

PENDING LEGISLATION

HEARING
BEFORE THE
SUBCOMMITTEE ON ENERGY
OF THE
COMMITTEE ON
ENERGY AND NATURAL RESOURCES
UNITED STATES SENATE
ONE HUNDRED FIFTEENTH CONGRESS
FIRST SESSION
ON

S. 1336 S. 1876
S. 1455 S. 1981
S. 1563 S. 2030
S. 1851

DECEMBER 5, 2017



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The text for each of the bills which were addressed in this hearing can be found on the committee’s website at: <https://www.energy.senate.gov/public/index.cfm/hearings-and-business-meetings?ID=C916913D-3DA3-454B-A1B0-F4CAD5587F22>.

PENDING LEGISLATION

TUESDAY, DECEMBER 5, 2017

U.S. SENATE,
SUBCOMMITTEE ON ENERGY,
COMMITTEE ON ENERGY AND NATURAL RESOURCES,
Washington, DC.

The Subcommittee met, pursuant to notice, at 2:44 p.m. in Room SD-366, Dirksen Senate Office Building, Hon. Bill Cassidy, presiding.

OPENING STATEMENT OF HON. BILL CASSIDY, U.S. SENATOR FROM LOUISIANA

Senator CASSIDY [presiding]. Good afternoon. I call this meeting to order.

Today the business before the Subcommittee is to receive testimony on several pieces of legislation relating to the applied energy programs at the Department of Energy.

I would like to thank Under Secretary Mark Menezes for appearing before the Subcommittee today to provide the Department of Energy's perspective. A Louisiana native and fellow LSU Tiger, I introduced Under Secretary Menezes at his confirmation hearing. I am pleased to welcome him back today.

A bill under consideration today is one I introduced with Senator Rubio, the Small Scale LNG Access Act of 2017. This legislation codifies a rule proposed by the Department of Energy to expedite the approval to small scale exports of natural gas.

Small scale exports primarily target markets in the Caribbean, Central America and South America. These markets represent relatively untapped potential as the United States only exported approximately three billion cubic feet of natural gas to the region in 2016.

An increase in exports of U.S. liquefied natural gas, or LNG, will decrease Caribbean and Central American reliance on Venezuelan fuel oil, increase economic opportunities and offer a cleaner burning fuel source for those nations. Reducing the time and investment required for small scale exports will simultaneously benefit U.S. production, manufacturing and construction jobs while also reducing trade deficits with the importing country.

Increasing LNG exports, even on a small scale, will positively impact the economies of the U.S. and those receiving the U.S. gas.

I would like to submit a letter for the record that I, along with Senator Barrasso and Chairman Murkowski, sent to Secretary Perry in support of the Department of Energy proposed rule. The

letter highlights the U.S.'s ability to meet the demands of increased LNG exports and benefits of doing so.
[The information referred to follows:]

United States Senate
WASHINGTON, DC 20510

October 5, 2017

The Honorable Rick Perry
Secretary, U.S. Department of Energy
1000 Independence Avenue SW
Washington, D.C. 20585

Dear Secretary Perry,

We write in support of the Department of Energy's (DOE) proposed rule (RIN 1901-AB43) to expedite the approval of small-scale exports of natural gas. We appreciate this proposal and the series of steps the Department has taken to decrease burdensome regulations and increase the United States' energy security.

Companies involved in the U.S. natural gas industry, throughout the entire supply chain, stand to be major beneficiaries of this proposed rule. As stated by the Department, this proposed rule will primarily service consumers in small-scale natural gas export markets in the Caribbean, Central America, and South America. The Caribbean small-scale LNG export market represents a relatively untapped outlet as the United States only exported approximately three billion cubic feet of natural gas to the region in 2016.¹ Increasing exports of U.S. liquefied natural gas (LNG) will decrease Caribbean and Central American reliance on Venezuelan fuel oil, increase economic opportunities, and offer a cleaner-burning fuel source for those nations.

The LNG export market is a growing and promising opportunity, and the United States is well positioned to meet the anticipated four to five percent annual growth in global natural gas demand.² According to the Energy Information Administration, the U.S. has an estimated 2,355 trillion cubic feet of technically recoverable natural gas, enough to last an estimated 86 years at current consumption rates.³ As the United States has increased LNG exports in recent years, natural gas prices have remained low for domestic energy users.

U.S. natural gas offers a cleaner alternative to the fuel sources relied upon by many Caribbean, Central American, and South American countries. In 2014, Jamaica generated over 90% of its

¹ (2017, August 31). *U.S. Natural Gas Exports and Re-Exports by Country*. Retrieved from https://www.eia.gov/dnav/ng/ng_move_expc_s1_a.htm.

² *Shell LNG Outlook 2017*. Retrieved from http://www.shell.com/energy-and-innovation/natural-gas/liquefied-natural-gas-lng/lng-outlook/_jcr_content/par/textimage_1374226056.stream/1488553856456/88c077c844a609e05eae56198aa1f92d35b6a33cc624cf8e4650a0a6b93c9dfb/shell-lng-outlook-2017-overview.pdf.

³ (2017, July 25). *Frequently Asked Questions*. Retrieved from <https://www.eia.gov/tools/faqs/faq.php?id=58&t=8>.

electricity from fuel oil, with no electricity generated by natural gas.⁴ If this rule is implemented, cheap U.S. LNG could offer countries like Jamaica a cleaner fuel source with which to generate electricity.

The current permitting process for LNG export facilities is expensive, and small-scale projects often are not cost effective under current conditions. Reducing the time and investment required for small-scale exports will benefit U.S. production, manufacturing, and construction jobs while also reducing trade deficits with the importing country. Increasing LNG exports, even on a small scale, will positively impact the economies of the United States as well as the economies of those receiving U.S. natural gas.

This rule would expedite the exportation of natural gas, creating well-paying jobs in the United States and contemporaneously offering a cleaner burning and inexpensive fuel source for Caribbean countries. Without this rule, U.S. investment will remain sidelined and our allies in the Caribbean will continue to pay higher energy prices for less reliable fuel sources. The federal government should facilitate U.S. natural gas exports, and we support policies that make U.S. natural gas more accessible.

We support this proposed rule, and look forward to working with you and the Department to advance our shared goal of United States energy dominance.

Sincerely,

Bill Cassidy, M.D.

Bill Cassidy, M.D.
United States Senator

Lisa Murkowski

Lisa Murkowski
United States Senator

John Barrasso

John Barrasso
United States Senator

⁴ 2017. *Jamaica: Electricity and Heat for 2014*. Retrieved from <https://www.iea.org/statistics/statisticssearch/report/?year=2014&country=Jamaica&product=ElectricityandHeat>.

Senator CASSIDY. In addition, the Committee will consider three bills relating to energy storage.

Just a few weeks ago in this room, the full Committee held a robust hearing on energy storage highlighting a number of opportunities and challenges associated with these technologies. Our accomplished panel of witnesses provided numerous thoughts on what a successful research development, demonstration and deployment program could look like.

Today, we continue that conversation by considering S. 1455, Senator Flake's Energy Storage Goals and Demonstration Projects Act; S. 1851, Senator Franken's Advancing Grid Storage Act; and S. 1876, Senator Wyden's Reducing the Cost of Energy Storage Act. In addition, we will consider Chairman Gardner's Reliable Investment and Vital Energy Reauthorization Act, a bill that previously was reported from this Committee last year and included in the energy bill as well as Senator Tillis' ceiling fan Energy Conservation Harmonization Act. Last, but not least, we will consider Senator Manchin's Rare Earth Element Advanced Coal Technologies Act which I am sure he will touch on during his opening statement.

With that, I turn to Senator Manchin.

**STATEMENT OF HON. JOE MANCHIN III,
U.S. SENATOR FROM WEST VIRGINIA**

Senator MANCHIN. Thank you, Mr. Chairman, for scheduling this hearing to discuss the seven bills on today's agenda. I would like to also thank our witnesses, our dear friend, Senator Tillis, and Mr. Menezes, for being here.

I would like to briefly discuss my bill which is Senate bill 1563, the Rare Earth Element Advanced Coal Technologies Act, which ensures the Department of Energy and its partners have the resources to continue its vital research into developing and commercializing a domestic source of rare earth elements from coal and coal by-products.

Rare earth elements are an essential component for products that Americans rely on every day. The list includes everything from smartphones to wind turbines, to electronic vehicles, to national defense systems critical to our national security. The United States does not have a domestic source of these critical minerals. I repeat. The United States does not have a domestic source of these critical minerals, and instead imports nearly all of its rare earth elements from China.

The National Energy Technology Laboratory (NETL) in Morgantown, West Virginia, has explored the concept of extracting rare earth elements from coal and coal by-products for some time now, and Congress recognized it as a liability to have a growing dependence on foreign imports and began appropriating funds for NETL's Rare Earth Element Program in 2014. The Consolidated Appropriation Act of 2017 provided \$15 million for NETL to develop prototype advanced separation technologies for rare earth elements from coal and coal by-products.

My bill, Senate bill 1563, authorizes an annual appropriation of \$20 million for the Department of Energy to continue its work on rare earth elements. I believe the Department of Energy's research

will help set us on a path toward reestablishing domestic production of these critical minerals.

My bill also directs Department of Energy to focus on the rare earth elements most critical to the national security interests of the United States. So far, NETL's Rare Earth Element Program has produced promising results.

Just last week Secretary Perry announced that NETL found high concentrations of rare earth elements in coal samples taken from various locations across the country, including the Northern Appalachia, Central Appalachia and the Rocky Mountain Coal basins. According to the Department of Energy, the samples contain concentrations of rare earth elements exceeding 300 parts per million, the necessary level to make commercial viability of these technologies a reality.

Mr. Chairman, I would ask unanimous consent that the press release from the Department of Energy be entered into the record.

Senator CASSIDY. Without objection.
[The information referred to follows:]



U.S. DEPARTMENT OF **ENERGY**

Press Release

News Media Contact: [\(202\) 586-4940](tel:(202)586-4940)

For Immediate Release: November 29, 2017

High Concentrations of Rare Earth Elements Found in American Coal Basins

WASHINGTON, D.C. - The **U.S. Department of Energy's (DOE) National Energy Technology Laboratory (NETL)** has found high rare earth element (REE) concentrations in coal samples taken from the Illinois, Northern Appalachian, Central Appalachian, Rocky Mountain Coal Basins, and the Pennsylvania Anthracite region. These highly concentrated samples are greater than 300 parts per million (ppm).

