 percent as it does for natural uranium.

So, having a stock of that moderately-enriched uranium does give a leg up to a nation that might want to start producing high-enriched uranium for weapons. And that is our point now,

that is why Iran, there was so much concern about Iran stockpiling this material.

In addition, that material could be used for radiological weapons which has been their study in the past.

So it is important to examine those issues if you do develop a new demand and production capacity for this material, start exporting, other countries may be kind of interested in similar designs, want to start producing HA-LEU themselves. I think that warrants further exploration.

Mr. McNerney. Thank you. Mr. Irvin, where does the Southern Company see small modular reactors fitting into their business model?

Mr. Irvin. That is a good question and it is an interesting one. We view SMRs as being a critical component of the maintaining the supply chain as we go forward for advanced reactors. We are always looking at our customers' needs and evaluating what they are telling us with regards to their price and performance requirements.

I believe that SMRs have a critical challenge with respect to being competitive against natural gas combined cycle in the U.S. That doesn't mean that that future is not bright. And certainly there is a significant opportunity for SMRs, but I

do think it is challenged.

We, we see advanced reactors as providing a potential to drive down the costs low enough to be competitive with the natural gas combined cycle. And so really the core component of SMR is providing a bridge to that future.

Mr. McNerney. Good segue.

Mr. Merrifield, how do you, how do we help jump start the industry without hampering the NRC's capability to do their job?

Mr. Merrifield. Well, I think, I think, you know, a number of pieces of legislation that you have before you today would be, would be helpful. In terms of the NRC's process, I think the agency's made a lot of, a lot of progress on right-sizing itself. I think putting in specific deadlines for reviewing applications, reviewing environmental reviews, I think that is certainly appropriate and I certainly would support that.

Overall, on the part of the advanced reactor community I think having appropriate funding through other committees of Congress is going to be important to your technologies which have great promise. They are certainly deployable in the late 2020s, and the U.S. is ahead in this technology. Certainly want to take advantage of that for export purposes.

Mr. McNerney. So in honor of the sitting chairman, what about the nuclear waste issue? Do you see a resolution of that in the works or what are your feeling about that?

Mr. Merrifield. Is that directed toward me?

Mr. McNerney. Yes. Yes, sir.

Mr. Merrifield. Well, I have a specific prohibition against lobbying Congress on Yucca Mountain related issues. So, with that caveat I think that there are common-sensical ways to address the material. There are several proposals for interim storage facilities, both in Texas and New Mexico, which provide I think common sense ways of dealing with this in the interim.

At the end of the day, my personal view as an American is Yucca Mountain is a perfectly safe place to put that fuel.

Mr. McNerney. Thank you. Mr. Chairman, I yield back.

Mr. Shimkus. [Presiding.] Thank you. The gentleman yields back his time.

It is great to have you here. It is great to be in the chair for the Energy Subcommittee. So let me go with my line of questions, kind of similar to what I did with the first panel. I want to go to Ms. Mann.

Your testimony notes that your NRC-licensed facility is

capable of producing high-assay LEU or low-enrichment uranium for advanced nuclear fuels. I would like a brief clarification. Are there any technical, regulatory, or other legal restrictions from your enrichment plant to make high-assay LEU for commercial purposes?

Ms. Mann. Certainly the technology is fully capable now of doing that. The site that we have we think is certainly suitable. We do need a nuclear NRC license amendment to build a HA-LEU enrichment module. But there are no other restrictions on that technology or that proposal other than, of course, having a market that we can serve.

Mr. Shimkus. Markets are important as you directly put.

Are you aware -- and you were in here for the first panel, so this is a similar question -- are you aware of the GAO report that recently analyzed the NNSA's preliminary cost estimates and mission statement regarding future enrichment needs for American defense purposes?

Ms. Mann. I am generally familiar.

Mr. Shimkus. Based on your experience in building and operating the only enrichment plant in the United States, what is your perspective on GAO's conclusions on NNSA's cost estimates?

Ms. Mann. There are certainly two very different things. We built a greenfield commercial enrichment facility in New Mexico, taking it from what was a effectively a square mile of scrub brush and coyotes in 2006, and turning it into a high class enrichment facility. And investment to date is about $5 billion.

I think that is very different than the cost range that was envisioned for a much smaller footprint of capacity for the DOE domestic uranium program.

Two comments on that. One, I do believe there is strictly a clear delineation between civil and military programs. I can also tell you that the cost estimates that are in that GAO report are unsustainable, whether it be for the commercial fleet or for an emerging advanced reactor community.

Mr. Shimkus. So you were, again, here during the first panel. And what do you respond -- and he could have stayed, too -- Mr. McGinnis' comments on the similar question?

Ms. Mann. I certainly appreciate that the department has other missions it needs to fulfill. And I understand that they may be looking to merge some of those. But what we are looking at is the near-term need for HA-LEU fuel for commercial reactors, and a relatively small demand, even if you aggregate

all of those small pieces from different users.

