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RPTR KERR

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H.R. 4979, THE ADVANCED NUCLEAR TECHNOLOGY
DEVELOPMENT ACT OF 2016, AND H.R. _____,
THE NUCLEAR UTILIZATION OF KEYNOTE ENERGY
POLICIES ACT

FRIDAY, APRIL 29, 2016

House of Representatives,
Subcommittee on Energy and Power,
Committee on Energy and Commerce,
Washington, D.C.

The subcommittee met, pursuant to call, at 9:34 a.m., in Room 2123, Rayburn House Office Building, Hon. Ed Whitfield [chairman of the subcommittee] presiding.

Present: Representatives Whitfield, Shimkus, Latta, McKinley, Kinzinger, Long, Rush, McNerney, Tonko, Green, Doyle, Castor, Welch, and Loeb sack.

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Staff Present: Will Batson, Legislative Clerk, E&P, E&E; Allison Busbee, Policy Coordinator, Energy & Power; Tom Hassenboehler, Chief Counsel, Energy & Power; A.T. Johnston, Senior Policy Advisor; Chris Sarley, Policy Coordinator, Environment & Economy; Dan Schneider, Press Secretary; Peter Spencer, Professional Staff Member, Oversight; Andy Zach, Counsel E&E; Jeff Carroll, Minority Staff Director; Rick Kessler, Minority Senior Advisor and Staff Director, Energy and Environment; John Marshall, Minority Policy Coordinator; Dan Miller, Minority Staff Assistant; Alexander Ratner, Minority Policy Analyst; Tim Robinson, Minority Chief Counsel; Andrew Souvall, Minority Director of Communications, Outreach and Member Services; and Tuley Wright, Minority Energy and Environment Policy Advisor.

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Mr. Whitfield. I would like to call the hearing to order this morning. I recognize myself for 5 minutes.

Good morning, and welcome to our hearing to discuss legislative proposals to advance the use of nuclear energy.

I want to thank all of our witnesses in advance, and I will be introducing each of you before your 5-minute opening statement.

But we want to thank Marvin Fertel for the great job he did at the Nuclear Energy Institute, and I think it is his plan to go on and look at other challenges at the end of this year. So we are delighted he is here. He has served as NEI's president and chief executive officer since 2009 and has had a long and distinguished career advocating for the nuclear industry.

Nuclear energy is an integral part of our energy policy. The current fleet of roughly 100 operating nuclear power plants safely and reliably generates about 20 percent of our Nation's electricity. However, many of these power plants are approaching the end of their current license, and unnecessary regulatory costs are adding to challenging economic conditions.

This outlook provides a timely opportunity to examine proposals to improve the regulatory framework for nuclear power plants and options to develop a regulatory framework for advanced nuclear technologies.

New nuclear technologies hold great promise to operate in a

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cost-competitive environment with even greater safety margins than existing reactors while generating less waste and reducing proliferation concerns. However, regulatory uncertainty is repeatedly cited as a top barrier to developing these technologies. The Department of Energy, which supports nuclear research and development activity, should collaborate, where applicable, with the NRC to address this uncertainty.

Today, we are going to hear from stakeholders about how to more effectively manage the regulatory process, including options to increase the efficiency and certainty of the NRC's existing licensing process. Representative Kinzinger's discussion draft highlights that cumbersome red tape in our regulatory process forces ratepayers to pay more for safe, clean nuclear power, and I want to thank him for his legislation, and we look forward to your comments about that.

Also, I certainly appreciate Congressman Latta's leadership in addressing regulatory barriers hindering the development of advanced nuclear technologies. His legislation, the Advanced Nuclear Technology Development Act, will assure that DOE's technical expertise, research, and facilities are utilized, when appropriate, to assist the NRC.

And at this time, I would like to yield a minute or so to Mr. Latta, and then I will yield to Mr. Kinzinger, for their comments on their legislation.

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[The prepared statement of Mr. Whitfield follows:]

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Mr. Latta. Well, thank you very much, Mr. Chairman. Thanks for yielding.

And thanks for our panel for being with us today.

I would like to again thank you for holding this hearing today on nuclear power, which is highlighting the bill Congressman McNerney and I introduced last week, H.R. 4979, the Advance Nuclear Technology Development Act of 2016.

I would like to ask unanimous consent, Mr. Chairman, to enter several letters of support into the record. These letters are from the Nuclear Energy Institute, the American Nuclear Society, and ClearPath.

Mr. Whitfield. Without objection.

[The information follows:]

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Mr. Latta. Thank you very much.

The future of the nuclear industry needs to start now with Congress ensuring that the Nuclear Regulatory Commission is able to provide the certainty that the private sector needs to invest in innovative technologies. Nuclear power is currently 20 percent of our national energy portfolio and must remain a vital part of our energy mix.

As the United States looks to the future, more energy will be needed, and nuclear power provides a reliable, clean baseload power option. Investment in new technologies is already happening with approximately 50 companies in this country working to develop the next generation of nuclear power.

And again, that is why we have introduced H.R. 4979. It is time for Congress to ensure that NRC provides a framework so that innovators and investors can prepare to apply for licensing technologies. H.R. 4979 not only requires that NRC establish a regulatory framework for issuing licenses for advanced nuclear reactor technology, but it also requires that NRC submit a schedule for implementation of the framework by 2019.

Safety in nuclear is the number one goal, and the regulatory framework ensures that NRC has the opportunity to develop a framework that enables them to safely regulate the future technology of the nuclear industry. H.R. 4979 also requires that the Department of

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Energy and the NRC collaborate in advancing new nuclear technology. The National Labs in DOE provide opportunities for testing of new nuclear technology on Federal lands and the option to look at public-private partnerships between the DOE and the private sector companies interested in investing in the future of nuclear.

There is also a role for the NRC in this space because these testing opportunities allow for a demonstration of technologies that NRC has not been licensing over the past 4 years.

And, Mr. Chairman, I greatly appreciate you holding this hearing, and I yield back to you. Thank you very much.

[The prepared statement of Mr. Latta follows:]

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Mr. Whitfield. Mr. Kinzinger, you know, Mr. Upton is not going to be here, so I want to give you his time.

Mr. Kinzinger. Thank you.

Mr. Whitfield. And then if Mr. Latta wants to talk some more, he can talk some more too then.

At this time I recognize Mr. Rush for his 5-minute opening statement.

Mr. Rush. I want to thank you, Mr. Chairman, for holding this important hearing today on H.R. 4979, the Advanced Nuclear Technology Development Act of 2016, and the Nuclear Utilization of Keynote Energy Policies Act.

Mr. Chairman, as we move towards a reduced carbon sustainable energy economy, there is no doubt that nuclear energy will need to play an instrumental role in order to reach those objectives. While today's fleet of nuclear reactors utilize light-water reactor technology, more attention is now being paid to the use of non-LWR reactor designs that have been demonstrated by the Department of Energy but are currently not licensed for commercial use in the United States.

In fact, Mr. Chairman, emerging innovative designs of advanced nonlight-water reactors and light-water small modular reactors have the potential to produce nuclear power more efficiently and with less waste than the current technologies.