"Rare Earth Elements are vital to the development and manufacturing of high-tech devices such as computers, cell phones, and our national defense systems," said **U.S. Secretary of Energy Rick Perry**. "The current difficulties and high expenses associated with REE extraction has left the U.S. dependent on foreign REE imports. Supporting innovative research and development to establish efficient, cost-effective REE extraction methods is critical to our country's energy and national security."

Concentrations of rare earths at 300 ppm are integral to the commercial viability of extracting REEs from coal and coal by-products, making NETL's finding particularly significant in the effort to develop economical domestic supplies of these elements.

The discovery was made in partnership with West Virginia University (WVU), the University of Kentucky (UK), Tetra Tech, and the XLight Corporation. WVU explored acid mine drainage from bituminous coal mines in the Northern and Central Appalachian Coal Basins, while Tetra Tech looked at bituminous, subbituminous, and anthracite coal from the same basins. Meanwhile, UK analyzed western Kentucky bituminous coal in the Illinois Coal Basin, and XLight Corporation investigated coal-related materials in the Eastern Pennsylvania Anthracite Region.

These findings could encourage technology developers to recover REEs from these basins by helping them find high quality feedstocks—the raw materials needed for REE recovery processes. Higher REE concentrations in the feedstock will improve the prospect of producing higher-purity REE materials. A separate research initiative is focusing on DOE cost-shared research projects to design, develop, and test technology to actually recover REEs from coal-related materials in a variety of American coal basins.

These recovery projects began in October 2017 and will use materials from the high-REE containing coal basins as feedstocks. They include WVU using acid mine drainage from bituminous mines in the Northern and Central Appalachian Coal basins as a feedstock, with final design and construction of bench-scale test facilities beginning in January 2018. A second bench-scale facility is being designed for construction by the University of North Dakota to recover REEs from lignitic material.

In addition, UK also began pilot-scale design and construction in October 2017 for systems using West Kentucky bituminous coal preparation plant refuse from the Illinois Coal basin. A second pilot-scale facility is being designed and constructed by Physical Sciences Inc.

Two additional pilot-scale facilities began in September 2017 as part of the Phase 1 project designs of small, pilot-scale, salable REE recovery systems. These include Inventure Renewables using material from the Eastern Pennsylvania Anthracite Region and Marshall Miller & Associates using Northern Appalachian Upper Freeport bituminous coal preparation plant middlings refuse.

Identifying promising sources of domestic coal and coal by-products containing high REE concentrations is a key milestone on the pathway toward economic recovery of REEs from U.S. coal and coal by-products. Additional analytical results for REE-bearing coal-related material at the state and/or county level can be found at NETL's Rare Earth Elements Energy Data eXchange [website](#).

###

Senator MANCHIN. In conclusion, I am excited about the work that NETL is doing, and I believe we have a tremendous opportunity to continue to use our nation's abundant coal resources to strengthen our national security, introduce competition into the supply chain and ensure that America entrepreneurs have reliable access to these materials.

I want to thank you again, Mr. Chairman, and I look forward to the hearing.

Senator CASSIDY. Our first witness, the Honorable Thom Tillis.

**STATEMENT OF HON. THOM TILLIS,
U.S. SENATOR FROM NORTH CAROLINA**

Senator TILLIS. Thank you, Chairman Cassidy, Ranking Member. I just want to thank you and your staff for your willingness to hear a bipartisan, commonsense, regulatory reform idea. Ranking Member Manchin, I also want to thank you and your staff. You have been very helpful.

I think it is a real testament to the simplicity of what we are trying to do here in terms of the underlying bill.

I am deferred from presenting the 30-page PowerPoint that I had to describe the technical aspects of this bill.

[Laughter.]

With your approval—

Senator CASSIDY. Approved.

[Laughter.]

Senator TILLIS. I will just simply say that Senator Heinrich and I just tried to come together on something that makes perfect sense. We have two regulations that are going to be implemented over the course of the next two years that could disrupt the supply chains all the way from the manufacturers to the retail outlets, twice, or we can simply harmonize it by targeting the dates, delaying a date, having both regs go into place at the same time.

It makes good sense, particularly for all the consumers that rely on ceiling fans to actually—I have had a ceiling fan in my house forever. As a matter of fact, my wife brought it to my attention. My last ceiling fan I purchased back when grunge rock was very popular. They last a long time, but it is a significant purchase. What we don't want to do is add cost and complexity to getting something as simple and as helpful as a ceiling fan in a home.

So there are so many debates on regulatory reform to where we could really drill down and cause an impasse, but I don't think this is one of them. I think that this commonsense legislation, if we can work it in to the markup and get it passed, makes perfect sense and it is an example where Democrats and Republicans can come together when you see a commonsense solution.

I appreciate your support and serious consideration of Senate bill 2030, the Ceiling Fan Energy Conservation Harmonization Act. That is all it is doing. Harmonizing regulations and moving forward. And I appreciate your serious consideration.

Senator CASSIDY. Mr. Menezes.

**STATEMENT OF HON. MARK MENEZES, UNDER SECRETARY,
U.S. DEPARTMENT OF ENERGY**

Mr. MENEZES. Chairman Cassidy, Ranking Member Manchin, members of the Subcommittee, I thank you for inviting me here today to provide the Department's testimony on the seven bills currently pending before the Committee. I ask that my written statement be included in the record.

I have the honor of serving as the Under Secretary of Energy at the Department of Energy, and I appreciate the expeditious action that this Committee took to conduct my hearing and to report me unanimously to the full Senate. It was greatly appreciated.

Having been confirmed about a month ago, I have had the opportunity to see the successes and challenges facing the U.S. energy sector firsthand. The Department of Energy is an agency tasked with a number of important responsibilities. Among them, assuring our nuclear readiness, overseeing the nation's energy supply, carrying out environmental cleanup from the nuclear mission and managing the Department's 17 national laboratories.

The Department of Energy is fostering an environment that promotes responsible investment, increased efficiency and development of new technologies as well as predictability and ease of access by the private sector to the national labs and facilities.

In support of the Administration's goals of establishing energy dominance and economic competitiveness, the Department's energy and science programs are focused on research and development across a variety of technologies and fuel sources. By carefully setting priorities and focusing on the most promising research, the Department and its national laboratories will continue to support the world's best enterprise of scientists and engineers. These are the great men and women who create innovations that help drive American prosperity, security and competitiveness for the next generation.

I have been asked to testify on multiple bills today which the Administration continues to review. They are, as mentioned: Senate bill 1455, the Energy Storage Goals and Demonstration Projects Act; Senate bill 1851, the Advancing Grid Storage Act; and Senate bill 1876, the Reducing Cost of Energy Storage Act. Let me pause here and remind the members that our Office of Electricity has an ongoing storage research office that looks at the materials, devices and systems and analyses necessary to help foster breakthrough technologies on battery storage. The specific national labs that are included in that are Sandia, Pacific Northwest and Oak Ridge. We partner with universities, utilities and industry, we have published 185 peer-reviewed publications, and we hold 122 patents in this area. We have—we are holding over 20 commercial licenses, and we have won nine R&D 100 awards. So we are pleased to see additional bills on this topic, and we look forward to working with the members on the storage bills.

In addition to those three bills, as Ranking Member Manchin said, we're looking at his bill, 1563. And in addition to the comments that Ranking Member Manchin said, I'd like to point out to the Committee members that our Office of Rare Earth Elements at the Department has conducted over 1,000 rock samples in 14 states

and came to the conclusions that were expressed by Ranking Member Manchin, in your comments.

Senator Tillis described the ceiling fan bill. And again, this bill seeks to harmonize two of the rules that we had issued, one for the electric motors and one for the electric lights. They were on the same timetable initially; however, they were finalized at different times and because a statute separated those two technologies and devices, there was no way that we could link them up. So, unless Congress acts we are really unable to do the harmonization ourselves.

Chairman Cassidy described the small scale LNG access and there's not anything I can add to his description of what it does in the reasons set forth, as he stated.

And then finally, we have the Senate bill 1336, the Reliable Investment and Vital Energy Reauthorization Act, that is, the River Act.

I look forward to discussing these bills in further detail and helping the Committee understand the impact these bills could potentially have on the Department. The Department appreciates the ongoing bipartisan efforts to address our nation's challenges and looks forward to working with the Subcommittee and Committee on the legislation on today's agenda and any future legislation.

Our nation will achieve our economic energy and environmental goals by ensuring the United States continues to be a leader in energy technology, development and delivery and by unleashing America's ingenuity to unlock our natural resources and energy potential. Through research and development, collaboration at all levels of the government and the private sector, the Department of Energy and our national labs aim to support the America's energy renaissance.

The Administration looks forward to continuing to work with Congress on legislation to enhance U.S. competitiveness and job creation.

I thank you for the opportunity to be here today. I look forward to your questions and, if the Chairman wishes, I can give a very brief update on the situation in Puerto Rico and the Virgin Isles, just having returned from a trip there, you know, over the weekend.

[The prepared statement of Mr. Menezes follows:]

Testimony of Under Secretary Mark Menezes
U.S. Department of Energy
Before the
U.S. Senate Committee on Energy and Natural Resources,
Subcommittee on Energy
December 5, 2017

Introduction

Chairman Gardner, Ranking Member Manchin, and Members of the Subcommittee, it is a privilege and an honor to serve at the Department of Energy (DOE), an agency tasked with fulfilling missions in nuclear security, basic scientific research, energy innovation and security, and environmental cleanup. Thank you for the opportunity to testify today on behalf of the Department regarding seven bills that pertain to energy storage, rare earth elements, energy conservation standards, small volume exports of liquefied natural gas, and hydroelectric power.

In support of the Administration's goals of energy dominance and economic competitiveness, resources within DOE's energy and science programs are focused on early-stage research and development (R&D) across a variety of technologies that support American energy independence and domestic job-growth. Through careful prioritization and ensuring funding goes to the most promising research, DOE, through its national laboratories, will continue to support the world's best enterprise of scientists and engineers whose innovations drive American prosperity, security, and competitiveness for the next generation. This testimony is not intended to provide a formal Administration position, but rather to provide general and technical comments to the Committee.

Energy Landscape

There has been an energy revolution in the United States over the last decade. Through the increase in production of crude oil and other liquid fuels, refined petroleum products, and natural gas, this nation has become an energy powerhouse. Wind and solar power generation also play a role in our energy mix and vehicles have reached historic levels of efficiency.

The United States is, however, at an energy crossroads. Our energy landscape is changing with implications across the energy sector and the economy as a whole. These changes have created opportunities. At the same time, they pose a set of challenges for energy policy makers, investors, non-governmental organizations, and industry.