If you try to put the defense program on that backs of that, you will break it.

Mr. Shimkus. And Mr. McGinnis' comment which, you know, I fleshed out a little bit but not enough, he seemed to be making the debate of competitive marketplace and having two production facilities. How would you comment on that?

Ms. Mann. We certainly support competition. And I can tell you we are very much aware of the competition that we see, both in the enrichment market and other parts of the fuel cycle. And that's really up to the market to bear.

We know that utilities, like Southern here, like a very diverse range of supplier. I think the question is until we know what the full demand profile is, how many advanced designs, advanced fuel types move forward I am not sure what that industry is capable of sustaining in the earliest years.

Mr. Shimkus. Well, I think that's been my point, too, because I would concur that we would like to have multiple sources, like to have competition. We want lower costs and more efficiencies.

But I am also concerned about the Government overbuilding on a projected market which may not be there immediately to

fulfill the production needs and desires, and you will have stranded costs there in producing fuel that you may not need to do.

Ms. Mann. I will just tell you quickly that the existing fuel cycle is under quite duress due to the falling demand, to the significant amount of inventories, to state-sponsored competition. We are trying to sustain that. And if you look at trying to add additional pressures on top of that, it's not sustainable.

Mr. Shimkus. Well, and I follow it very closely because I have the Honeywell facility. And I have talked with DOE quite a bit about the multiple individual markets that don't produce it, but then the repurposing of, in essence, government-subsidized ability to purchase and buy and then also create fuel waste. It makes it hard for a corporate entity to be able to provide that certainty.

So, I am going to yield back my time. And thank you for answering those questions. And then yield to Mr. Green for five minutes, from Texas.

Mr. Green. Thank you, Mr. Chairman. I thank our witnesses for waiting here today.

Mr. Merrifield, based on your vast experience in the

Nuclear Regulatory Commission I would like to ask you a few questions on the NRC's fee and Mr. Kinzinger and Mr. Doyle's bill.

Section 3(b) of the bill would provide an exclusion of fees for those costs associated with the development of regulatory infrastructure for advanced nuclear reactor technology. Can you talk a little bit about why this provision is so important to this new industry and how our current NRC fee structure stifles growth in the sector?

Mr. Merrifield. Yes. Thank you very much, Congressman, for that question.

A couple of things. First, I think if you look historically, with the current fee in nuclear reactors they did not have to pay those kind of fees when those reactors were developed in the 1960s, 1970s, and 1980s. So concurrently I think that is one issue.

The second one is these are nascent technologies. These are not large companies that are developing these technologies. They are smaller. They are innovative. And they are currently in the market seeking funding to bring those designs forward.

Placing on top of all of that effort the costs of the NRC, building its regulatory infrastructure would be, would be

potentially crushing. And that's really a role and responsibility that is more appropriately left to the U.S. Government. And so I believe, and ClearPath Action believes that the language is appropriate.

Mr. Green. As more and more nuclear plants go offline across the country, the fee burden is felt more heavily by those who remain. Do you feel the current NRC structure is sustainable? And if not, is there a tipping point that you expect to come?

Mr. Merrifield. I think that is, I think that is a great question. And I agree with the direction from which it comes.

Yes, I do think Congress is going to have to continue to take a look at the number of reactors and adjust the amount of fees that are put on licensees as a result of it. The NRC has certain breadth of work that they have to do. But there will become a point at which I think there will need to be increased general revenues dedicated to that to make sure that that fee structure isn't overly burdensome to U.S. utilities.

Mr. Green. So, do you have a year. I mean, because some of this legislation needs, sometimes it takes years to get something passed. Do you have any idea when that may be, looking into the future?

Mr. Merrifield. Well, I think, I think this is something that this committee should be thinking about and Congress should be thinking about right now. I mean the discussion is as many of a quarter of the reactors could potentially go offline. I think, you know, changing the current ration that previously was 90:10, I think taking it to a different ratio makes sense currently right now.

Mr. Green. Do you feel the draft legislation adequately addresses these challenges?

Mr. Merrifield. I think the legislation is a great step in the right direction.

Mr. Green. While I made clear before that I am not fond of DOE's recent notice of public review that proposed subsidizing certain industries, I do think we face a challenge that needs to be addressed. We have heard from many witnesses on multiple pieces of legislation.

What else should Congress be looking at to shore up the domestic nuclear energy production in the coming year other than these legislations?

Mr. Merrifield. Well, I think having, having the fast reactor capability out in Idaho is going to be important for the testing of the various rules that will be used for these

reactors. So I think that is an important one.

I think the actions that Congress has made to make sure the loan guarantee program stays in place is important.

I think the Ex-Im Bank is an important tool for the export of these reactors, so I would certainly recommend continuation and, frankly, some strengthening of their nuclear capabilities.

Those are among some of the things I think Congress ought to look at.