If we are to truly develop and scale up these technological

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advances, it is important that policymakers and the Nuclear Regulatory Commission provide regulatory certainty for the nuclear industry in order to encourage investment in these next-generation nuclear designs.

So I applaud my colleagues, Mr. Latta and Mr. McNerney, for introducing H.R. 4979. This legislation seeks to provide guidance and direction to the NRC and the DOE to ensure that these two agencies have sufficient technical expertise in order to support and regularly advance reactor technology.

The rule also requires the NRC to formulate a plan that would help foster civilian research and development of advanced nuclear energy technologies and enhance the licensing and commercial development of such technologies.

Mr. Chairman, I fully support the intent of this legislation. I look forward to hearing feedback from our panel of experts on both the necessity for this type of legislation and the implications once it is enacted. In regards to the Nuclear Utilization of Keynote Energy Policies Act, I also look forward to engaging the witnesses on this legislation.

Mr. Chairman, finally, if nuclear energy is going to continue to play a constructive role in a reduced carbon energy portfolio, we must ensure that we have policies in place that appropriately reflect the contributions of the industry and the current reality that it faces.

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So I commend my colleague from Illinois, Mr. Kinzinger, for introducing a bill draft that at the very least initiates a conversation toward reaching this goal.

Of course, Mr. Chairman, today's bill is simply a discussion draft, and we would need to hear from the NRC commissioners themselves before moving into the legislative process. But I look forward to today's hearing, and I look forward to testimony from today's experts on both the need for the changes outlined in the bill as well as the practical implications if these changes were indeed enacted.

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

[The prepared statement of Mr. Rush follows:]

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Mr. Whitfield. The gentleman yields back.

At this time I recognize Mr. Kinzinger for 5 minutes. And if some others who want some of your time, you might considering yielding to them. Thank you.

Mr. Kinzinger. Sure. This will be fairly quick.

Mr. Chairman, I want to thank you for holding the hearing, and I want to thank each of the witnesses for being here today. It is an important topic.

As we have heard, nuclear power generates about 20 percent of electricity in the United States, and in Illinois it is over 50 percent, including 60 percent of our Nation's carbon-free electricity. These plants are high performing, consistently having the highest capacity factors by far in the electricity industry and setting the gold standard for commercial nuclear safety worldwide.

We have to recognize, however, that while our nuclear fleet is strong today, the demand for clean, reliable, and affordable energy is only increasing. We have an obligation to safely maintain our existing fleet of 99 units and to ensure the NRC continues to regulate efficiently and effectively so investment in plants can continue.

The regulatory inefficiency and uncertainty we often see today does nothing to help our existing fleet, does nothing to foster investment in new plants, or most importantly, to ensure safety and protect public health.

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I want to thank the NRC for providing me with technical feedback on this draft, which we are currently reviewing, and I look forward to continuing to work with them throughout this process. Furthermore, I appreciate the interest in my colleagues in this issue addressed in my discussion draft, including establishing fair and more equitable NRC fees, streamlining the licensing process, and improving the current regulatory framework for decommissioning plants. These are all important conversations to have so that nuclear power can continue to provide clean, reliable, and affordable electricity to ratepayers in the United States.

Again, I welcome this opportunity to discuss how we can maintain our Nation's position as the global leader in civilian nuclear power and NRC's position as the gold standard of safety. I think all of us who are in this room recognize that if we cede the position, it will have serious consequences not only for our economy but also for our national security.

With that, Mr. Chairman, I am happy to yield to anybody who wants my time.

[The prepared statement of Mr. Kinzinger follows:]

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Mr. Whitfield. Anybody on our side seek additional time?

Mr. Kinzinger. Great. I yield back.

Mr. Whitfield. Okay. Yields back.

At this time I recognize the gentleman from California, and thank him very much for cosponsoring this legislation as well, for 5 minutes.

Mr. McNerney. Thank you, Mr. Chair.

Our Nation will, by necessity, diminish our dependence on fossil fuels in order to fight climate change, and as we do so, we will need to turn more and more to nuclear power.

H.R. 4979, the bill that my colleague, Mr. Latta, and I introduced, allows the NRC to develop the needed technical expertise for emerging technologies. This legislation provides a pathway for the NRC and the DOE to continue collaborating and establishes a regulatory framework for consideration of licensing advanced reactors. This will help ensure that as newer, safer technologies are developed, that the NRC has the framework in place to review new applications.

Mr. Chairman, with unanimous consent, I would like to submit three letters, one from Berkeley's Nuclear Engineering Department, one from Third Way, and one from the Clean Air Task Force, into the record.

Mr. Whitfield. Without objection.

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Mr. McNerney. And I will yield the balance of my time to my colleague from Pennsylvania.

[The prepared statement of Mr. McNerney follows:]

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Mr. Doyle. And I thank my colleague.

I want to thank the chairman and the ranking member for holding this important hearing today. To me, nuclear is a critical component of our energy future. We need to work here at this committee to ensure that it remains feasible and safe for our constituents back home by investing in this incredible energy source and its technology and making sure its value as carbon-free reliable baseload power is properly appreciated.

I believe that advanced nuclear is a key component of maintaining nuclear power in the future and will be an integral part of our energy portfolio here in the United States. My colleagues, Congressman Latta and McNerney's bill takes important steps in that direction.

I also want to applaud our colleague Mr. Kinzinger for his discussion draft. I think we share many similar concerns regarding the nuclear industry, and I am optimistic that we will be able to find some common ground on solutions. Though I couldn't help but notice the acronym for your bill is NUKEPA, which I find somewhat distressing.

But I am certainly encouraged by bringing attention to these issues the nuclear industry is facing, and I do hope we can work together on solutions and by coming up with a different acronym than the one you have chosen.

Thank you. I yield back.

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[The prepared statement of Doyle follows:]

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Mr. Whitfield. The gentleman yields back. So that concludes the opening statements, and I am going to introduce the witnesses individually before they speak.

So first of all, we have Mr. Marvin Fertel, who I mentioned in my opening statement, president and chief executive officer for the Nuclear Energy Institute.

Thanks for being with us, and we look forward to your testimony. You are recognized for 5 minutes.

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STATEMENTS OF MARVIN FERTEL, PRESIDENT AND CHIEF EXECUTIVE OFFICER, NUCLEAR ENERGY INSTITUTE; JEFFREY S. MERRIFIELD, PARTNER, PILLSBURY LAW FIRM, CHAIRMAN, ADVANCED REACTORS TASK FORCE, NUCLEAR INFRASTRUCTURE COUNCIL; TODD ALLEN, SENIOR FELLOW, CLEAN ENERGY PROGRAM, THIRD WAY; AND GEOFFREY FETTUS, SENIOR ATTORNEY, NATURAL RESOURCES DEFENSE COUNSEL

STATEMENT OF MARVIN FERTEL

Mr. Fertel. Thank you, Mr. Chairman and Ranking Member Rush and members of the subcommittee. On behalf of the commercial nuclear energy industry, I want to thank the committee for considering the Advanced Nuclear Technology Development Act, H.R. 4979, and the discussion draft of the Nuclear Utilization of Keynote Energy Policies Act.