These challenges to the energy system come in many forms, and addressing them will require action by many parties, including Congress, the private sector, and the public sector. The Administration looks forward to working closely with the Congress on this important topic.

I have been asked to testify on multiple bills today, which the Administration continues to review. Our understanding of what each bill seeks to accomplish is as follows:

S. 1455 - Energy Storage Goals and Demonstration Project Act

It appears this bill sets new goals for research and demonstration projects, including the deployment of three grid-scale energy storage demonstrations. The future resiliency and reliability of our electric system likely depends to a large degree on the deployment of breakthrough battery technologies. While DOE appreciates the research priorities set forth in this bill, Administration goals are to encourage early-stage R&D programs and projects. This Administration believes the private sector has the most important role to play in the development of late stage energy projects. Currently, there are multiple private companies competing and installing grid scale battery storage projects and this Administration encourages an increased reliance on the private sector to fund later-stage development of energy technologies. The Department looks forward to working with the committee to review the technological objectives expressed in the bill and provide technical comments.

S. 1851 - Advancing Grid Storage Act of 2017

This bill requires the Secretary to establish an energy storage research program, a demonstration and deployment program, and a technical assistance and grant program. The bill seeks to continue R&D on storage materials, electrochemical systems, and power conversion technologies. It specifically directs the Advanced Research Projects Agency-Energy (ARPA-E) to conduct research, and the Office of Electricity Delivery and Energy Reliability (OE) to conduct technical assistance. The demonstration and deployment program does not appear to have been assigned to a specific DOE program office.

The Department recognizes the content and approach taken within the proposed legislation. The basic elements of the program appear to foster the acceleration of energy storage systems.

As the members of this Committee are aware, the Administration proposed to eliminate funding for ARPA-E in its FY 2018 budget request. It appears the language in the bill singles out ARPA-E for undertaking this research, however, the Department has typically undertaken grid-scale energy storage research through its OE program with notable success. With this in mind, the Department hopes to have the discretion to determine under what program offices DOE would manage this research.

Finally, advanced technologies owned by Federally funded laboratories are used to facilitate public/private partnerships. The Department has a proven record of success with this arrangement. Thus, it is important that "lab-owned" technologies (given the appropriate application of provisions for the licensing of intellectual property) be considered as potential candidates for demonstration projects in any legislation considered by the Committee.

S. 1876 - Reducing the Cost of Energy Storage Act

This bill seeks to "establish a cross-cutting national program" within DOE with the goal of reducing energy storage costs through research, development, and demonstration.

Currently at the Department, the Office of Energy Efficiency and Renewable Energy (EERE) researches energy storage for transportation purposes, and the Office of Electricity Delivery and Energy Reliability (OE) researches energy storage technologies for grid-scale applications. EERE and OE coordinate their energy storage work through the Grid Modernization Initiative. The research investments in both vehicle technologies and grid-scale energy storage are greatly advancing the broader energy storage field.

The Department appreciates the research priorities in the bill, and looks forward to working with the Committee to evaluate the technical targets contained in the bill, such as any specific cost targets for vehicular and grid energy storage.

S. 1563 - Rare Earth Element Advanced Coal Technologies Act

It's likely the development of a domestic supply of rare earth elements (REEs) that is economically competitive will help fuel our nation's economic growth, secure our energy independence, and increase our national security. The bill appears to authorize \$20 million per year from 2018 through 2025 for the Department of Energy (specifically the Office of Fossil Energy) to develop advanced separation technologies for the extraction and recovery of REEs and minerals from coal and coal byproducts. It appears the bill also requests that DOE, in consultation with the Department of Defense, within 1 year after date of enactment, submit a report that assesses the importance of REEs to the United States, evaluates the development of new separation technologies, and analyzes the market impact of new technologies. Due to the complexities of the research and scope of the report, Congress may want to consider extending the due date of the initial assessment.

The bill appears to acknowledge the current ongoing efforts within DOE to advance separation technologies for the recovery of REEs. Thus, DOE appreciates the proposed legislation as it incorporates its ongoing R&D. DOE is developing technologies with the goal of enabling additional domestic supplies of REEs, reducing environmental impact of coal and REE production, and delivering technologies that can be manufactured within the United States. DOE has accomplished much in this area, including the evaluation of pilot-scale processing options, and the nature and distribution of REEs in U.S. coal deposits.

S. 2030 - Ceiling Fan Energy Conservation Harmonization Act

This bill changes the compliance date for amended energy conservation standards for ceiling fan light kits from January 7, 2019 to January 21, 2020 so that it aligns with the ceiling fan energy conservation standard. These products were listed separately under the Energy Policy and

Conservation Act of 1975 and the compliance dates were developed under separate rulemakings. DOE cannot revise the dates of compliance for ceiling fan light kits set forth in its regulations without Congress making an exception from the anti-backsliding provision of the enabling statute, thus this bill will require an additional statutory change by Congress.

By syncing up compliance dates, the date of importation of compliant products will be the same, allowing for easier compliance for manufacturers as well as government tracking for products entering the U.S. This harmonization will likely reduce the burden of tracking compliant and non-compliant products that are shipped in one box, especially for retailers.

S. 1981 - Small Scale LNG Access Act of 2017

Currently, all exports of natural gas, regardless of quantity, are subject to review and approval by the Department through its regulatory authority under the Natural Gas Act (NGA). Applications are made under NGA Section 3(a) for exports of natural gas to non-free trade agreement countries or NGA Section 3(c) for exports of natural gas to free trade agreement countries. This bill amends Section 3(c) to expedite approval of exports of small volumes of natural gas. The effect of this bill would be to have qualifying applications granted automatically, saving several months of review time at a minimum.

This bill appears to be similar to the volume criteria DOE laid out in a recent DOE Notice of Proposed Rulemaking (NOPR) concerning small-scale natural gas exports published on September 1, 2017. The NOPR sought to revise DOE's regulations in 10 CFR 590 concerning its role in administering the NGA. DOE's NOPR proposed that natural gas export applications to non-free trade agreement countries that proposed to export up to and including 0.14 billion cubic feet per day (or 51.75 billion cubic feet per year) would be deemed to be consistent with the public interest. The Department looks forward to working with the Committee to determine the technical aspects of the bill.

S. 1336 - Reliable Investment in Vital Energy Reauthorization

This bill reauthorizes hydropower production and efficiency upgrade incentives established in the Energy Policy Act of 2005 for an additional 10 years. Hydropower production incentives, which are paid to qualifying hydropower facilities based on the amount of electricity they generate, are reauthorized from 2018 through 2027. Hydropower generation efficiency incentives, which support capital improvements to existing hydropower facilities that increase their efficiency, are likewise reauthorized from 2018 through 2027.

Hydropower has significant capabilities to support economic competitiveness and electricity system reliability by providing low-cost, flexible generation. The recent Staff Report to the Secretary on Electricity Markets and Reliability found that while some hydropower plants are operated as baseload resources, many also support the dynamic behavior of grid operations by

providing a full range of ancillary services. This flexibility has historically complemented other traditional forms of baseload generation, such as coal and nuclear.

DOE appreciates the goal S. 1336 attempts to achieve. Hydropower furthers goals of economic competitiveness and electricity system reliability, and it appears this bill incentivizes both hydropower generation and efficiency upgrades.

Conclusion

DOE is fostering an environment that promotes responsible investment, increased efficiency and development of new technologies, as well as predictability and ease of access by the private sector to the national laboratories and facilities.

Our nation will achieve our economic, energy, and environmental goals simultaneously by ensuring the United States continues to be a leader in energy technology, development, and delivery, and by unleashing America's ingenuity to unlock our natural resources. Through early-stage research and development, and collaborations at all levels of government and with the private sector, the Department of Energy and our National Laboratories aim to support an efficient transition during our nation's energy revolution. Significant progress has been made, however, more work is necessary to capture the full set of opportunities.

The Department appreciates the ongoing bipartisan efforts to address our nation's energy challenges, and looks forward to working with the Committee on the legislation on today's agenda and any future legislation.

Thank you again for the opportunity to be here today, and I look forward to your questions.

Senator CASSIDY. I think we have a bunch of folks who have to hustle, so I am going to ask you to hold that for a little bit.

Senator Wyden wanted to make a short statement.

Senator WYDEN. Mr. Chairman, thank you, and it will literally be 30 seconds.

First, I very much appreciate your putting my bill, S. 1876, on the schedule and the reason why is to get renewable energy to the power grid. Our country needs fresh strategies to reduce the cost. That is the point of this legislation. I appreciate it.

The second. This is a complement to what I have been working over the years to look at using the tax code to provide incentives to promote energy storage as well. I think the one-two punch is going to make it possible and particularly as we move to a tech neutral policy with respect to energy.

So I thank you and I apologize to my colleagues and appreciate them letting me leap in for this 30 seconds.

Senator CASSIDY. I am not under a time constraint, so I am going to allow my Democratic colleagues to go because I think some of you all are. So, please proceed.

[Laughter.]

Senator MANCHIN. Thank you, Mr. Chairman.

[Laughter.]

Mr. Menezes, I want to thank you for being here, but also on the rare earth bill that we are working on, I was amazed to find out that nowhere in the country are we mining any of this, producing any. We are totally dependent for things we depend on almost every minute of every day on other countries supplying us the rare earth minerals that we need to do this.

I know that you all have partnered up with Western University, of which our state is very proud. If we have, we have already mined—we are still mining coal. We have already mined a lot of coal.

There are three elements and three aspects, I guess we would have to do. First of all, we have what we call the coal fines in ponds and slurry dumps and all that. We can go back and reprocess that and get an awful lot out of that also. Next, you have coal that you are mining, that we are mining, fresh. When we do that, we wash some of it. So if the washing process is changed when we are cleaning the coal, taking the ash and all the particulates out of it, that could be an easy source also. And next, we run what we call run-of-the-mine (ROM), just taking the rock and that without going through a wash plant.

Are you all looking with NETL and partnering up on all three technologies trying to find the best and most cost-effective way? Or my biggest question, are we looking at it from a defense of our nation, a national defense perspective, that we have to be able to produce so much of this in this country so that we are not entirely, totally dependent?

Mr. MENEZES. Thank you for the question, Ranking Member Manchin. To answer your last question first.

Yes, you know, 84 percent of these minerals are produced in China.

Senator MANCHIN. Yes.

Mr. MENEZES. We at one time had a mine in Eastern California that was attempting to produce, was producing, but it no longer is. Yes, you are correct that we are not producing this and we are dependent, primarily, on China and other countries for these rare earth minerals.