Mr. Green. Well, hopefully next time we reauthorize Ex-Im Bank it won't take such a battle as we had last time.

Mr. Chairman, I will yield back my time. And thank you for my earlier extra 20 seconds.

Mr. Shimkus. The gentleman yields back his time. And the chair recognizes the gentleman from Missouri, Mr. Long, for five minutes.

Mr. Long. Thank you, Mr. Chairman.

Mr. Irvin, your testimony focuses a lot on the research and development of advanced nuclear reactors. What are the long-term benefits your customers will see after Southern Company invests in these new technologies?

Mr. Irvin. So, the industry at large, we talked a lot today about the nuclear industry being in the crossroads, but

I think the industry at large is at a crossroads as well. We have seen the influx of lots of new technologies being disruptive across the board. And so as we look forward, we believe investing in technology that is, I am going to use the phrase, options positive. So I want to create options. Knowing that I am believing that the future is uncertain I want to create technologies that provide multiple options for my customers.

So, the first and foremost for me is the technology, does it have a potential to drive down the cost of energy? I believe advanced reactors do have that potential.

But further than that, does the technology have the potential to serve more than just electricity needs? Does it have options for a multitude of product slates? And these advanced reactors and the nature in which they operate creates opportunities for nuclear energy to be transitioned into the industrial sector, into the transportation sector, but certainly providing low cost electrons.

And so, we see the opportunity for this long-term, stable energy supply to be pervasive across the entire energy economy.

Mr. Long. What does Congress or the Department of Energy need to do to help companies like Southern Company and other

companies streamline the development of these advanced reactors?

Mr. Irvin. Well, I think the one of the most important things there, and it is something I have seen out of the department over the last five years do more and more is really seek out industry's input and partner with industry in a collaborative way, and take that feedback from industry as to where we need to move the technologies to. I think industry, in partnership with the department, can accelerate. And we need that collaboration with the department on things like fundamental science, testing capabilities such as the advanced reactor, fast test reactor that was mentioned earlier.

But then, ultimately, as that collaboration matures we need the department and Federal Government to allow industry to then move forward and commercialize and take advantage of the investment that has been put in before it.

Mr. Long. Okay. This next question is for everyone. We will just start Merrifield, Mann, Irvin, and Lyman down the line if we can.

But for all of you, I have seen some of your testimonies reference the -- in reference to China starting to load fuel into new nuclear power, a new nuclear power plant, and India,

Russia, and Korea leading the United States in deploying large nuclear reactors over 1,000 megawatt units. Is the United States falling behind these countries in the field of nuclear energy and nuclear technology in your opinion, Mr. Merrifield?

Mr. Merrifield. That is -- I have got a mixed answer to that. Frankly, the reactor that is being built in China is a Westinghouse technology. The United States continues to possess the most modern nuclear design out there in that particular technology, so we are leading in that regard.

In terms of construction, obviously Southern Company has two of those reactors that continue to be built. It is unfortunate that the cost of natural gas is what it is, which is hindering utilities like Southern, more and more of those. But certainly there is a robust export market. And certainly the United States should be a leader in that, in that regard.

Mr. Long. Okay. Ms. Mann, is the United States falling behind these other countries in the field of nuclear energy, nuclear technology in your opinion?

Ms. Mann. Mr. Long, my specialty is on the nuclear fuel cycle. And in that regard the answer is clearly no.

But in order to be able to supply into China we need to have an open market. And that is one of the things we are

concerned about is to make sure that they are able to continue to receive the output of American technology in their home.

Mr. Long. Mr. Irvin?

Mr. Irvin. Personally, I think the race is a little too close to call right now. But I think the reference to natural gas being low, by the way it is a good thing for Southern Company if natural gas prices are low, but it is a clear indication that when the U.S., when we put U.S. innovation to work through collaboration with the Federal Government, like we did with learning how to frack, and finding shale gas, then we can clearly stay ahead and put ourselves further ahead than the rest of the world. And so that is the reason why we are so focused on innovation.

Mr. Long. Dr. Lyman?

Mr. Lyman. Well, I would say the answer is no. From our perspective safety and security are paramount. And I do agree with Mr. McGinnis when he said that the U.S. as far as its safety and security infrastructure for nuclear power is probably the best in the world.

So we would like to see those concepts, you know, exported. We don't want to see a race to the bottom where the U.S. has to compromise on its own principles just to compete with China

on nuclear safety concerns. So we think that that is the best selling point of U.S. technology is that backbone of safety and security.

Mr. Long. Thank you, Mr. Chairman. I yield back.

Mr. Shimkus. The gentleman's time has expired. The chair recognizes the gentleman from Pennsylvania, Mr. Doyle, for five minutes.

Mr. Doyle. Thank you, Mr. Chairman.