I am pleased to represent the broad nuclear industry, including the owners and operators of nuclear power plants and the supplier community today.

As Congressman Kinzinger said, nuclear energy is the largest and most efficient source of carbon-free electricity in the United States. Our 99 reactors produce nearly 20 percent of our Nation's electricity and approximately 63 percent of our carbon-free electricity.

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Nuclear energy facilities demonstrate unmatched reliability by operating with an average capacity factor of 92 percent, higher than all other electricity sources. And importantly, they are essential to the country's economy and the communities in which they operate.

Despite the significant environmental, economic, and national security benefits that nuclear energy provides, the current regulatory requirements and licensing processes challenge the industry's ability to build new technologically advanced reactors.

The prospect of developing advanced reactors has become both attractive and necessary in the U.S. and abroad. In this country, approximately 126,000 megawatts of generation will be retired over the next 15 years. The U.S. Energy Information Administration forecasts the need for 287,000 megawatts of new electric capacity by 2040 in addition to the electric capacity that will be needed to replace the retired power plants.

Many other countries are looking to a rapid expansion of nuclear energy to address their growing electricity and environmental needs. Advanced nuclear reactor designs offer many technological advances for the U.S. and are also well suited to developing economies. However, without strong Federal leadership and direction, the U.S. industry runs the risk of falling behind its international competitors.

H.R. 4979 affirms Congress' commitment to U.S. leadership in nuclear technology and safety. The industry supports provisions in

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the bill that effectively direct the NRC to think differently about licensing reactors. The bill calls for an efficient, risk-informed, technology-neutral framework for advanced reactor licensing and a phased review process that could effectively facilitate private financing for advanced reactors.

Developers will be able to demonstrate progress to investors and other participants in these first-of-a-kind projects and obtain necessary capital investments as they achieve milestones.

The NRC imposes stringent safety requirements that all nuclear facilities must meet to maintain public health and safety. As we look to the details of how innovative advanced reactor technologies can meet these requirements, it is important for the NRC's regulatory framework to acknowledge that there will be a variety of effective ways to meet their safety requirements.

H.R. 4979 also recognized that it is a government function to develop the regulatory infrastructure to licensed advanced reactor technologies and therefore authorizes Federal funding to support those activities.

Congress should reform the NRC's fee-recovery structure to make fees more equitable and transparent. Despite NRC's efforts to reduce its budget and rightsize the agency, fees continue to be excessive and limitations of the mandated 90 percent fee rule create fundamental structural problems.

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The NRC budget is approximately \$1 billion per year, despite significant declines in its workload. In particular, according to an Ernst & Young study performed for the NRC, the NRC spends 37 percent of its budget on mission support costs, more than 10 percent higher than some peer agencies.

Because the NRC must collect 90 percent of its budget from licensees and the NRC budget has not correspondingly declined, remaining licensees are responsible for paying higher annual fees. With recent premature shutdowns and additional reactor decommissionings in the coming years, the current fee structure virtually guarantees that remaining licensees will continue to bear even higher annual fees.

The draft Nuclear Utilization of Keynote Energy Policies Act adopts a straightforward approach to making NRC fees more equitable. It would continue to require the licensee to pay for all agency activities attributable to a licensee or class of licensees but disallow collection of fees associated with the agency's corporate support. While there are Federal budget questions that arise with this approach, it would require the NRC to justify corporate support costs to Congress in order to receive appropriations, and in turn, prompt the NRC to control its budget and reduce or eliminate wasteful spending.

The draft bill recognizes the value of allowing international investments in U.S. nuclear plants by removing outdated restrictions

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on foreign ownership that ignore the multiple protections to our Nation's security and the reality of today's global nuclear energy markets. The draft bill also eliminates the uncontested mandatory NRC hearing on construction permits and combined license applications. This would not limit public participation since the public does not participate in a mandatory hearing and multiple other formal opportunities are available for public participation.

The draft bill would require that the NRC improve the regulatory framework for decommissioning nuclear power reactors. It is in the best interests of all parties, the NRC, licensees, and other stakeholders, to have a more efficient regulatory framework for plants entering the decommissioning process. The existing framework does not appropriately account for the significant reduction in risk that results when a power reactor ceases operations, defuels, and decommissions.

In closing, on behalf of NEI and its members, I wish to thank Congressmen Latta and McNerney for introducing the important advanced reactor legislation. We support passage of this bill. We also appreciate Congressman Kinzinger's work to reform NRC fees and the regulatory process.

We look forward to working with members of the committee and their staff to advance these reforms. Again, thank you for the opportunity to testify today.

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[The prepared statement of Mr. Fertel follows:]

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Mr. Whitfield. And our next witness is Mr. Jeffrey Merrifield, who is partner of the Pillsbury Law Firm and also chairman of the Advanced Reactors Task Force, the Nuclear Infrastructure Council.

Welcome, and you are recognized for 5 minutes, Mr. Merrifield.

STATEMENT OF JEFFREY S. MERRIFIELD

Mr. Merrifield. Thank you very much, Mr. Chairman. I also want to thank Ranking Member Rush and members of the subcommittee. As a former commissioner of the U.S. Nuclear Regulatory Commission, I frequently testified before this committee, and it is again an honor to --

Mr. Whitfield. Mr. Merrifield, would you move your microphone a little closer?

Mr. Merrifield. Sorry. I got it.

Mr. Chairman, again, thank you very much.

Thank you, Ranking Member Rush.

As a former member and former commissioner of the Nuclear Regulatory Commission, I frequently testified before this committee, and again, it is an honor to be here this morning.

Today, I am appearing in my role as chair of the U.S. Nuclear Infrastructure Council, Advanced Reactors Task Force, although, as mentioned, I am a partner in the Pillsbury Law Firm. My testimony will

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discuss the provisions in H.R. 4979 on advanced reactors, as well as the proposed changes to the NRC procedures that are the subject of a discussion draft offered by Congressman Kinzinger.

NIC salutes the subcommittee's focus and support for advanced reactors, as well as the NRC budget reform provisions that provide funding for the NRC to develop a modernized nuclear licensing framework for advanced nuclear technologies. NIC issued a framework for advanced reactor licensing modernization white paper on February 22, 2016, which embraces many of the elements contained in the legislation.

When I first became a commissioner in 1998, the NRC, with the support of Congress, worked to rightsize the agency, consistent with the level of licensing and inspection activities. At that time, the agency had approximately 3,400 employees, and within the next few years we were able to reduce that down to about 2,800, principally through attrition, yet without any sacrifice to its mission of protecting people and the environment.

Today, the agency faces the same challenges to reduce its staff and to become more efficient and timely in its licensing activities. While the NRC has made great strides in rightsizing the agency through Project AIM, we believe further efficiencies can be realized, while at the same time maintaining safety and inspection activities and improving the timeliness of licensing.