With respect to your first question, the short answer is yes. We are doing all of those. We are looking at all of those different aspects of trying to recover those rare earth minerals in the most cost-effective or efficient way to do that.

Senator MANCHIN. I think what I am asking also, with the Department of Energy, is if you all are supporting and stressing that with the defense of our nation, the security of our nation, that we should be mandated and basically finding ways that we can produce this in the United States of America whether it is through coal or, if there is a different process that can be used, but coal seems to be the most logical since we are mining through strata to begin with. It would seem to me that it would behoove our country to take a position that we are going to produce so much domestically, knowing that we can, just for the defense of our own nation, for the security of our nation. But unless you all, the Department of Energy, take that position, it might not be taken up at the highest level.

Do you all feel it is that important or have you gotten to those discussions yet or do you not feel like we are vulnerable with 84 percent dependent upon China with things that could go a little bit awry at any time? We have very little control over this.

Mr. MENEZES. Right.

And Secretary Perry, you know, serves on the NSC.

Senator MANCHIN. Yes.

Mr. MENEZES. And we also have NNSA within our jurisdiction.

So readiness for our defense, our nuclear weapons program, I mean, our national security is one of our top priorities, should I say.

Our Fossil Energy Office is working with those labs and the industries to, in fact, try to become more independent in our own production and supply of these materials. So, yes, I mean, I agree.

Senator MANCHIN. But we are depending on your support because I think the State of West Virginia can produce what is needed to be produced if we have the technology and the support from NETL and support for NETL to work with WVU and the research people we have there. To find a way that we can extract and produce it right here in America.

Mr. MENEZES. And I appreciate your comments in talking to the program scientists who have been doing this. They were genuinely pleased to see your bill.

Senator MANCHIN. Right.

Mr. MENEZES. So, it seems as though it is building on what we have been doing.

Senator MANCHIN. Good.

Mr. MENEZES. It recognizes the work that has been going on and the need to continue it.

Senator MANCHIN. Well, we appreciate your support on this, and tell Secretary Perry we appreciate his support very much.

Thank you.

Senator CASSIDY. Senator Heinrich, I was going to let you go next, but my staff tells me I have to be some places too.

[Laughter.]

So, if you don't mind, knowing that you have a Committee.

Our bill, Mr. Menezes, there has been bipartisan interest, and I am sorry that I am not hearing what you have to say about USVI and Puerto Rico.

If you could submit that for the record, I would like to review that.

There has been bipartisan interest in how we can make the grids more resilient for those two places.

One thing that I have been trying to promote is that we would have some sort of mix, again, trying to find 60 votes of renewables and a microgrid, but the backstop being LNG.

Now knowing that about 17 percent of the Puerto Rican grid right now is LNG but knowing that they have clearly got a grid that is vulnerable to storms empirically, we see that.

What is the possibility of these floating gasification tankers going to the Caribbean Islands or a place like Puerto Rico and providing the backstop for the microgrids as we build that out? Is that pie in the sky or is that something that we can reasonably do?

Mr. MENEZES. Well, to be sure we have heard from many interested parties on a variety of ways to make improvements to the grid down there and making both their generation, transmission and distribution systems more resilient because as we know there will be additional extreme weather events on the island.

Regarding LNG, indeed, those that are there have looked at modernizing, if you will, some of the generation there to be able to get off of the bunker oil that they currently are on.

Senator CASSIDY. Could they use the same turbines if we came in with a tanker that gasified LNG, pulls it up and provides the fuel, does everything else stay the same or do they have to change the turbines to adapt to a different fuel source?

Mr. MENEZES. Excellent question.

As we've discovered, and others have known this, but a lot of their generation really has, you know, had not been properly maintained.

There's a particular unit, Palo Seco, which is important to the San Juan area. It runs on bunker fuel. It's dated. It needs to be redone.

And so, in this instance, were you to bring LNG there, right now we have, I think, two 30-megawatt, natural gas, modular units that have re-energized the grid around San Juan. It uses natural gas. That is being brought in by LNG. Now it's re-gasified, and that's what's powering it.

Senator CASSIDY. On the boat itself, I presume.

Mr. MENEZES. On the island.

I'm not sure, I think it's re-gasified there. There is a re-gasification unit there, but I'm not sure that it's operating at this time.

But the point being is that they're very desirous of getting off the bunker fuel.

Senator CASSIDY. But to the point, those are two temporary turbines. If they have a turbine in Haiti that is running off of bunker fuel and they bring in liquefied natural gas, can they use the same

turbines that they are using now, just replacing the bunker fuel with the natural gas or do they actually need to replace the electricity generating unit?

Mr. MENEZES. We're looking at this right now, Senator Cassidy. I'm not sure that I can answer that question.

Senator CASSIDY. Let me also ask what is the possibility, because I think there is a lot of interest here and I am obviously mixing what you are going to say about Puerto Rico with finding a utility for liquefied natural gas. I think we could get bipartisan support, if it was somehow tied to increased use of renewables and a microgrid.

You have been going to Puerto Rico. What is the feasibility of that?

Mr. MENEZES. Well, what we're doing is next week we are having a workshop where we are bringing in all of the parties that have made proposals on refurbishing generation, the transmission system and the distribution system. The staffs of this Committee have been invited, actually, the Chairman and Ranking Member have been invited. We expect their staffs to attend, as well as the House. But attending will be DOE, will be FEMA, the Corps, our labs that have been asked to do the resiliency modeling, the economic analyses, New York Power Authority, NYPA, and its consultant, Navigant, will be there, and all of the interested parties. The goal is to put everybody's best thinking there to look at an all-of-the-above strategy, to make it as resilient as we can and the placement of these.

LNG is certainly one of the key fuel choices that are being looked at, as well as renewables, the integrated microgrids and to try to modernize the system.

Senator CASSIDY. Okay.

Mr. MENEZES. So that will occur next week and your staffs, your Committee staff has been invited to participate.

Senator CASSIDY. Thank you.

Senator Heinrich.

Senator HEINRICH. Thank you, Mr. Chairman.

I want to thank you, Mr. Chairman. I want to thank you for holding this hearing today, and I am certainly pleased to co-sponsor three of the bills on today's agenda.

Mr. Menezes, congratulations on your recent confirmation.

Mr. MENEZES. Thank you, Senator.

Senator HEINRICH. I also want to say a special thank you to Senator Tillis for his testimony on our bill, S. 2030, and suggest that it might be time for him to consider a new ceiling fan.

[Laughter.]

Mr. Menezes, I wanted to ask you about the status of the reorganization at DOE and, in particular, do you know yet what specific areas that yourself and Under Secretary Dabbar are going to be responsible for?

Mr. MENEZES. Well, we have considered a realignment in several categories and we have been discussing our plans, what we've been thinking about, with the staffs of this Committee. We have also been meeting with other stakeholders on the Hill, particularly the appropriators, to talk about our ideas that we have. We have not made any announcements yet. We haven't made any final decisions

yet. We have committed not to, frankly, do any realignment until after you all have completed your work on the budget, on the CR, and then it would, we would continue to get input.

Senator HEINRICH. Let me shift here—

Mr. MENEZES. But as a practical matter, you know, I think as we have told your staffs on the realignment, I would have the applied offices. Under Secretary Dabbar would have the science labs.

Senator HEINRICH. Okay.

Mr. MENEZES. And so, we're going to follow that kind of model.

Senator HEINRICH. Okay.

Let me just shift gears on you real quick then.

I was pleased to host in Albuquerque last year a summit that was focused just on energy storage. We had more than 200 industry leaders, scientists and grid experts who came together from all around the country, as well as national labs, experts from Sandia and Los Alamos.

One outcome of this summit was that New Mexico became the first state that requires investor-owned utility companies to include storage in their integrated resource plans. So they don't have to pick it, but they have to model it and see if it comes out cheaper than other alternatives.

Do you think sufficient attention is being given to energy storage in utility system planning and is there a role for DOE and/or the labs to play in that process?

Mr. MENEZES. There's a big role for DOE and the labs to play.

In looking at the bills submitted, for example, you may have different technical objectives whether it's stationary battery storage, if you will, or transportation and perhaps in some instances you can gain economies of scale or sharing of technologies in both, but generally for the reach goals and to make the breakthrough technologies, you're going to make sure, we would like to make sure, that you have metrics for each because we don't know whether or not, even if we have a transportation battery that works, it may not be able to just easily be grid scale. So we play a big role in that. And I think you would be pleased were the program folks with me to testify, I think that you would be pleased with the work that they have done. And as I had mentioned, the patents and the licenses that, you know, that they have.

Regarding whether or not utilities are doing enough in the IRP, a lot of that is, of course, driven by their individual states, if they go through the IRP and whether or not it's a priority there. FERC, I think, can play a role in trying to make, send out, guidelines.

Senator HEINRICH. Right.

Mr. MENEZES. Right, as to, as you know, there's state jurisdictional and what is FERC jurisdictional.

Senator HEINRICH. Right.

Mr. MENEZES. And so if we had some clarity on that.

Senator HEINRICH. Let me ask you about that, that FERC piece, in following up, because last year FERC issued a proposed rule that would assure that energy storage is compensated properly for the flexibility that it provides to grid operations, things like frequency and voltage control.

Do you believe that utilities and regulators have the tools that they need to properly model the market value of energy storage

and is there a useful role for DOE and the labs to help power markets and regulators make sure that they accurately value the services that storage provides?

Mr. MENEZES. We do think that we have a role. We can certainly provide a collaborative forum, if you will, for these issues to be resolved because we know that we have differing markets throughout the country, across the country, rather, I should say, with differing rules. And so, not all have capacity markets, for example.

Senator HEINRICH. And some don't have rules.

Mr. MENEZES. And some don't have any rules. That is correct.

Senator HEINRICH. That is a good first step, I think.

Mr. MENEZES. But if, even if, in any event there's always how can you work with the states, with the commissions or with FERC.

And indeed, in getting prepared for this hearing our program folks made it clear there's one of the bills, and I generally think this is kind of a good thing, I think it's Senator Franken's bill that talks about, you know, nothing in here will cloud the jurisdiction, if you will, of the various agencies. I can see that as a good thing because you don't really, necessarily, want to make that an issue in the bill itself.

But on the other hand, they said, we want to make sure that we can continue to work with the state officials or the state commissioners who ask us, as a practical matter, how does this work? Right? How could it be priced? What is the cost? You know? How can it be integrated? Right? Basic questions like that. And so, those regulators come to us just to ask for technical assistance.

Senator HEINRICH. Right.