Commissioner Merrifield, welcome back. I want to thank you for taking the time to speak to the committee on nuclear energy issues and the NUKE Act. The NUKE Act made several changes from the discussion draft that was under consideration when you last testified before the committee. These changes include significantly longer time lines for major license applications, milestones for new plants, and the removal of deemed approved language.

Under the current version of the NUKE Act, if the NRC does not meet the time lines that are laid out in the bill will that have any effect on an operator's application?

Mr. Merrifield. Yeah, I would have to go back and look at the explicit detail, but I think it does provide an opportunity for that process to continue. So I don't think it

has a hindrance. But I will certainly look at that and give you some comments.

Mr. Doyle. Now, do you think the current language gives the NRC sufficient flexibility?

Mr. Merrifield. I do. I do.

Mr. Doyle. Do you think the current NRC fee structure is able to appropriately adjust to reflect current market and future changes to our national energy portfolio without congressional action?

Mr. Merrifield. As I indicated -- great question -- as I indicated in the questions earlier, I believe there needs to be additional revisions to that fee structure, part of which is envisioned by the legislation we have been talking about today. I think that is going to be a continually evolving issue if there are additional U.S. reactors that go into decommissioning prematurely.

Mr. Doyle. Can you speak to the current budgetary burden that is placed on remaining nuclear reactors when a plant retires? I mean, how do you anticipate this is going to affect our nuclear fleet if it is not addressed?

And do you see the changes that are proposed in the NUKE Act as helping to address this problem?

Mr. Merrifield. Well, I will start with, I will start with the second question first. I do think they are helpful. But there is no question there are certain fixed assets that the agency has that it needs in order to be an effective regulator. At some point that will become large enough that the burden placed on the individual reactor operators will become larger and larger. And that is troublesome and problematic because it makes even more complicated the likelihood that some of those reactors will be shut down. And I don't think that is a good thing.

Those are important, carbon-free, clean-generating assets for our country. I think there are some that have shut down that have been, frankly, a real shame.

Mr. Doyle. Thank you very much. Mr. Chairman, I yield back.

Mr. Shimkus. The gentleman yields back his time. The chair would now like to recognize the gentleman from Illinois, Mr. Kinzinger, for five minutes.

Mr. Kinzinger. Thank you, Mr. Chairman. Thank you all for being here today. I very much appreciate it.

Mr. Merrifield, Section 7 of H.R. 1320 sets time lines and goals for the NRC to issue environmental impact statements and

safety evaluation reports for several NRC licensing actions such as early site permits, construction or operating permits, and combining operating licenses. Are the time lines in Section 7 generally reasonable to expect based on historical processing times?

Mr. Merrifield. I believe so.

Mr. Kinzinger. And in your view would instituting such time lines in any way weaken the underlying stringency of the established reasonable assurance regulatory requirements?

Mr. Merrifield. I do not believe so. And frankly, you know, we looked, and as I mentioned in prior testimony before this committee, I led a task force that looked at some of these very same issues when I was on the Commission. We felt at that time there was really a need to streamline some of those processes, and it didn't really happen. I think the language that you all have put into that draft will be very -- would be a very welcome change and would give the discipline necessary for you just to go ahead and do that without sacrificing their mission of protecting public health, safety, and the environment.

Mr. Kinzinger. Thank you.

Ms. Mann, your enrichment facility holds an NRC license

and is subject to NRC's fuel recovery. My bill, or our bill creates reasonable and predictable expectations for NRC's fee recovery process. I understand the number of licensees who fund NRC fuel cycle activities has decreased recently without a reduction in overall NRC staffing.

Will you discuss recent trends associated with NRC fuel cycle facilities?

Ms. Mann. Certainly. What we are seeing on the fuel cycle in many way echoes what we have just talked about with regard to the reactors. The first I would note is that since our enrichment plant started operation in 2010, we have seen on average a 12 percent a year increase across the board. And even though the amount of work that is being done at our facility has slightly gone down now, we are fully operational.

As the number of fuel cycle facilities that are licensed has dropped, the fees, the total fees that they are trying to collect have not gone down. And we are, in fact, spreading those fees across a fewer number of licensees. And so, by that logic, if we were to perhaps be the last one standing we would be bearing the full $25 million a year burden.

What I think is also notable, and we touched on it a little bit, is there are things that have to be paid for at the NRC

that have nothing to do with the operation of an individual facility. And right now what we are looking at is that 74 percent of our fees go to those non-direct services rather than directly to licensing our site. And we certainly understand the need to share that burden, but that burden is becoming prohibitively high.

Mr. Kinzinger. Thank you. And how has this embedded cost in the nuclear fuel cycle that you have touched on, business, and ultimately impact the commercial nuclear industry and electricity rates that my constituents pay?

Ms. Mann. Well, I can tell you sitting next here to one of the utilities is that it is highly unlikely we would be able to pass those additional costs along to any of our utility customers. They have other choices and they have other suppliers who don't bear the burden of those fees. So we need to be careful.