During the past decade, the U.S. has maintained its technology

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leadership by developing new passive Generation III reactors in Georgia and South Carolina, as well as small modular light-water nuclear reactors headed toward deployment. NIC has seen significant growth and support for Generation IV advanced reactors that will provide expanded options for economical, carbon-free electricity and industrial heat generation.

If the United States is to be successful in maintaining its lead in developing and deploying these reactors in the 2020s and 2030s, Congress must consider significant policy changes. We believe the language in section 6 of H.R. 4979 will allow the agency to create a modern, risk-informed, technology-neutral framework, which will enable the development of appropriate advanced reactor regulations without passing these costs on to the developers or the utilities.

While section 6(a)(6) calls for the NRC to evaluate options to allow applicants to use phased review processes, we believe the language should be strengthened to require the NRC to establish specific stages in the commercial advanced nuclear reactor licensing process, including a prelicensing vendor design review modeled after the Canadian Nuclear Safety Commission vendor design process that was recommended by the NIC white paper.

Such a process would allow advanced reactor developers and investors to have a clearer picture of where they stand in the NRC process and in meeting NRC safety requirements and allow them to achieve

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further investment in their technologies.

We would emphasize a need to establish risk-informed performance criteria applicable for advanced reactors. While licensing process reforms are needed, advanced reactor technical performance criteria are critically required for developers to proceed with advanced reactor designs, and the NRC must move forward to finalize advanced generic design criteria, source term, and emergency planning requirements, among others.

We strongly support section 2 of the discussion draft which places fair and equitable provisions on the agency's fee-based programs. By eliminating the current fee-based-to-nonfee-based ratio and articulating the specific areas that will be borne by general revenues, the draft provides the appropriate balance between the fees borne by individual companies and those overhead activities covered by the Federal Government.

NIC believes the discussion draft would be strengthened by providing that the early stage engagement between advanced reactor developers and the NRC should be conducted at no or limited cost, with an appropriate cost share, perhaps 50/50 for later stages of the licensing process. While this can be funded through general revenues or a DOE grant program, either way, it should avoid the DOE and NRC picking advanced reactor winners and losers. We believe the private sector is better placed to identify and promote innovation, and the

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NRC licensing fees should not have a chilling effect on these entrepreneurial efforts.

Finally, I strongly support the elimination of the foreign ownership requirements of section 3 and the mandatory hearing requirements contained in section 4, and I am pleased to discuss my views with the subcommittee.

I would ask that some additional letters of support, including that of X-energy, be included in the hearing record.

[The information follows:]

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Mr. Merrifield. And with that, I again thank you very much for allowing me to testify today.

[The prepared statement of Mr. Merrifield follows:]

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Mr. Whitfield. Thank you, Mr. Merrifield.

Our next witness is Mr. Todd Allen, who is a senior fellow at the Clean Energy Program for the Third Way.

Dr. Allen, thanks for being with us, and you are recognized for 5 minutes, and please get the microphone up close. Thank you.

STATEMENT OF TODD ALLEN

Mr. Allen. Absolutely.

Good morning, Chairman Whitfield, Ranking Member Rush, other distinguished members of the subcommittee. On behalf of Third Way, I greatly appreciate the opportunity to provide testimony on the importance of nuclear energy innovation.

My perspective on nuclear energy comes from my diverse career. My first job after college, I lived on a floating nuclear reactor as an officer in the U.S. nuclear submarine fleet. I spent 10 years teaching at the University of Wisconsin nuclear engineering. I have seen firsthand the young generation that believes in nuclear technology as a critical component for providing clean energy.

I have worked in the national laboratory system as the deputy for science and technology at the Idaho National Laboratory, working to open up the laboratory facilities to university and industry users across the country. Now I am at think tank, where I think.

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Third Way supports the further development of an innovation culture that creates and brings to market advanced nuclear technologies. Currently, nuclear energy is provided as a single product offering, specifically large gigawatt scale electricity production machines. But the national energy system is changing rapidly, opening up the possibility of nuclear energy supporting a wider range of functions if new ideas can get from conception to commercialization.

A 2015 Third Way report identified nearly 50 companies, backed by more than \$1.3 billion in private capital, developing plans for new nuclear plants in the U.S. and Canada. These companies are creating a growing number of product options of varying sizes and capabilities intending to build upon the continued success of our current light-water reactor fleet, which provides over 60 percent of the carbon-free electricity in the United States.

Private-public partnerships will be key to the story, similar to the way hydraulic fracking and the Internet were developed and how SpaceX is currently teaming with NASA to send unmanned vehicles to Mars.

So how can Federal investments nurture this emerging culture of nuclear innovation? I will use as an example a hypothetical graduate nuclear engineering student named Carla who wants to provide clean energy to the world and make money at the same time. What is her path to success in transitioning a good idea on paper to a marketable product

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and a thriving company, and where can partnerships with the Federal Government be useful?

First step, Carla would benefit from early interactions with technical experts, financiers, and business developers. We suggest Carla could be helped through the creation of private-public partnerships in early innovation, a proposal we have called Innovation Centers. Innovation Centers would also benefit the Department of Energy by providing the agency with valuable information on private sector investment trends that could then inform how DOE directs research dollars to solve problems that support multiple companies.

Step two, securing investments. At the Innovation Center, Carla has opportunities to troubleshoot and mature her concept. She is also introduced to financial firms, which ultimately helps her secure a small investment to fund her company. Carla could leverage for private investment to receive DOE cost share, allowing her to move quickly and to signal to investors that her design is especially promising. The Department of Energy already engages in cost share programs, like the ones currently supporting project agreements with Southern Company's TerraPower and X-energy, and further use of these is encouraged.

Her third step, specialized testing. Here is where the Federal programs become uniquely valuable, through access to national test beds. Some development requires access to specialized capabilities. For instance, test reactors, facilities to test radioactive materials,

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or high-performance computing. Fortunately, a number of the Department of Energy laboratories have these types of facilities and expertise that Carla needs. The Department of Energy created the Gateway for Accelerated Innovation in Nuclear, or GAIN program, to facilitate these private-public interactions.

Step 4, beginning her regulatory process. As she develops her technology, Carla would like to get signals from the regulator, short of licensing, that her technical solutions are reasonable. This will help her gain additional funding increments as she develops her designs. She needs a regulator who is staffed and funded in a manner that allows it to be ready to respond to emerging light-water reactor technologies. Ideally, the pace of regulatory review would support new products for an energy system that is changing rapidly, all while maintaining the traditional exemplary safety record.

Step 5, demonstration reactor. As is typical with many new and capital-intensive technologies, Carla may need to build a demonstration of a reactor before moving on to a full-scale commercial reactor. To address this, the Department of Energy should allow innovators like Carla a chance to build their demonstrations at one of their laboratories that already have experience running nuclear facilities, allowing Carla to build her reactor at Idaho or Oak Ridge, for example, to help her more affordably test her design and make any final changes to commercialize her product.

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Final step, NRC licensing of her demonstration reactor. Because Carla is hoping her demonstration reactor design will eventually be commercialized, which would require her to go through the NRC licensing process, it would benefit her if the NRC were involved in the licensing and construction of her demonstration reactor. When Carla's demonstration reactor works, she is ready to work with her investors and the Nuclear Regulatory Commission to get final design approval and funding for commercialization.