Mr. MENEZES. They don't ask our opinion as to whether they should have jurisdiction over something or not and we can't comment on that. But again, we're a source of information to help people understand. And then they can go with their pricing and figure out—

Senator HEINRICH. Make those decisions, yes.

Thank you, I appreciate it, Mr. Chair.

Senator STRANGE [presiding]. I was interested in the answer. That is great.

I can save my questions for last. Senator King, if you would like to ask your questions, I recognize you.

Senator KING. Well, I was going to point out when Senator Heinrich leaves you and I are in charge. What part of the Constitution do you want to rewrite? We could, there is just the two of us here.

Mr. Menezes, thank you and congratulations again on your confirmation.

Mr. MENEZES. Thank you.

Senator KING. There is a notice of proposed rulemaking which was submitted to FERC, I think, by the Department, called the Resiliency Rule. It seems to identify two main sources, nuclear and coal. Wouldn't storage have been a logical part of that proposal because storage is clearly a resiliency technology. Why was it left out?

Mr. MENEZES. Well, the rule was written generally. The rule was not written specifically for any fuel at all. You just have to simply meet the criteria of the rule, as it was in storage, but certainly, you

know, qualify. It's a 90-day on-site fuel requirement, but it could be anything.

The key about batteries is that it actually has to act like a fuel. In other words, it has to accept, receive the electricity, hold it over a short or longer period of time and then to be able to discharge electricity when——

Senator KING. So is your interpretation of the submission that it would, in fact, accommodate a storage component, if it met the other requirements of the rule?

Mr. MENEZES. It could, certainly.

Senator KING. Fine, thank you.

Mr. MENEZES. It's fuel neutral.

Senator KING. And let me ask, and I think you covered this somewhat with Senator Cassidy on Puerto Rico. Many of us think that Puerto Rico offers us a huge opportunity to build the grid of the 21st century instead of rebuilding a grid of the 20th century. There were some questions with regard to the Stafford Act that disaster funds can only be used to rebuild, not to build new.

Do you know——

Mr. MENEZES. To restore—to restore not to rebuild.

Senator KING. Restore, yes.

Do you consider that a limitation on our ability to do, for example, a more distributed grid using LNG and renewables? Is the Stafford Act an obstacle and, if so, I would appreciate for the record if you would let us know how we might fix that.

Mr. MENEZES. Well, thank you for the opportunity to talk about the Stafford Act. I know it's not the subject of the hearing, and I'm sure we could fill up the whole day of testimony on the Stafford Act.

It has been the experience here that the Stafford Act does go through a process. And indeed, it is restore. And in this case, where the Corps went in and had to decide on whether or not restore would be tantamount to a rebuild, it created some confusion.

Our role was to help play a role, rather, in making determinations. As a practical matter now we are moving toward, I think, triggering what's called the 428 under the Stafford Act and move toward a rebuild. And indeed, historically, you do have a transition from restoration to a rebuild.

Senator KING. So, the Stafford Act does allow——

Mr. MENEZES. It does.

Senator KING. ——some new infrastructure as opposed to just rebuilding or restoring what was already there.

Mr. MENEZES. It does.

The Stafford Act probably did not anticipate a situation like Puerto Rico in that to restore, it was tantamount to rebuild.

Senator KING. Right.

Mr. MENEZES. And that caused lawyers, everybody, to look at it and to say well, do we have the authority and not FEMA that has to make the calls, was relying on DOE in a lot of respects.

Senator KING. Has that call been made? Are we moving toward a new form of grid or are we rebuilding the old one?

Mr. MENEZES. Well, as I said, we're now in anticipation of moving toward spending monies to a potential rebuild. We have put in place this workshop to put together a comprehensive plan on the

rebuild as to what it would look like to make it more resilient so that we're not coming and doing the same kind of restoration the next time a hurricane hits.

I just saw before coming over here we were getting briefed by NYPA in what was going on down there. We had modeled the hurricane tracking across Puerto Rico, I mean, just going back——

Senator KING. Well, as I understand it one of the problems is most of the generation is in——

Mr. MENEZES. South.

Senator KING. In the south.

Mr. MENEZES. Correct.

Senator KING. And the load is in the north.

Mr. MENEZES. That is correct.

Senator KING. There are these long transmission lines which, of course——

Mr. MENEZES. Across the mountains.

Senator KING. Across the mountains?

Mr. MENEZES. Yes.

Senator KING. Vulnerable?

Mr. MENEZES. Yes.

Senator KING. And transmission loss.

Mr. MENEZES. Yes.

Senator KING. So are we going to be able to build a more distributed grid?

Mr. MENEZES. We are. We're looking at distributed——

Senator KING. Whose call? Who makes this decision? Who decides what goes? Is it the Puerto Rico Power Authority or is it FEMA or is it you? Who makes the decision we are going to rebuild that high-tension line or we are going to do something different?

Mr. MENEZES. That's an excellent question. I mean, right now we're still restoring so those decisions are fairly easy to make. We're doing whatever it takes——

Senator KING. Sure.

Mr. MENEZES. ——to restore.

Senator KING. I understand that. But I am talking about the longer-term.

Mr. MENEZES. Yeah, the longer-term.

We intend to submit this to the White House, to Congress, to the Corps. We will have it, and we will all be united on the priorities.

The Corps has now let over \$1 billion to floor and contractors to begin to rebuild. So we've got that amount to work with initially. We expect that whatever this group produces will likely have some cost scenarios. And so, it will probably need approval from Congress, in all honesty, to be able to do it. We look forward to working with everybody as we go forward.

But next week will be the big gathering where we're going to try to make——

Senator KING. I would appreciate it——

Mr. MENEZES. ——consensus, if you will.

Senator KING. ——if you could keep this Committee informed of the steps and the plan and this process so that we can have an opportunity to review the progress, but not only the progress but the plans and structure of the response.

Mr. MENEZES. Yeah.

Senator KING. Final question.

Mr. MENEZES. Well, good.

Senator KING. Final question, I am out of time, but Senator Cassidy's bill talks about small, relatively small, exports of LNG and it said, it basically exempts them from the finding of public interest.

But I remember voting on an amendment here a couple of years ago that said that those decisions had to be made within 90 days or something and the Department was here and they said there was no problem. We are doing them rapidly anyway.

My question is, and maybe you want to take this for the record, what is the timeframe for making these national interest decisions? Do we need this bill, I guess is the question, or is there a holdup or is there not?

I would like, and you don't have to answer now, but—

Mr. MENEZES. Yeah, let me take that one for the record.

Senator KING. I appreciate it.

Mr. MENEZES. So we can have a timeframe.

Senator KING. Thank you, Mr. Chairman.

Mr. MENEZES. Can I?

I was just going to say something else.

Senator STRANGE. Well, if you want to, go ahead and finish your thought.

Mr. MENEZES. Well, I was just going to say that it's really an exciting project because we do have the labs that are doing modeling. The White House is in full backing of us to try to identify opportunities for microgrids, for example, you know, these would be integrated microgrids.

Senator STRANGE. Sure.

Mr. MENEZES. So that, you know, both the structure, the grid, benefits as well as the individual places that take advantage of distributed generation.

Senator KING. And my understanding from a prior hearing is that the solar installations on Puerto Rico survived pretty well and also on the Virgin Islands, that there were some that were destroyed, but others survived, depending, I think the testimony was, on how they were built and, you know, this is a place where there is certainly an abundance of solar energy.

We want to be sure that is part of the solution.

Mr. MENEZES. I mean, the fact is that those that were in the path of the storm did not survive well at all.

We visited—

Senator KING. Well, that's contrary to the testimony we had from the Governor of the Virgin Islands—

Mr. MENEZES. Well—

Senator KING. —who said that depending upon how they were built some survived amazingly. In fact, we saw photographs of some surviving amazingly well and they were in the track of the storm.

Mr. MENEZES. Right.

Senator KING. But I think it depends. He said it was how they were engineered.

Mr. MENEZES. He's talking about—in fact, we just saw these over the weekend.

On St. Croix we passed and they were fairly close together, I mean, within several miles. We saw one solar array, probably a couple acres, nothing was touched. In fact, I have pictures here. They look fine. Okay?

We literally went down the road toward the municipal building, believe it or not, where it was across from the municipal building a similar array totally trashed, okay.

Now this was film. It wasn't like glass panes. It wasn't smashed like one of the arrays were on Puerto Rico. So the question was well, why? Right? I mean, clearly the hurricane passed over this area. As explained was in one area on the frame structure the boards that held the film lined up with the frame structure. On the one that was destroyed, they overlapped just by a couple of inches. And that lip was essentially like a wing and it caught it and they were tighter on the structure than the structure was on the ground and it literally lifted the whole thing and twisted it and it was amazing to be told. So, yes, to answer your question, those that told you that, in fact, that is true.

My point—

Senator KING. I will follow up on this.

Mr. MENEZES. Yeah, yeah.

Senator KING. I don't want to take too much of the Senator's time.

Mr. MENEZES. No.

Senator KING. But I just don't want to miss this opportunity to do it right.

Mr. MENEZES. Exactly.

Senator KING. Thank you.

Senator STRANGE. I appreciate that, Senator King. And I think you actually have taken my entire time which I—

Senator KING. Sorry.

Senator STRANGE. —which I am happy to concede to you because I was very fascinated by your line of inquiry there and what is going on in Puerto Rico.

I do have some questions, but I am going to submit them for the record.

You have had plenty of time to testify today, I know.

I want to thank you, Mr. Menezes and Senator Tillis, for being here and remind my colleagues that questions for the record are due by the close of business on Thursday.

With that, the hearing is adjourned.

[Whereupon, at 3:27 p.m. the hearing was adjourned.]

APPENDIX MATERIAL SUBMITTED



Department of Energy
Washington, DC 20585

February 27, 2018

The Honorable Lisa Murkowski
Chairman
Committee on Energy and Natural Resources
United States Senate
Washington, DC 20510

Dear Madam Chairman:

On December 5, 2017, Under Secretary of Energy Mark Menezes testified regarding seven Senate energy bills.

Enclosed are answers to questions submitted by Senators Ron Wyden, Al Franken, Martin Heinrich, Bill Cassidy, Luther Strange and you.

If you need any additional information or further assistance, please contact me or Fahiyeh Yusuf, Office of Congressional and Intergovernmental Affairs at (202) 586-5450.

Sincerely,

A handwritten signature in black ink, appearing to read "J.A. Loraine", followed by a horizontal line.