And, likewise, we understand why Nick couldn't do that, he can't pass it on to his customers. So the question is what is a more rational way to spread those total fees across, and then also reflect the individual licensing work being done at each of our sites.

Mr. Kinzinger. And that, by definition, would skew the

whole energy mix anyway, which is something that we are obviously very concerned with. And so, would enacting this legislation help control those costs in your mind?

Ms. Mann. Yes, it would.

Mr. Kinzinger. Thank you.

Mr. Lyman, H.R. 1320 contains substantially similar language regarding NRC's fee structure as the Nuclear Energy Innovation and Modernization Act sponsored by the Senate EPW Chairman Barrasso. With respect to that, though, your organization said the bill balanced reforms to the licensing process while allowing the NRC flexibility to regulate in the public interest and the Union of Concerned Scientists took a neutral position on the bill. Does that position also apply to the same language fee that is included in my legislation?

Mr. Lyman. Yes, it does. And as you see in my testimony with regard to the fee cap and the corporate support costs, we also, you see that we take a neutral position because we think there is language in there that provides enough flexibility. We just don't want to see Congress mandate an arbitrary cap that would force the NRC to curtail important safety and security work and needs some flexibility. And I think the way the language is written now they would have that.

Mr. Kinzinger. Thank you. And I yield back.

Mr. Shimkus. The gentleman yields back. At this time the chair recognizes the ranking member of the Environment Subcommittee, Mr. Tonko, for five minutes.

Mr. Tonko. We have the environment team here and --

Mr. Shimkus. They are taking over.

Mr. Tonko. -- the energy team. So only kidding.

Welcome to our witnesses, and thank you for your input. Mr. Merrifield, H.R. 1320 would exempt a number of activities from NRC's fee structure. Can you give us the sense of what those activities would include?

Mr. Merrifield. I don't have, I don't have the list in front of me right now. The one that we focused on is an exclusion for costs associated with developing a regulatory infrastructure for regulation on advanced reactors. We think that that, that particular language makes a lot of sense. It is important the NRC put that structure in place. It is working very hard to do so right now.

There are upfront costs that are associated with that kind of activity. And certainly we think that should be borne by the general revenues rather than individual developers.

One of the elements I included in my written testimony is

the suggestion that you may wish to increase that to allow some degree of regulatory research as part of that advanced reactor program so the NRC had the tools looking forward to appropriately regulate those, including an appropriate balance of risk-informed regulation in that part. So that, we certainly think that that is a very good element of that program.

Mr. Tonko. So the NRC currently recovers approximately 90 percent of its budget from license fees?

Mr. Merrifield. Yes.

Mr. Tonko. Are any activities exempted under this bill currently recoverable by NRC?

Mr. Merrifield. I would have to look at, I would have to look at the individual elements of the legislation that go past it. And there are certainly some areas where there may be an overlap, but I would have to confirm that.

Mr. Tonko. Okay, thank you.

And do you have any estimates, and if not, Mr. Chair, maybe we could ask NRC, of how this bill might change that 90:10 cost recovery, if enacted?

Mr. Merrifield. I do not have an estimate of that. And I do think you are quite correct, directing that to the NRC

would be more appropriate.

Mr. Tonko. Thank you. The bill also places a cap on the fees that NRC can charge an operating reactor. Mr. Merrifield or Mr. Irvin, do you know the current average annual fees assessed on operating reactors?

Mr. Merrifield. I am going to pass that one to Mr. Irvin.

Mr. Irvin. Unfortunately, I don't, I don't know that. I am in the R&D sector, not the operations side, so.

Mr. Tonko. Okay, thank you.

Dr. Lyman, you expressed concerns about the expedited review process in Section 7 of H.R. 1320, which would require the draft environmental impact statement within 24 months and a 42-month deadline for technical review process and final environmental impact statement. Can you explain your concerns with the time line for these reviews?

Mr. Lyman. Yes. As a policy matter we don't support the micromanagement by Congress of regulatory agencies to that extent that they should be given these strict time lines to conduct environmental reviews. Often during the review new issues will arise that simply take time to resolve. And I do not think that it is appropriate to try to force resolution of those where they are right.

So that is why we don't think, unless there was more discretion to the agency to be able to exempt those time lines, we don't think it is appropriate.

Mr. Tonko. Thank you. And, Dr. Lyman, again, and let's switch to Part 810, it seems you believe we should err on the side of caution for nuclear technology transfers. What role should the State Department play in assessing proliferation threats?

Mr. Irvin. I think the State Department has a critical role and brings its own expertise to these reviews. And in particular by taking a broader view that we did hear about this morning, that any technology export has to be seen in context. So, even a light-water reactor without any fuel cycle technology could potentially pose undue risk if it goes to, let's say, a region of the world like the Middle East or Saudi Arabia where the countries are stating its desire to acquire fuel cycle technology possibly from somewhere else.