Where can Congress help? Early innovation. Support the creation of multiple private-public Innovation Centers that facilitate the creation of a new generation of nuclear entrepreneurs. This can be formally done through report language in the appropriations process.

Test beds. Support the GAIN program as our national nuclear Innovation Center, ensuring a modern infrastructure with world-leading staff that serves as the Nation's test bed. Ensure that federally supported R&D programs are structured to maximize value through well-structured private-public partnerships. And finally, regulation. Ensure that the Nuclear Regulatory Commission is staffed, structured, and funded to support a pace of regulatory review that would support new products for an energy system that is changing rapidly.

House Resolution 4979 asks the NRC and DOE to look broadly at their functions and report back on how they could better serve this emerging nuclear innovation community. We are supportive of this national

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approach and have suggested some specific ideas. We hope DOE and NRC have additional useful ideas.

We also appreciate the intent of the discussion draft from Mr. Kinzinger and are ready and willing to interact to optimize our ability to move nuclear technology forward.

Thank you for inviting me to testify. I look forward to your questions.

[The prepared statement of Mr. Allen follows:]

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Mr. Whitfield. Thank you.

And our next witness is Mr. Geoffrey Fettus, who is the senior attorney for the Natural Resources Defense Council.

Thanks for being with us, and you are recognized for 5 minutes.

STATEMENT OF GEOFFREY FETTUS

Mr. Fettus. Thank you, Chairman Whitfield and Ranking Member Rush and distinguished members of the committee. It is a great honor to be here. I will just highlight a few points here.

First, with respect to H.R. 4979, which requires DOE and the NRC to work together to work to develop a plan with public input for advanced reactor licensing systems, such a charge has merit in that it asks two of the relevant Federal agencies to work together, but some cautions are in order.

Two hundred and seventy days is far too short a time to both gather and analyze the necessary technical and regulatory information and provide for public comment with respect to such a complicated set of economic, security, and environmental challenges as those faced by the licensing of advanced reactors.

Further, both EPA and the President's Council on Environmental Quality should be part of any such enterprise, EPA for its standard-setting authority and CEQ for its oversight of NEPA

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obligations. Even though many of these advanced reactor concepts have been around for decades, none of the current space have demonstrated the security, environmental, and safety improvements necessary to make them viable in the near term, and more pertinent to the reality of a carbon-constrained future, none of them have demonstrated any likelihood that they will be able to compete in competitive energy markets. And the licensing process, effectively designed by industry and streamlined by the NRC multiple times over the last two decades, has little to do with that.

Thus, our concern is real that the practical nuclear engineering and economic hurdles inherent to these technologies may serve as a distraction to the rapid continued scale-up of existing, economically viable, and proven solutions to the threat of climate change from wind, solar, and energy efficiencies.

Second, we found the discussion draft substantially more problematic, and I will highlight just a few of the sections. Section 2 unwisely shifts substantial costs to the taxpayers rather than collecting them, as has been done historically via licensing fees.

Section 3 requires a study on the feasibility and implications of repealing foreign ownership restrictions. While it is wise to study a matter and collect information before legislating, we would urge a requirement for wide public input on a matter this complicated, especially from the security terms.

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Section 4 does away with the mandatory hearing provision, which would do much harm to public confidence that all technical issues have been thoroughly and adequately considered by the NRC. Indeed, the mandatory hearing plays a crucial role in supplementing the contested hearing process in which few issues -- and I want to stress this -- sometimes no issues survive the gauntlet of NRC's arduous procedural requirement for admission of issues to a hearing.

The mandatory hearing process has a proven track record of highlighting weaknesses in the NRC's staff's review. For example, in the case of the Clinton ESP, the Atomic Safety and Licensing Board found the staff's review, and I quote, "did not supply adequate technical information or flow of logic to permit a judgment as to whether the staff had a reasonable basis for its conclusions," 64 NRC at 460.

Section 5 is equally troublesome as it is simply a codification of agency drift to an informal, less rigorous hearing process that really has already been underway for a long time. And rather than ensuring the hearing process continues to become a yet more expedient process and more of a restrictive venue for States and the public, Congress should be directing NRC to submit a substantially redesigned adjudicatory hearing process that will provide regulatory certainty but will also simplify the hearing requirements to allow substantive technical issues of safety or environmental concern come to the fore rather than entertaining joint industry-staff efforts to flyspeck,

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curtail, or have dismissed literally every contention that has ever been filed before the Atomic Safety and Licensing Board.

Section 6 is also problematic in that it weakens the opportunity for hearings on inspections, test analyses, and acceptance criteria prior to operation. It further bars the use of incomplete information as a basis for granting a hearing.

Briefly, the perception that hearings cause delays in licensing has no basis in fact. The industry has long structured the hearing process, and NRC staff requests for additional information are at the heart of the timing, and that is simply evidence of the regulator doing its job.

But even more to the point, docketing the application before it is complete when it often contains substantial areas that are promised to be addressed later or leaves out significant details creates the false impression that the time between when the application is docketed and when the final decision is rendered is attributable to the hearing process and public participation. This delay should not be used to justify even further restrictions.

Section 7 would do grave harm to NEPA and likely bar any meaningful NEPA review by staff. The current NEPA process, as is practiced by the NRC, is already problematic, and I detail that in my testimony.

And finally, with respect to section 8, we recommend striking the text in section (b), "factors," entirely from the draft legislation

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as this language can prejudice and distort the final decommissioning rulemaking that has just commenced at the Commission.

Thank you again for this opportunity, and I am happy to take any questions.

[The prepared statement of Mr. Fettus follows:]

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Mr. Whitfield. Well, thank you.

Thank all of you for your testimony.

At this time, we will recognize members for questions.

And, Mr. Latta, you are recognized for 5 minutes.

Mr. Latta. Well, thanks, Mr. Chairman, and again, thanks for holding today's hearing.

And, gentlemen, thanks very much for your testimony today. It is very much appreciated.

Mr. Merrifield, if I could start with the first question to you.

My legislation requires the development of phased licensing process to provide certain assurances to the license applicants. What do you see are the primary advantages of structuring the licensing process in this manner and how would you recommend the NRC develop such a process?

Mr. Merrifield. Well, I think right now one of the disadvantages of the current system is it is sort of all or nothing. You have to put in your license application and wait a very long period of time to determine whether the NRC is going to find that to be acceptable.

For the advanced reactor community, having a stepwise process, as envisioned by your bill, would allow early interaction with the NRC and an early indication of whether that design may be licensable. If, indeed, the NRC finds out that that is the case, that developer can identify additional areas of funding to continue to process that

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application and that design.

If for some reason -- and we hope it is not the case -- the NRC were to find that that would be something that would be difficult or not able to be licensed, then that applicant can then make a logical business decision whether they want to continue to move forward or not, and we think that is a real benefit to innovation.

Mr. Latta. Well, thank you. And your testimony also suggests that the model used by the Canadian nuclear regulator should be pursued. What do you think makes their structure more unique and constructive?