Jennifer A. Loraine
Deputy Assistant Secretary for Senate Affairs
Congressional and Intergovernmental Affairs

Enclosures

cc: The Honorable Maria Cantwell
Ranking Member



QUESTIONS FROM SENATOR WYDEN

- Q1. Tesla's Gigafactory in Nevada is a promising example of how new technologies can grow American manufacturing and create middle-class jobs. However, according to a June report in Bloomberg News, China is building so many factories that they will be able to produce four times as many batteries as Tesla by 2021. I am concerned that the United States could fall behind China in a technology area that is already so important, and will become even more critical in the future. My bill, the Reducing the Cost of Energy Storage Act, was written to help spur innovation and ensure that Americans have access to low-cost energy storage technologies.
- Q1a. What should the United States government be doing to ensure to we have a leading role in energy storage technologies?
- A1a. The Office of Electricity Delivery and Energy Reliability's (OE's) Energy Storage program has utilized the 2013 Grid Storage Report as a roadmap to address the challenges facing deployment of grid scale energy storage.¹ To date, the program's R&D efforts in cost-competitive technologies, improved safety and reliability, standardized valuation methodologies, and industrial acceptance have resulted in significant innovations that enable the greater adoption of energy storage. Since 2012, the program has contributed 185 peer reviewed journal publications, 122 patents and applications, and 9 R&D 100 awards. While these innovations have already resulted in new storage start-ups in emerging technology areas such as redox flow batteries and power electronics, there remain significant opportunities to further enhance U.S. leadership in the field.
- R&D efforts in materials modeling, combinatorial testing, and in-situ characterization can accelerate the materials discovery process and provide a suite of potential new chemistries for battery energy storage.
 - The development of common manufacturing architectures that are applicable to entire classes of storage technologies can greatly reduce the time between innovation and validated system-level performance.
 - New design tools for utilities and regulators that accurately determine optimal sizes, locations, and economic and resiliency benefits that storage provides can greatly reduce institutional uncertainty surrounding energy storage.

¹ <https://energy.gov/oe/downloads/grid-energy-storage-december-2013>

These efforts provide a holistic development approach that can enable continued U.S. leadership.

- Q1b. What are other examples that show how research and development funding at the Department of Energy resulted in more manufacturing in the United States?
- A1b. Several of OE's energy R&D investments for grid scale storage have resulted in private sector investments and continued commercialization by U.S. industry. To date, 22 companies have licensed technologies from DOE national laboratories that have directly led to new high-tech jobs and manufacturing in the United States. For example, early stage R&D efforts in vanadium redox flow batteries enabled the technology to overcome several technical barriers that limited commercialization and has been licensed to eight companies.

One of these companies, UniEnergy Technologies (UET), was started by two former PNNL scientists in 2012 and currently employs more than 60 workers at its facility, north of Seattle, Washington. UET has currently installed 18.5 megawatt-hours of commercial systems in the United States and abroad, and has an additional 365 megawatt-hours under contract or award as the technology starts to achieve cost parity with lithium-ion systems. These efforts have firmly established U.S. leadership in flow battery technology, a leadership that will continue as OE invests in the development of the next generation of flow chemistries that offer an additional 50 percent reduction in cost.

OE efforts to facilitate the development of uniform codes and standards, support installation and techno-economic assessments of deployed storage systems, and develop valuation methodologies for industry have greatly increased stakeholder confidence in the technology and made the path to commercialization easier for U.S. companies.

Argonne National Laboratory's advanced battery research lead to the development of the nickel manganese cobalt (NMC) blended cathode and is a major leap in lithium-ion battery technology from earlier cathode chemistries. TODA America, Inc. licensed the NMC technology and built a \$70 million lithium-ion cathode materials plant and a \$24 million expansion in Battle Creek, Michigan, which manufactures multiple cathode materials, but chiefly NMC. Customers of the TODA plant include LG Chem's battery

production facility in Holland, Michigan. BASF Corporation licensed the NMC cathode technology and built a 70,000-square-foot plant in Elyria, Ohio, to produce NMC-based products. General Motors licensed NMC for use in the Chevrolet Volt, the first mass-produced plug-in hybrid electric vehicle. NMC is also found in the battery in the Chevy Bolt, the successor to the Volt.

Argonne National Laboratory researchers have also collaborated with companies such as Caterpillar, Cummins, and Delphi Automotive to discover and test new fuel injection nozzle designs. These companies tapped into capabilities at Argonne to understand the complex physics and chemistry happening within the fuel nozzles allowing them to save time, money, and energy in designing injectors. Without Argonne's high resolution measurements and kinetic modeling simulation of the fuel nozzle inner workings, Caterpillar, Cummins, and Delphi would have had to rely on costly prototype hardware and physical testing for the designs. Laboratory costs for such assistance are fully reimbursed by the companies.

The Office of Energy Efficiency and Renewable Energy's Advanced Manufacturing Office (AMO) brings together national laboratories, educational institutions, companies (for-profit and not-for-profit), and state and local governments to identify scientific and technical challenges; catalyze innovation; and support R&D of materials, processes, and information technologies needed for an efficient, productive, and competitive American manufacturing sector leading to enduring economic growth and increased domestic manufacturing. Historically, over 300 AMO (and its predecessor programs) supported R&D projects have resulted in the development of a commercialized technology since the 1970s. By employing these technologies, manufacturers have saved considerable amounts of energy and money and have increased manufacturing activity. Additionally, since 1991, 78 technologies have received an R&D 100 Award, with 50 of those awarded after the year 2000. Over 500 patents that enable new manufacturing activity have also been issued as a result of AMO-funded R&D projects. Examples include:

- The expansion of manufacturers like LeMond and Leisure Pools to East Tennessee to leverage the carbon fiber composite and additive manufacturing

expertise of Oak Ridge National Laboratory's Manufacturing Demonstration and Carbon Fiber Test Facilities.

- Overseeing six current consortia with over 600 members focused on key manufacturing-related technology areas, 2 commercialized technologies, and 11 R&D 100 Awards.
- The Critical Materials Institute's filing of 45 invention disclosures and 15 patent applications and licensing of two technologies to industry—a strong basis for a response to China's near-monopoly on the rare earth materials supply chain.
- Working with private sector partner X-Fab, through the Power America Manufacturing USA Institute, to convert its Lubbock, Texas, silicon wafer fabrication facility to also produce silicon carbide, supporting 400 jobs through access to the advanced power electronics market that would have been lost.
- The Lab Embedded Entrepreneurship Program, which includes the Cyclotron Road program, which has spun off six advanced manufacturing startups with over \$15 million in follow-on funding.

- Q2. Department of Energy research programs and private companies are making huge strides in new energy storage technologies like sodium batteries and flow batteries. But these discoveries can take decades. The initial discovery that led to lithium-ion batteries took place in 1980! It took three decades of government-sponsored research to get lithium batteries to the point where Americans could use them on the grid and in our cars.

Two things are clear from the development of lithium batteries: First, there's still a role for government funding in new energy technologies. Second, the pace of innovation has to increase if the U.S. is going to transition to a low-carbon economy by mid-century.

What is the Department of Energy doing to ensure that new energy storage technologies—which could reduce the cost of storage—move from discovery to commercialization faster than lithium-ion batteries did?

- A2. In 2017, the OE Energy Storage program initiated the development of common manufacturing architectures that can be utilized by several different storage chemistries that share key common characteristics. For example, OE is currently investing in the development of a flow battery stack architecture that could be utilized by multiple electrochemistries (vanadium, iron-chromium, aqueous soluble organic electrolyte, etc.) that have similar pH, concentration, viscosity, and operating voltage ranges. Any new

chemistry that shares similar properties could utilize this platform to accelerate the scale-up and validation of the technology at scale. Since multiple developers can use the same platform, all benefit from a lower cost through aggregated production volumes.

The development of common manufacturing architectures for all classes of battery systems is one method to reduce the time between innovation and validated system-level performance, while enabling these technologies to meet the ever-demanding cost targets of the market.

QUESTIONS FROM SENATOR AL FRANKEN

- Q1. Energy storage improves the reliability and resilience of the electric grid to in the face of extreme weather events. It allows existing infrastructure to be used more efficiently, saving ratepayers money, and it facilitates increased amounts of renewable energy on the grid.

That's why we're seeing more and more communities looking at energy storage. Just last week, the largest battery storage project in the world came online in Australia. The project was commissioned to improve the resilience of their grid. And similar decisions are being discussed around the United States. In Minnesota, Connexus Energy, a rural electric cooperative, is planning a 20 megawatt battery storage project outside of the Twin Cities. I think that the federal government has an important role to play in developing new storage technologies and to help communities plan and finance these type of projects.

The Advancing Grid Storage Act promotes research, development, demonstration, and deployment of grid-scale energy storage systems. The bill provides dedicated funding for storage systems within ARPA-E and creates grant and technical assistance programs to help overcome barriers to deployment. Does the Department of Energy support increased federal investment in research, development and deployment of energy storage? What do you see as the role of the federal government overall in developing reliable, efficient, and cost-effective advanced energy storage?

- A1. DOE is refocusing the Department's energy and science programs on early-stage research and development with a renewed focus on cutting-edge innovation. DOE will also provide technical assistance to various stakeholders where appropriate. Accelerating the transition of energy technologies from the laboratory bench to the marketplace is an important component of increasing America's economic prosperity and energy security. The Office of Technology Transition's Technology Commercialization Fund (TCF) provides funding to help businesses move promising energy technologies from DOE's National Laboratories to the marketplace.¹

¹ U.S. Department of Energy, "Secretary of Energy Rick Perry Announces Nearly \$20 Million To Help Commercialize Promising Energy Technologies," September 13, 2017, accessed: December 19, 2017, <https://energy.gov/technologytransitions/articles/secretary-energy-rick-perry-announces-nearly-20-million-help>

- Q2. What barriers do you see to the deployment of energy storage systems—particularly for smaller utilities, municipal utilities, and rural electric cooperatives? And how can the federal government help overcome these barriers?
- A2. Science and technology efforts are critical to enable the development and deployment of energy storage by utilities. However, utilities at all levels—consumer-owned, investor-owned, municipalities—must also have the capacity to understand and quantify the value energy storage provides to their systems. State regulators need the same tools and data sets to evaluate energy storage, so they can provide an appropriate policy environment for the efficient and effective deployment of energy storage technologies.

Value propositions for grid storage often depend on identifying the institutional and regulatory hurdles to deployment and understanding how storage benefits can be evaluated when compared to other grid resources. Currently, the Office of Electricity Delivery and Energy Reliability (OE) Energy Storage program is working with selected utilities and public service commissions across the country to develop an analytical framework for the accurate valuation and use of energy storage. The development of a uniform analytical framework will enable industry stakeholders to utilize the same tools and data sets and more accurately inform policy decisions that help reduce the barriers for energy storage deployment.