So if, if we give them cover to be able to acquire that technology, possibly for eventual misuse for nuclear weapons, I think that would be a dangerous development.

Mr. Tonko. And is it important to be able to reassess those risks in real time?

Mr. Irvin. Yes. One would hope getting information and making decisions is always based on the best available information at the time, but also by looking ahead. And understanding we heard earlier a nuclear reactor, you know, could be a 60 or a 100 year proposition. Well, that cuts both ways. Governments often don't last that long. So you have to look forward and make conservative projections about what may happen in the future with that technology.

Mr. Tonko. Thank you to all of you. I yield back.

Mr. Shimkus. The gentleman's time has expired. The chair recognizes the gentleman from Michigan, Mr. Walberg, for five minutes.

Mr. Walberg. Thank you, Mr. Chairman, and thanks to the panel for being here.

Ms. Mann, your testimony notes that there is a need to address packaging and transportation needs. But you also note that we already transport nuclear fuel to meet the needs of the commercial fleet. Additionally, we currently ship HA-LEU for research reactors and other purposes.

Can you please provide a bit more context on what is different about the needs and designs for transportation packages for HA-LEU on a larger scale?

And, second, why are the existing packages not adequate for widespread commercial use for uranium enriched at higher levels?

Ms. Mann. Certainly. Thank you.

One of the things that we, that we know is that the HA-LEU is at a higher enrichment level than the commercial industry. And when we look at the HA-LEU fuel cycle, the first piece of that, the enrichment piece, will come out in the form of what we call uranium hexafluoride. There are no current commercial packages that are suitable for HA-LEU enrichments of uranium hexafluoride.

Moreover, existing NRC regulations require additional performance requirements for such packages. So what we need to do is to develop that, that capability. Similarly, we don't have packages for higher enrichments of oxides in most cases. We do for some metals. And we have used the research reactor fuel that is in metallic form. However, there is only a handful of I think six to ten packages in total that would not serve the full breadth of the industry.

So what we are looking to do is develop that capability. Or, alternatively, is one of the things we suggest in our written testimony is you could obviate some of that need by

collocating one or more of those HA-LEU fuel cycle steps on a single facility, thus avoiding public transportation.

Mr. Walberg. Is that in the works?

Ms. Mann. Certainly we would be happy to find a dance partner if there were somebody who wanted to collocate with us in New Mexico. That makes a lot of sense as well from an economic standpoint, as well as from a regulator standpoint, because these existing licensed sites are known to the NRC, they are well characterized. We could take advantage of existing infrastructure, security, manpower.

Mr. Walberg. You also note that the design, development, testing, and NRC certification for transportation packages typically take between four to seven years. Would the program required by the Advanced Nuclear Fuel Availability Act help move the time frame earlier through a public/private partnership for the design and the DOE efforts to develop criticality benchmark data?

Ms. Mann. It would in two important ways. First, it recognizes that there is a transportation challenge. And I think that has been lower on the priority list, as much of the focus has appropriately been on the reactor design.

But, secondly, we talked a little bit in the earlier

session about the need for nuclear criticality benchmarks. And this is a sort of data analysis to see how will these nuclear materials perform. And to the extent that we can come up with a common set of those benchmark codes that we can use in our enrichment facility, that converters and fabricators can use, and that are also used in transportation packages, gives us a single set of data to focus our attention on and to allow the NRC to focus on that, rather than reviewing multiple different sets of submissions.

Mr. Walberg. Thank you.

Mr. Irvin, I understand that a research reactor in Norway, known as the Halden Reactor, is currently shut down for maintenance. And the Norwegian Government is discussing the future of the reactor. My question is, what sort of capabilities does that reactor provide for American research needs? And what are the implications for the advanced nuclear community if the reactor is shut down?

Mr. Irvin. So, my understanding is that reactor is a boiling water reactor. And if I am not mistaken, much of the interest in that reactor has to do with evaluating something called accident tolerant fuels which would be used in the existing fleet.

Certainly, in general, access to research and testing capabilities for the existing fleet as well as for the future fleet is of critical importance. There has been some talk today about a fast neutron source. I am not intimately familiar with the level that the industry is relying on that reactor right now, so I can't comment really any further than that.

Mr. Merrifield. Congressman, if I may?

Mr. Walberg. Yes.

Mr. Merrifield. I had the opportunity to visit the Halden Reactor when I was a member of the NRC. The NRC actually contributes money toward that program. There are a variety of countries around the world that are members of their research programs there. It is a critical research facility. It is one that has some of the longest fuels in there for some of the longest periods of time in the world. It would be a real loss to the international nuclear community if Norway were to make the choice not to --

Mr. Walberg. So there is a potential role for the U.S. in that?

Mr. Merrifield. I would, I would say certainly. There certainly is a role. If we don't have -- right now we don't have the ability to do a lot of research that we need to do in

U.S. fuels. We use the hindsight mind, who I support, if we can't get it done here in the U.S. you have got to look to Russia, you have got to look to China, you have to look elsewhere, and we really shouldn't be in that position.