Mr. Merrifield. Well, it has some very specific steps to it. It does have this pre-application vendor design review. It has got some specific deliverables that are expected by the Canadian regulator that are well spelled out. It has a specific timing for when that review should occur. And, indeed, they even have limitations in terms of what the cost is going to be for the applicant.

So it makes it a very clear program for everyone involved to understand what is expected in that first step, and it allows the technology both to be evaluated as well as to move forward.

Mr. Latta. Thank you.

Dr. Allen, if I could turn to you, following up on that, do you have any additional thoughts regarding the benefit of the phased licensing process.

Mr. Allen. Just one small thing. I agree with the commissioner

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that it is a very important early signal to someone who is trying to take an early idea to commercialization to be able to get that feedback from the regulator.

The other thing by getting those is, parallel to this, we have got the Department of Energy doing research programs in similar technical areas. The more that we can get early signals that we can then use to feed back and guide how we spend Federal dollars on research in a way that helps those private companies is also very useful.

Mr. Latta. Thank you.

If I could ask Mr. Fertel a question of you. In your testimony you talk about that the country is going to lose, in the next 15 years, 126 gigawatts of generation and that we are going to need 287 gigawatts by 2040. I represent a district with 60,000 manufacturing jobs. We have to have a baseload capacity out there.

Could you just maybe kind of give me an overview of how many power plants we are talking about when you are talking about 126 gigawatts and what we are going to need when you look at 287?

Mr. Fertel. I think, Congressman, in general, you could think about them if they are gas plants, which is what we are building now, they are probably on the order of 400 to 500 megawatts each. So if we need 100,000 of them, we are going to be building, you know, 2,500-megawatt -- I am sorry. 1,000, yeah, we would be building 100 of those, you know, to get to 240 plus -- it is about 500 -- almost

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500,000 megawatts. So you would be building 1,000 plants at 500 megawatts each.

Mr. Latta. Thank you.

Mr. Merrifield, the Advanced Nuclear Technology Development Act requires the NRC to develop a risk-informed regulatory framework. Given your experience as a commissioner, would you please provide your interpretation of what a risk-informed framework means and what the primary inputs are into such a framework?

Mr. Merrifield. Well, a risk-informed performance-based approach uses a combination of risk analysis and performance history to identify what are the most significant areas to focus your inspection and your regulatory activities. It recognizes that in any system, whether it is a nuclear power plant, a petrochemical refinery, or an interplanetary space vehicle, every system is not equally important to safety. So using a risk-informed performance-based approach allows you to prioritize what are the most critical components and focus your regulatory process toward those.

Mr. Latta. Well, thank you very much.

And, Mr. Chair, I see my time is about ready to expire, and I yield back.

Mr. Whitfield. The gentleman yields back.

At this time, I recognize the gentleman from Illinois, Mr. Rush for 5 minutes.

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

Mr. Fertel, last week at the NRC's fiscal year 2017 budget hearing, the subcommittee examined the agency's request of almost \$20 million less this year than what was enacted in last year's budget. These cuts were said to be in line with the agency's Project AIM initiative designed to streamline operations and better reflect the Commission's increased workload.

However, in your statement you said that those reductions are not sufficient and that industry continues to see regulatory inefficiencies. Can you discuss why the new fee structure, as outlined in the discussion draft, is necessary?

However, how would the change in the outline in the bill impact safety standards and protocols in these nuclear facilities.

And if there are any other witnesses who would like to address any of these questions that I have asked, please chime in.

Mr. Fertel.

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

First of all, we never want to see either NRC's effectiveness as a regulator or their credibility as a regulator undermined. We think they are the best regulator in the world, and it is very important to us, from a commercial industry standpoint, for them to be very effective and credible in what they do.

They have Project AIM going. We think Project AIM is a very

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significant and sincere effort on their part to look at rebaselining what they are doing. The scope of what they have as responsibilities has dramatically decreased. They had staffed up for 20-plus new plants. They were operating as though they had 107 existing reactors. We are moving forward with four new reactors. We currently have 99, and a number of those are going to be shutting down soon. Their material licensees have significantly decreased in how many that they are regulating.

So they have, and they recognize this, a significant opportunity to rebaseline what they are trying to do with the basically scope of safety that they have to look at.

They also, as the commissioner mentioned before, are looking at getting much more safety focused. They were looking at on the order of greater than 60 new rulemakings, which now the Commission is saying they are not going to do all of them, for an industry that is performing exceptionally well and for an industry that they have been regulating now for 50-plus years.

So we see a significant opportunity for them to continue to do what they are doing, and we think that as they do what the industry is doing, as you deal with turnover due to retirements, you deal with a lot of this through attrition. And basically, you have an opportunity to hire critical resources, but probably not replace all resources. That is what we are doing on our side really religiously

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right now, unfortunately, because of the challenges that our plants face.

On the corporate overhead and the approach in the bill that Congressman Kinzinger has proposed, what we see is really a tremendous benefit of having Congress provide some accountability and oversight to the corporate overhead. Their corporate overhead, based upon the study that they commissioned with Ernst & Young, is much higher than all their peer agencies that they looked at.

I don't think they are evil for doing that, but there is not a lot of accountability for them to do less because we pay for it. It is not appropriated money, there is not a lot of oversight put to it, and there is very little transparency from our side to seeing what we are paying for and why.

So we see a significant opportunity. But to your point, we do not want to hurt their credibility or their effectiveness, but we think that they can continue going down their path. Now, we may push harder because we know they won't go as fast, but we think that that helps them go in the right direction.

Mr. Merrifield. Congressman, to that point, I mean, I was very proud to serve as a commissioner of the NRC, and I agree with the characterization. It contains an extraordinary group of hard-dedicated individuals.

Having said that, as I related in my testimony, we went through

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a similar process when I was a commissioner to the process that they are undergoing today. There was a decreasing workload, and there was a need to appropriately align the size of the workforce and the task and make it more risk informed.

We were able to do that, and I think it resulted from a couple of things. One, we had a significant amount of oversight from Congress. We had to provide monthly reports to Congress on the progress of the licensing activities that we had underway. And that drove the Commission, in its budget process, in what it presented to Congress, to conduct a line-by-line review of how it was spending money, what the priorities were, and to make sure that it was doing the most important stuff and recognize that some things just simply didn't need to be done. I think the Commission certainly needs to have that level of engagement, and I trust they should right now.

The one thing I would mention on corporate overhead support -- we didn't have this term when I was a commissioner -- I think there has been a lot of growth in things like IT and other things which may drive some of this. There is one program I think this committee needs to be aware is important that isn't overhead, and that is international programs. There are countries around the world that look to the NRC to help them craft their regulatory programs. It is very important, as Congress looks to oversee these programs, that that one, in particular, is not hurt.

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Those are important investments, they should come from general revenues, but it is assistance that that agency provides around the world, and it is critical.

Mr. Fertel. The industry would certainly support what Commissioner Merrifield recommends on them helping internationally from a safety standpoint.

Mr. Rush. I yield back, Mr. Chairman.