- Q3. Thank you for joining Chairman Murkowski, Senator Cassidy, and me on our trip last month to Puerto Rico and the U.S. Virgin Islands to see the impact of Hurricanes Irma and Maria and to affirm federal commitment to the rebuilding effort. As you recall, during our trip, we toured a children's hospital where after the storm, Tesla installed a solar array and an energy storage backup. The solar plus storage project provides the majority of the power for the hospital. And in the case of a hurricane that takes down the grid, the hospital can go into "island" mode and continue to operate.

We know that we're going to see more hurricanes and extreme weather events, and we know that we need to rebuild in a more resilient and sustainable way that is better able to withstand the effects of these disasters. We simply cannot allow communities to be without power for three months as is currently the case in Puerto Rico and the U.S. Virgin Islands. What role do you see for energy storage in the grid resilience for these islands? And how is DOE going to be involved in planning and rebuilding the grid?

- A3. The hurricanes that impacted the United States and its territories this past fall demonstrated the resiliency benefits of integrating storage into solar-outfitted individual

homes and emergency shelters. In certain cases, these facilities were able to provide essential services while awaiting repair of the electrical infrastructure. Greater adoption of storage, from utility-scale systems at substations to commercial, community, and residential microgrids could enable a hierarchy of resiliency that helps ensure some level of electrical services in times of national disasters.

For the past decade, the OE Energy Storage program has been actively engaged with the integration of energy storage into islandable microgrids. Program efforts in Alaska, Hawaii, Massachusetts, and Oregon are helping regional entities optimize the suite of microgrid assets (diesel generators, solar, storage, etc.) to ensure a high degree of survivability while maximizing the economic benefits of the system during normal operations. These demonstration efforts can provide a template for other regions, like Puerto Rico and the U.S. Virgin Islands.

- Q4. I noticed in your testimony that you reiterated this administration's desire to end the incredibly successful and innovative APRA-E program. This summer, the American Energy Innovation Council—a group of ten current and retired corporate leaders, including Norm Augustine, the former CEO of Lockheed Martin, and Bill Gates—released a report outlining the importance of federal investment in cutting-edge energy research and development. The group recommends increasing funding for ARPA-E three fold and increasing federal investment for advanced energy innovation to 16 billion dollars per year—two and a half times the total amount for energy research proposed in the President's Fiscal Year 2018 budget. But the President's budget does the opposite of what the American Energy Innovation Council recommends. It significantly reduces public investment in research, including slashing energy research programs by 3.1 billion dollars and eliminating ARPA-E altogether. This will seriously hinder American competitiveness. We're in an international competition to unleash the next wave of technological innovation. Do you disagree with Mr. Augustine and Mr. Gates that we need to drastically increase investment in energy innovation and ARPA-E?
- A4. The President's Budget focuses resources on early-stage R&D, where the Federal role is strongest, for energy technologies best positioned to enable American energy independence and domestic job-growth in the near to mid-term. The budget reflects an increased reliance on the private sector to fund later-stage research, development, and commercialization of energy technologies. Through careful prioritization and ensuring that funding goes to the most promising research, the DOE will continue to be a world-leading science and technology enterprise that generates the innovations that fulfill our mission of ensuring the nation's

security and prosperity. I look forward to working with this committee and both houses of Congress on these important issues.

QUESTIONS FROM SENATOR MARTIN HEINRICH

- Q1. With respect to the status of the reorganization of DOE's structure, do you know yet what specific areas you and Under Secretary Dabbar will be responsible for?

You noted you would be responsible for applied energy programs and Mr. Dabbar would have science. Will you be responsible for DOE's Environmental Management programs (EM) or will that be Mr. Dabbar's?

- A1. Since my testimony before the Committee, the Department announced its intent to realign the agency's organization structure. As the Under Secretary of Energy, I will be responsible for energy policy, applied energy technologies, energy security and reliability, and certain Department-wide management functions.

Mr. Dabbar, the Under Secretary for Science, will be responsible for supporting innovation, basic scientific research, and environmental cleanup.

The new organization chart for the Department can be found here:

<https://energy.gov/sites/prod/files/2017/12/f46/DOE-ORG-CHART-December-2017.pdf>

- Q2. As I see it, the Office of Science's Battery and Energy Storage Hub is a perfect example of an early-stage partnership that is making very substantial progress in advanced battery technology R&D. I am pleased the Senate's FY18 spending bill directs SC to review and renew the battery storage hub for 5 years. Have you had an opportunity to be briefed on the status of the JCESR energy storage hub and do you agree it is a prime example of a promising early-stage R&D partnership that can help DOE meet the nation's goals for energy independence and economic competitiveness?

- A2. Since my Senate confirmation, I have been working to set up many briefings on the Department's programs. I have not yet been briefed on the status of JCESR, but once I do receive a briefing, I look forward to continuing the conversation about DOE's advanced battery technology R&D with you and your staff. The nation's energy independence and economic competitiveness are important goals that I share.

QUESTIONS FROM SENATOR BILL CASSIDY

- Q1. What impact will increasing LNG exports have on the United States energy sector and the economy as a whole?
- A1. In several studies the Office of Fossil Energy has commissioned that examine the economic impact of LNG exports, the studies have shown that LNG exports provide positive economic benefits to the United States. The most recent export study, which examined the impacts of LNG exports from 12 to 20 billion cubic feet per day (Bcf/d), was conducted in 2015 by Oxford Economics and Rice University (Rice-Oxford Study)¹. The Rice-Oxford Study concluded that raising LNG exports from 12 billion cubic feet per day (Bcf/d) to 20 Bcf/d could raise GDP by up to \$20 billion. The same study found in its Reference domestic case that, in the long run, U.S. GDP would be 0.03 percent higher on average with exports of 20 Bcf/d (\$7.7 billion annually in today's prices) over 2026-2040 than in the 12 Bcf/d export case. The Rice-Oxford Study's result of GDP gains is consistent with the results of one of the earlier LNG export studies conducted by the U.S. Energy Information Administration (EIA) on behalf of the Office of Fossil Energy in 2014². The EIA 2014 study found that GDP increases across all cases "range from 0.05% to 0.17% and generally increase with the amount of added LNG exports required to fulfill an export scenario for the applicable baseline." These amounts equal an annual net increase to GDP of \$12 billion to \$20 billion across the scenarios from the 2014 EIA LNG Export Study. These increases are significant, and both the EIA and Rice-Oxford studies project higher levels of employment with increased LNG exports.
- Q2. Can you elaborate on the impacts increased access to United States LNG can have in Caribbean and Central American countries receiving the exports, specifically what their energy mix would look with the availability of more U.S. natural gas?
- A2. Many Caribbean and Central American countries are currently dependent on diesel and/or fuel oil for their generation needs which are challenging from both a cost and

¹ Rice University and Oxford Economics, "The Macroeconomic Impact of Increasing U.S. LNG Exports," October 2015. Available at: https://energy.gov/sites/prod/files/2015/12/f27/20151113_macro_impact_of_lng_exports_0.pdf

² U.S. Energy Information Administration, "Effect of Increased Levels of Liquefied Natural Gas Exports on U.S. Energy Markets," October 2014. Available at: <https://www.eia.gov/analysis/requests/fe/pdf/lng.pdf>.

emissions perspective. The benefits to these countries by importing LNG from the United States is that the imports can provide a more reliable, cost-effective supply that also has emissions benefits over current energy sources.

- Q3. What environmental benefits can an increase in United States natural gas have on global emissions?
- A3. Exports of U.S. natural gas is expected to have an environmental benefit with regard to emissions due to the fact that in many scenarios U.S. gas will be used generate electric power that would have otherwise been generated by coal. The Office of Fossil Energy commissioned a study conducted by the National Energy Technology Lab (NETL) in 2014 to examine potential emissions from natural gas exported from the United States as LNG. The study, titled “Life Cycle Greenhouse Gas Perspective on Exporting Liquefied Natural Gas from the United States” (May 29, 2014), analyzed lifecycle emissions of greenhouse gases (GHG), including carbon dioxide (CO₂) and methane (CH₄), associated with natural gas produced in the United States and exported as LNG to other countries for use in electric power generation.

The study had two key conclusions; first, use of U.S. LNG exports to produce electricity in European and Asian markets will not increase GHG emissions on a life cycle perspective, when compared to regional coal extraction and consumption for power production. Second, there is an overlap between the ranges in the life cycle GHG emissions of U.S. LNG, regional alternative sources of LNG, and natural gas from Russia delivered to the European or Asian markets. Any differences are considered indeterminate due to the underlying uncertainty in the modeling data. Therefore, the life cycle GHG emissions among these sources of natural gas are considered similar, and no significant increase or decrease in net climate impact is anticipated from any of these three scenarios.

- Q4. What impact can an increase of natural gas exports to our southern neighbors have on facilitating increased renewable generation?
- A4. Imports of LNG can work in concert with the development of renewable generation in importing countries as the imported natural gas can provide reliable standby energy

supply available immediately while renewable development is occurring. Imported LNG can also provide continued reliability to enhance solar or other renewable sources once they are developed.

- Q5. What do you believe would be the impact on the competitiveness of U.S. small scale LNG exporters, given the tight global market, if this legislation becomes law?
- A5. If S. 1981 were to become a law, it would strengthen the impact of DOE's recent proposed rule, published this past September, (82 FR 41570; Sept. 1, 2017), regarding small-scale exports. If S. 1981 were enacted, it would reduce regulatory burdens, provide additional certainty for small-scale natural gas exporters, and serve to enhance the competitive position of U.S. small scale exporters by reducing the amount of time and expense required to obtain an export permit. The improved regulatory environment offered by S. 1981 would also serve to attract more exporting companies into the market.
- Q6. What is the feasibility of utilizing liquefied natural gas to increase the use of renewables in a microgrid?
- A6. Natural gas is a flexible and reliable fuel for power generation. Natural gas fired power generation can be quickly dispatched to meet increased electricity demand during peak times and to supplement supply when renewable generation is reduced. The integration of natural gas fired power generation with renewables would improve both the reliability and resilience of an integrated microgrid.
- Q7. Please provide a written update regarding the status of hurricane recovery efforts in the USVI and Puerto Rico.
- A7. The U.S. Department of Energy (DOE) continues to support restoration and recovery efforts related to Hurricanes Maria and Irma in Puerto Rico and the U.S. Virgin Islands (USVI). DOE Emergency Support Function #12 – Energy (ESF-12) responders were deployed to Puerto Rico in support of the Federal Emergency Management Agency (FEMA) until the week of February 19 and DOE continues to provide ESF #12 support to FEMA as needed. DOE ESF #12 responders deployed to the USVI demobilized on January 12 and a team from DOE's National Renewable Energy Laboratory (NREL) completed a deployment to perform assessments of USVI electricity infrastructure. A

team of 25 available personnel and 10 line-trucks from DOE's Western Area Power Administration (WAPA) went to St. Thomas to provide mutual aid, through a DOE mission assignment from FEMA and at no cost to WAPA's rate payers, to restore the transmission system on the island. The WAPA crews completed work on the transmission system and finished work on November 29.