We, as a country, are the world's inventor, and innovator, and leader in nuclear technologies. We should not lose that leadership. And certainly we are at risk of doing so.

Mr. Walberg. Thank you. I yield back.

Mr. Shimkus. The gentleman's time has expired. The chair recognizes the ranking member of the subcommittee, Mr. Rush, for five minutes.

Mr. Rush. I want to thank you, Mr. Chairman.

Mr. Merrifield, in your written testimony you state that eliminating the foreign ownership provision, as Section 4 of H.R. 1320 proposes, there could be essentially provide an opportunity to save the messy nuclear facility fuel investment by friendly foreign utility partners. Can you briefly discuss how that would work?

Also, do you have any concern about unintentional consequences that are listed in this provision might cause? And I would like to invite anybody in the panel who would want to have some input. So, Mr. Merrifield, will you answer the

question?

Mr. Merrifield. Thank you very much, Congressman.

So, I will start off with the second half of that first, and that is regarding the concerns. As currently written in statute, the foreign ownership provision really has two elements to it, one of which is an absolute prohibition on the foreign entity owning a majority of the U.S. nuclear power plant.

The second half of that requirement is one that imposes a inimicality test where a determination is made whether the own -- whether ownership in whole or in part would be inimical to the interests of the United States.

I have testified many times before this committee and before the Congress dating back to when I was on the Commission where we said, as a member of the Commission, we really felt the first half of that question is unnecessary. And the inimicality test, if left in place, would give an appropriate tool to make a determination about whether that ownership was against the interests of the United States.

I used in my, in both my written and my verbal testimony, an example where the decision of the United Kingdom to allow Électricité de France to purchase U.K. nuclear units had the

beneficial aspect of allowing those reactors to continue to operate. And they have done so effectively and safely since the late 2000s.

In terms of the potential in the United States, I can't, I would be -- it would be inaccurate for me to say I have got a list of foreign utilities that today wish to purchase U.S. nuclear power plants. What I was suggesting in my testimony is there are past examples of utilities that I am aware of that have expressed an interest in purchasing U.S. nuclear plants but made the determination not to do so when they found out they couldn't purchase the plants in their totality because they were prohibited from that under U.S. law.

So the suggestion is that perhaps if that provision were to be taken out of law, there may be the emergence of companies currently not on the market who may be interested in owning U.S. generating assets in the nuclear arena.

Mr. Rush. Does anybody else want to weigh in on that? Mr. Lyman?

Mr. Lyman. Just briefly. I think I may sound like a hawk here, but from the national security perspective I think removing these requirements and allowing a foreign nation to own, assert control over dominant U.S. nuclear facilities would

be an irresponsible move. So we certainly oppose. We opposed that provision in the Senate version. We oppose, we don't think there is any point in reviewing it in the study that is proposed in this committee.

Mr. Rush. Mr. Lyman, you are -- you think a study in this proposal would be dangerous?

Mr. Lyman. I am sorry, could you repeat the question?

Mr. Rush. You point out concerns with Section 4.

Mr. Lyman. Yes.

Mr. Rush. Which involved the GAO study on implication of repealing restriction on ownership, control, and domination by a foreign entity of nuclear facilities here in the U.S. And you are not in favor of the study?

Mr. Lyman. Oh, I am sorry, in the Senate there is a bill, Nuclear Energy Innovation and Modernization Act. In the original version of that bill it had a provision to strike the restrictions on foreign ownership, control, and domination. So we opposed that provision in that bill that ended up being stricken from the final version that was passed by the committee.

Mr. Rush. I am concerned about this GAO study. Am I understanding your opinion that you are opposed to GAO

conducting a study on foreign ownership?

Mr. Lyman. Yes, this, the draft or the H.R. 1320 calls for a review and calls for a study on elimination of foreign licensing restrictions done by the Comptroller General in consultation with the Secretary of Energy. As we say, you know, generally we don't oppose a study as long as it is done properly, because studies always bring more information. So we wouldn't oppose the study. But we think that the results of that study would probably support strongly the conclusion that those restrictions should be maintained.

Mr. Shimkus. The gentleman's time is far expired. The Chair recognizes the gentleman from South Carolina for five minutes. We thank him for being very patient.

Mr. Duncan. Thank you, Mr. Chairman. Thank you guys for being here and being very patient. It will all be over soon; I am last.

Mr. Merrifield, you talked a lot about the benefits of nuclear energy. And I agree with you, I have long been a proponent of the industry. And being from South Carolina you have talked today about VC Summer and what happened there. I also heard the gentleman from Missouri, Mr. Long, talk about China, and Russia, and others that are leading the United States

in nuclear technology, and research and development.

So I have got to ask you, have we lost the ability here in the United States to do big things in the nuclear power sector?