Mr. Whitfield. At this time, I recognize the gentleman from West Virginia for 5 minutes, Mr. McKinley.

Mr. McKinley. Thank you, Mr. Chairman. And in deference to time, I will try to keep this short, so I am going limit to maybe one or two questions on it.

Mr. Fertel, with you with the NEI, we understand with the new nuclear technologies that will come as a result of legislation like this, we know that there are going to be developments that will probably reduce the amount of waste product that comes from the spent fuel rods. But nevertheless the whole process of making nuclear energy is going to develop a waste product, maybe less than we are currently doing, but nevertheless there still will be a waste product.

So does NEI have a position? Do you support the Yucca Mountain as a permanent site for the disposal of nuclear fuel waste as required by law?

Mr. Fertel. Congressman, we have always supported going

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forward, finishing the licensing on Yucca Mountain to determine it is licensed, which we think it would be, and then to move forward with Yucca Mountain. We also support, in parallel, the necessity of having centralized interim storage, because we don't think you can get to Yucca and do everything fast enough for the fact that we have plants that are shutting down. And our support also goes to making sure that there is access to the Nuclear Waste Fund. There is over \$30 billion in it, and we don't have access right now.

Mr. McKinley. Of the 99, I guess, reactors we have functioning, I am curious about what is being done currently to safeguard those spent fuel rods in those water baths. We know the potential with all the fear of terrorism and other activity for national security. Is there something being done on this nuclear waste management that can give us a greater comfort than the way we are doing it now? If we are not using Yucca Mountain yet, how safe should we feel?

Mr. Fertel. Yeah. I am sure Commissioner Merrifield will add to this.

Mr. Merrifield. I will.

Mr. Fertel. But the NRC heavily regulates what we do with used nuclear fuel, both while it is in the spent fuel pool and then when we put it in dry cast storage on site. We obviously have stringent security plans to make sure that not just the used fuel is protected, but the active fuel and other things at our plants. And based upon

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the Fukushima lessons learned, there has even been enhancements to what we do with used fuel at our sites because of what we learned from what went on in Japan.

So I think to some degree the problem with used fuel is that it is managed very well on sites, which doesn't create the crisis to cause our country to try and implement the Nuclear Waste Policy Act or any other law related to it. So the good news is we manage it very well and it is regulated very well. The bad news is it doesn't move it very quickly to where you want it to go.

Mr. McKinley. Thank you.

Mr. Merrifield. Congressman, on the issue of security, I was a commissioner during 9/11. I was in front of this committee talking about the things that needed to be accomplished to protect the U.S. fleet of nuclear units.

I can say without reservation, I have been on nuclear sites within the last week looking at security issues, and I can assure you these are the safest industrial facilities in the United States. The level of security that we have at the nuclear power plants in the United States is well beyond what is even needed to protect that fuel from the adversaries that we face today.

Mr. McKinley. Thank you.

And, Chairman, I yield back the balance of my time.

Mr. Whitfield. We have two votes on the floor. We have got about

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10 or 11 minutes left. So if you all would be in agreement, we will recognize you for 3 minutes, and we will just get as far as we can, and then if somebody wants to come back, we can talk about that.

So, Mr. McNerney, you are recognized for 3 minutes.

Mr. McNerney. Thank you, Mr. Chairman.

Mr. Fertel, do you believe that we need to include fusion specifically in the H.R. 4979 framework?

Mr. Fertel. Was the question about fusion?

Mr. McNerney. Yes.

Mr. Fertel. To be honest, I hadn't thought about that, but my reaction is I think it is a whole different regulatory regime that we would have to look at for fusion, and the availability of fusion is still far enough off that I wouldn't rush it in and distract the NRC from paying attention to being able to put a regulatory process in place for the other technologies that are deployable sooner than that. I wouldn't eliminate it as something you should look at for the longer term, Congressman.

Mr. McNerney. Okay. Thank you.

Mr. Allen, the Third Way report that identified 50 companies developing plans for new nuclear plants in the U.S. and Canada, how soon are some of these technologies going to be available and is the NRC ready for that?

Mr. Allen. I think they are on a big spectrum, depending on how

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much technology development has been done in the past. I would say the quickest, assuming that we do the types of things we need in the regulatory space, would be on the order of 10 to 15 years. Some of them are much further out than that.

And I think that the NRC has a strong regulatory function, but as we talked about, it could do some things to be better receptive to these types of companies and to build staff depth in areas that they are not used to regulating.

Mr. McNerney. Mr. Merrifield, do you think there is a risk of agencies blocking heads against each other, the NRC and the DOE, with respect to the new technology?

Mr. Merrifield. There were a lot of discussions between the DOE and NRC on earlier advanced reactor-like programs. That did not get as far as I think we had hoped it would have gotten. I think with the focus that this committee and your counterparts in the Senate have on advanced reactor technologies, the legislation that you have before you will give the framework and the encouragement for the NRC to move forward.

They are an agency which, when focused on a mission, do a great job of accomplishing it. I sometimes refer to them as the Boy Scouts of Federal agencies. They need the focus, they need the encouragement of this committee. But I think they can accomplish the mission to appropriately and safely license and regulate advanced reactors in a

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timely and effective way.

Mr. McNerney. And an MOU would be sufficient to cause that to happen?

Mr. Merrifield. I believe so, yes, Congressman.

Mr. McNerney. Thank you.

Mr. Chairman, I will yield back.

Mr. Whitfield. Mr. Kinzinger, you are recognized 3 minutes.

Mr. McKinley. Thank you, Mr. Chairman.

The NRC has previously informed Congress that it believes amending the Atomic Energy Act to eliminate the mandatory uncontested hearing on combined license and early site permit applications could enhance the efficiency of NRC operations.

Section 4 in my draft allows the Commission, if a hearing isn't requested by an affected person, to issue a construction permit, operating license, or amendment to such permits and licenses without holding a hearing.

Mr. Fertel, in your view, how would this provision improve regulatory efficiency at the NRC?

Mr. Fertel. I think what it would do is allow both the licensee and the NRC staff to move forward on issues while a hearing is being done, which is, to be honest, very similar to a situation for the operating plants. So it would not delay the startup of a facility that might be critical to electricity, but certainly would not be making

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any revenue while it is sitting there.

If there was a true safety issue that it shouldn't start up, they are not going to allow it to do that. So it doesn't allow you to do something that is going to provide unsafe conditions.

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[10:32 a.m.]

Mr. Kinzinger. And what kind of regulatory and economic burdens are associated with the mandatory hearing requirement? How much can an uncontested mandatory hearing delay the process?

Mr. Fertel. There is not great data. We have looked at that based upon the Vogtle experience and some of the other projects, and it is hard to decipher exactly because there was the design cert going through at the same time. But our estimate was it could have been an 80- to 120-day delay as a result with, to be honest, not significant value added by that because of all the other reviews.

Mr. Merrifield. If I can just answer for a second on that one.

Mr. Kinzinger. Yeah.

Mr. Merrifield. Congressman, I think there are two issues associated with mandatory hearings. One of them is an issue of the extra time it takes. The other portion is the amount of staff activity that ultimately has to be borne by the applicant and the distraction it gives to actually getting to the ultimate decision. The staff, in preparing for those hearings, wants to make sure that everything they send up to the Commission is in a certain way. That eats up a huge amount of time.

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As a commissioner, I recognized that there were extraordinary opportunities for the public to comment on the process that even led to the ultimate licensing, and indeed the mandatory hearing was an antiquated legacy of the 1950s that was not needed.

Mr. Kinzinger. Thank you.

And a lot more to ask, but duty calls, and I will yield back. Thank you all for being here.

Mr. Whitfield. The gentlemen yields back.

At this time I recognize the gentleman from Texas, Mr. Green, for 3 minutes.

Mr. Green. Thank you, Mr. Chairman.

I am a supporter of nuclear power, and I think to get to a carbon-free environment that is where we need to get to. I believe increased cooperation between DOE and NRC would create efficiencies and expedite the process of approving new reactors. Combined with the President's GAIN initiative, I think we can revitalize our nuclear sector and secure additional baseload power.

I do have some concerns about the Nuclear Utilization of Keystone -- Keystone Energy -- Keystone on my mind -- Energy Policies Act. And I would like to ask some questions.

Mr. Merrifield, in your testimony you made reference to a 2016 white paper released by your organization that discussed framework for licensing modernization. The white paper listed five recommendations

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for Congress: proactive oversight of NRC's design review and licensing process; providing sufficient resources -- and I am guessing that means money; encouraging NRC to meet a 36-month deadline for review; and directing NRC to identify roadblocks to expedite approvals and submitting annual updates.

In your opinion, does the legislation before the subcommittee today adequately address these recommendations?

Mr. Merrifield. In the main, I think it does. We actually I think focused on a couple of things that we would ask for improvement in the two bills that you are looking at today. One is to be really specific in requiring a pre-application vendor design review process. The other one was to providing a greater opportunity for engagement between the developers of advanced reactor technologies and the NRC at no cost early stages in the process to really enhance the level of understanding on the part of the agency and the developer.

Mr. Green. During your service as a commissioner, do you recall how many licensing reviews the NRC completed?

Mr. Merrifield. How many licensing reviews?

Mr. Green. Yeah.

Mr. Merrifield. I would have to go back and do some research on that.

[The information follows:]

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Mr. Green. If you could get that, I would appreciate it.

With respect to these reviews, do you have a sense of how many hearings did the Commission grant upon request under section 189 of the Atomic Energy Act?

Mr. Merrifield. I would have to go back and review that one.

[The information follows:]

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Mr. Green. Okay. If you could get that for us.

And also under section 189, are formal adjudicatory procedures required of the Commission or do they have discretionary authority? Are they required to have those procedures or is it discretionary with the Commission?

Mr. Merrifield. I am sorry, Congressman, I didn't hear that.

Mr. Green. Under section 189, are the formal adjudicatory procedures required of the Commission or do they have discretionary authority?

Mr. Merrifield. Congressman --

Mr. Fettus. I can answer that.

Mr. Merrifield. I would like to have the opportunity to review those procedures and provide an appropriate response to the committee.

[The information follows:]

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Mr. Green. Okay.

Mr. Chairman, I will be glad to submit the questions.

And if you could get back to us.

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Mr. Green. Because, again, if we can move the process along. And coordination between agencies is never bad.

Thank you, Mr. Chairman.

Mr. Whitfield. Well, thank you.

And we appreciate you all being with us today. I am going to ask just a couple of questions.

We have still have 3 minutes before we have to vote, Bobby, so no rush.

NuScale Power has stated their plans to submit its design certification application to the NRC by the end of 2016 for a so-called small modular reactor. And, Mr. Merrifield, I would just ask you, what is your outlook for NRC's readiness to accept a high-quality application and review it in a timely manner?

Mr. Merrifield. Congressman, I think the NRC has been preparing, as far as I can tell, I believe the NRC has been preparing itself to receive that application. It is a light-water reactor technology. It is something that the NRC is familiar with. And I think they will do their level best to accept it and review it in due course.

Mr. Whitfield. Do you agree with that, Mr. Fertel?

Mr. Fertel. Yeah, I think the way Jeff Merrifield answered is probably accurate. And I think that the division director there is a very competent young woman who I think is making sure that they are as prepared as they can be. So we would expect they will do as good

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a job as they can.

Mr. Merrifield. Yeah, I agree with that. Mr. Fertel references Jennifer Uhle, who is the director of the Office of New Reactors. She is a very talented young woman I think will do an exceptional job for that team.

Mr. Whitfield. Well, we hear a lot of discussion about small nuclear modular reactors and great hope for them. And some are sodium cooled, some are lead cooled, light water. How many of these so-called small modular reactors are there operating today around the world? Does anybody have any idea?

Mr. Fertel. I don't think that from a commercial standpoint there is hardly any. But all of our submarines are using small modular reactors and our aircraft carriers. So there is experience with them. Now, they are different, but there is a lot of experience.

And in our country right now, Mr. Chairman, electricity growth, thanks to really very good efficiency and things like that, and also probably being hurt by our economy a bit, but our electricity growth is really very small. So small modular reactors are becoming actually even more important domestically. We always thought they were important internationally. But even domestically they are becoming very important, particularly as you replace older smaller coal plants and eventually even gas plants.

Mr. Merrifield. Mr. Chairman, one thing I think is important to

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remember, particularly about advanced reactor technologies, we talk about traditional utility uses for generating electricity. What is important to remember is these technologies also provide very high sources of heat. So the new users of these technologies may not necessarily be just our traditional utilities. It may be also for other industrial processes that can utilize that heat and power.

Mr. Whitfield. Anybody else have any comment? Okay.

Mr. Allen. Yeah, I would just agree that they are looking at a large number of different commercial products than just gigawatt-scale nuclear.

Mr. Whitfield. So when we talk about small, are we talking about below 300 megawatts or so?

Mr. Merrifield. Yeah. Some of them that are conceptualized could be as small as 3 to 10 megawatts. Some of them are in the range of 80 to 100. Others are on sort of the verge of 300. So there is a range of the potential reactors being proposed.

Mr. Fettus. Chairman Whitfield, though, there is one caution. The only ones that we have seen that have had any indication of any economic viability have been coupled together in the several-hundred megawatt range to allow for some economy of scale to actually be able to compete in a market. And none of these are built around the world. The number is actually zero. And the question of whether or not they will have any chance in a competitive marketplace in 10, 12, 15 years,

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no one has a crystal ball here.

Mr. Merrifield. Well, no one has a crystal ball, but at the end the market is going to resolve that. That is what we are asking for, a predictable regulatory regime that those reactors can be licensed through. If they can't come up with the economics that the market will bear, those reactors will not go forward.

Mr. Whitfield. Well, listen, thank you all very much. We look forward to working with you as we consider these two pieces of legislation and other issues as well.

We will keep the record open for 10 days.

[The information follows:]

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Mr. Whitfield. And once again, thank you. And that concludes today's hearing.

[Whereupon, at 10:41 a.m., the subcommittee was adjourned.]