Mr. Merrifield. I don't think so. I mean, I think what we had is we had some first-of-the-kind activities for the United States that we hadn't done in 20, 20 or 30 years. Although it is unfortunate that there was a decision made to, hopefully, temporarily shut down the VC Summer construction, I certainly give credit to Southern Company for moving forward with those AP1000 reactors at the Vogtle site and fully expect to help them celebrate those going online years down the road.

Mr. Duncan. So we all know that there is a lot of government bureaucracy, and the regulatory environment seems to be getting tougher and tougher for these type projects. What steps could be considered potentially for a cumbersome and inflexible regulatory regime from inhibiting new nuclear development. Do you think the gentleman from Illinois Mr. Kinzinger's legislation will help with that?

Mr. Merrifield. I do. I think there is a couple of things here. One is I do think it is appropriate to have time lines for the agency to conduct review of various activities.

I think there is nothing wrong with that. We did those kind of things when I was a commissioner.

I think as well making sure that the agency is the right size and has the appropriate mix of people and dollars is important. They have reduced to a certain extent. I think there is more than can be done in the areas of the agency, frankly, having gotten the focus it probably should have.

So, I think between the two, the legislation, and then things that NRC can do on its own are going to be important in getting there.

Mr. Duncan. And to Mr. Irvin, I am glad to see that Vogtle is moving on there for Southern Company. And you know what happened in South Carolina.

One of my biggest concerns is continuing private sector investment. I mean if the tens of billions of dollars that are required to build new nuclear reactors in this country and the long regulatory framework that takes place before construction, then starts the long construction period as we see with Vogtle and VC Summer, and then seven years into the project the construction side of it the rug gets pulled out from under the project and those investors lose that money or the ratepayers are on the hook for something possibly in South Carolina, how

are we as a nation going to get the investors and attract the investors to invest in these type projects going forward?

And that has got to be a question Southern is asking itself.

Mr. Irvin. This is a question I get asked often in terms of our need to try and get more investment in developing technology. I think, I think the answer, maybe because I am an R&D guy, is innovation.

If you look at the work we are doing on advanced reactors, as I said earlier, we believe they have the potential to drive down that cost. And they drive down that cost in multiple ways. But in a very notable way it is shortening construction time lines, it is simplifying plants, it is making the time from concept to delivery much more effective and efficient for the resources.

Mr. Duncan. That is a good point. We want to reinvent the wheel every time we do a new nuclear project when we have got proven reactor technology out there, and then design. But we are spending all this money to reinvent.

Mr. Irvin. Certainly I think one of the reasons we are having to spend time to reinvent the technology space is that the rest of the industry has moved forward. So, if you look

at 15 years ago relative to natural gas combined cycle, the technology we have right now, we have today to deploy, we are highly competitive. And with the innovation that happened in that sector, they no longer are.

And so, I think we, as a nuclear industry, are challenged to not reinvent for reinventing's sake, but to seek those technologies that provide the right level of benefit to our customers that can also be deployed in a timely manner and in the right characteristics.

Mr. Merrifield. I was going to say just on that score, I mean these new technologies provide also some different avenues. You know, the traditional technologies, AP1000, 1,000 megawatt baseload power; some of the molten salt reactors, high temperature gas reactors are smaller. They can be used in different ways. They can be used for desalinization. They can be used in remote locations in some circumstances. And they can be used for process technologies to provide very high temperature heat for chemical and industrial processes.

So, in that regard although we are doing something different, it is meeting a series of demands that currently are met.

Mr. Duncan. My time has expired.

Mr. Chairman, at any given time we have got over 100 small reactors floating around the seas of the world in the United States Navy. So, I didn't hear small modular reactor technology enough from this group. I don't hear thorium and molten salt technology.

I hope the industry is looking at that because they are safer, they are easy. SMRs may be the future for the cities across America and also, you know, improving the quality of lives of folks on other continents possibly.

So, thanks for the hearing. Thanks, guys. And I yield back.

Mr. Shimkus. The gentleman yields back his time. Seeing there are no further members wishing to ask questions, I would like to thank all the witnesses for being here today and being very patient as we had to go to vote.

Before we conclude I would like to ask unanimous consent to submit the following documents for the record:

A letter from Nuscale Power; an awesome floor speech by Mr. Shimkus on March 28th, 2017, regarding the nuclear power plant in Belarus. You are not objecting to that, are you? Maybe it wasn't that awesome.

[The information follows:]

3605

3606 ********** INSERT 10 **********

3607 ********** COMMITTEE INSERT 5 **********

Mr. Shimkus. And pursuant to committee rules, I remind members that they have ten business days to submit additional questions for the record. And I ask that witnesses submit their response within ten business days upon receipt of the questions. Without objection.

The subcommittee is adjourned. Thank you for being here.

[Whereupon, at 2:03 p.m., the subcommittee was adjourned.]