DOE also relied upon subject matter experts from several Power Marketing Administrations (PMAs) to provide technical assistance to the U.S. Army Corps of Engineers (USACE) for restoration planning on Puerto Rico and had a person deployed to assist FEMA with ESF-15 – External Affairs. In addition to DOE's deployments of personnel, there are also DOE personnel who volunteered for the FEMA Surge Capacity Force.

Finally, Secretary Perry, Deputy Secretary Brouillette, and Under Secretary Menezes have all visited Puerto Rico and the USVI, and Assistant Secretary Bruce Walker spent two weeks in Puerto Rico to help coordinate electricity restoration efforts between FEMA, USACE, the Puerto Rico Electric Power Authority (PREPA), and industry. Throughout the deployment of personnel for Hurricanes Harvey, Irma, Maria, and Nate, the DOE Energy Response Organization has been activated at DOE Headquarters providing support to deployed personnel, FEMA, and other Federal partners as well as coordinating with industry. Personnel were also deployed to the Region IV and VI Coordination Centers and State Operations Centers in Texas, Florida, Georgia, Alabama, and Louisiana for hurricanes as well as California in support of wildfires.

DOE is also supporting implementation of the National Disaster Recovery Framework (NDRF) and serves as a primary agency for Infrastructure Systems on the Recovery Support Function Leadership Group (RSFLG). The RSFLG meets regularly to coordinate cross-cutting recovery issues specifically related to Puerto Rico and the USVI. DOE briefed the RSFLG on the One Vision Plan at its most recent Under Secretaries level meeting on January 9, 2018. The One Vision Action Plan for Power Restoration for Puerto Rico integrates plans and materials from multiple resources (New York Power Authority; Puerto Rico Electric Power Authority; Puerto Rico Oversight, Management,

and Economic Stability Act (PROMESA); Governor's plan; and others) into a unified solution set. The draft Plan—due February 5, 2018, and to be released April 30, 2018—will incorporate resilient measures, and will be utilized in the Puerto Rico Recovery Plan. DOE also sent personnel to Puerto Rico through a FEMA Mission Assignment specifically to address recovery-related concerns there and work with other RSF partners to focus on a resilient recovery.

On Puerto Rico, as of February 21, the Puerto Rico Electric Power Authority reports that 84.5 percent of normal peak load and 85.6 percent of customers (1,261,513 of 1.47 million) have been restored and all 78 municipalities are at least partially energized or have an energized facility. As of February 21, approximately 92 percent of substations have been restored, and there were 4,896 line workers and associated personnel supporting the restoration efforts. USACE, as the coordinating agency for ESF-3 – Public Works and Engineering, received a mission assignment from FEMA to lead the Federal role in repairing the hurricane-damaged electrical power grid in support of the Government of Puerto Rico. USACE has partnered with PREPA, DOE, and FEMA to restore safe and reliable power to the people of Puerto Rico. USACE has awarded several major contracts to assist with the restoration efforts covering the crews and equipment to work on the transmission and distribution lines that need repairs, and for generators to stabilize the power grid, such as those installed in Palo Seco. USACE has also worked with PREPA to identify the materials and equipment needed for the restoration effort, which have been procured through the Defense Logistics Agency. USACE utilized the U.S. Navy's USNS Brittin Roll-On-Roll-Off Cargo Ship to transport these materials and equipment between Charleston, South Carolina and the Puerto Rico. In addition to the USACE restoration efforts, DOE and FEMA have worked closely with industry, through the Electricity Sub-Sector Coordinating Council, to facilitate mutual assistance and additional subject matter experts from utilities across the country.

In the USVI, as of January 31, the Virgin Islands Water and Power Authority (VIWAPA) reported that 51,473 customers (93 percent of total customers and 99 percent of customers currently eligible to receive power) have had electrical power restored. VIWAPA also began a *No Customer Left Behind* campaign aimed at reconnecting all

customers who can be restored to the electric grid and who may have been bypassed during the initial phase of restorations. As of January 31, following the completion of DOE's ESF #12 mission in the USVI and given VIWAPA's progress, DOE has discontinued regular updates on the restorations efforts but remains available to support if needed. DOE and FEMA have worked with industry to facilitate mutual assistance, including crews and equipment from the Northeast Public Power Association and VIWAPA has retained two off-island contractors to support the restoration efforts.

QUESTIONS FROM SENATOR STRANGE

Q1. As you know, there is a 110 megawatt energy storage facility in my home state. The PowerSouth facility has been operating since 1991 in McIntosh, Alabama, and is one of the world's two functioning compressed air energy storage facilities. This is a large facility, on the scale of many pumped hydro facilities, and it was developed to provide flexibility in meeting the load in our region. This type of facility adds value to traditional baseload power in Alabama, like large nuclear plants.

Q1a. Can you speak to the ways that these bills will help the Department develop energy storage technologies that can be paired with traditional energy generation facilities like nuclear?

A1a. Both Compressed Air Energy Storage (CAES) and Pumped Hydro Storage (PHS) were originally developed to help baseload nuclear generation load follow electrical demand. Existing systems, like the PowerSouth facility, have proven to be a highly effective resource for the region. The Office of Electricity Delivery and Energy Reliability (OE) recently held an Energy Storage workshop with Southern Research in Birmingham, AL that provided utility and industry stakeholders across the country a comprehensive overview of the operations and benefits of the McIntosh facility.

OE has also technically supported the potential siting of new CAES facilities, but the unique geographic requirements of both CAES and PHS can be challenging for new developments. More recently, the OE Energy Storage program has supported small modular CAES demonstrations, as well as investigations of underwater CAES (funded through a Small Business Innovation Research award) and modular PHS systems, that are independent from the local geography.

Ultimately, these systems, along with long duration flow batteries, have the potential to be economically paired with nuclear, natural gas, coal, and other generation sources to improve system efficiency and load-following capability.

- Q2. We know that the energy system will continue to adopt more distributed energy resources, including intermittent renewables, but the future may also have next-generation energy generation sources, like small hydro, distributed natural gas fuel cells, and micro-nuclear reactors. I already discussed Alabama's experience with large-scale compressed air energy storage, but what about small scale compressed air energy storage?
- A2. OE has supported previous demonstrations of small modular CAES technology. OE supported a 1.5 MW modular isothermal CAES with SustainX. While the system showed the ability to achieve efficiencies greater than 60 percent, the cost of the specialized compression equipment prohibited further commercial development. R&D efforts focused on reducing the cost of this highly specialized equipment will help make modular CAES and PHS economically viable for smaller power output systems.
- Q2a. What about flow batteries or thermal storage?
- A2a. Flow batteries are a viable, longer duration alternative to the lithium-ion based battery storage systems being deployed today. With continued R&D, flow batteries could economically provide storage durations currently seen in large scale CAES and PHS. OE's early stage R&D efforts in vanadium redox flow batteries enabled the technology to overcome several technical barriers limiting commercialization and has been licensed to eight companies.

One of these licensees, UniEnergy Technologies (UET), was started in 2012 and employs more than 60 people at its facility, north of Seattle, Washington. These flow battery systems have achieved cost parity with lithium-ion technology enabling the company to secure orders for more than 390 megawatt-hours of commercial systems in the U.S. and abroad. These systems are typically rated for a four-hour discharge and future DOE OE R&D efforts on the lower cost chemistries could make even longer duration flow systems economically viable.

Energy storage technologies based on PHS, CAES, flywheels, and batteries all have bi-directional capability, meaning they can take or deliver electricity into the power grid directly, enabling their utilization for many different applications. Other technologies like thermal energy storage have been demonstrated to be an effective way of shifting large

electrical loads away from periods of peak demand. The University of Alabama, with support from OE, successfully demonstrated the feasibility of chilled water aquifer storage. While these technologies are highly feasible today, they are limited in their ability to impart electricity back into the grid when needed, thus limiting their applicable use cases.

- Q2b. How will these bills help the Department work to develop next-generation energy storage technologies other than traditional electrochemical batteries?
- A2b. To enable greater deployment of energy storage to improve the resiliency, efficiency, and reliability of the U.S. power grid, a suite of energy storage technologies will be needed to meet the unique physical and economic challenges facing the more than 3,000 utilities, cooperatives, and municipalities around the country. The OE Energy Storage program is actively engaged in working with industry stakeholders to understand the regional technical and economic drivers for energy storage and to identify the key technical challenges that must be overcome to enable a portfolio of next generation storage technologies.

QUESTIONS FROM SENATOR DAINES

- Q1. Hydroelectric power is a pillar of Montana's energy production. Despite Montana already producing over one third of our electricity from hydroelectric dams, I believe we can continue to grow this important industry. That is why I continue to champion its production and why I have introduced legislation to permit projects in Montana. Do you believe that S. 1336 will have an impact on incentivizing the many non-hydroelectric dams in Montana to be converted into energy producing dams?
- A1. The Department of Energy (DOE) agrees that hydropower has significant capabilities to support economic competitiveness and electricity system reliability. Hydropower provides low-cost generation that can both serve as baseload and provide ancillary services such as frequency control that contribute to grid reliability and resiliency. Over the past four years, DOE has awarded \$890K from the Hydropower Production Incentive to fund three Montana hydropower projects that have converted non-powered dams to functioning hydropower projects. In fact, one of those projects utilized an existing dam built in the late 1800s. The power produced from the project is sold to the local utility to benefit the citizens of Granite County. Utilizing existing infrastructure, like non-power dams, for the development of additional hydropower generation can help ensure the Nation's electric grid remains stable and reliable now and in the future. It appears S. 1336 incentivizes both future hydropower generation and efficiency upgrades at many of the Nation's 80,000 non-powered dams, including in Montana.
- Q2. Liquefied Natural Gas continues to play an increasing role in US and world energy production. It is important that the United States continues to provide for current demand and remains prepared for future increases. I applaud the DOE for their recent work in expediting the approval process for small-scale LNG exports. Similarly, S. 1981 seeks to make the process of small-scale LNG exports quicker in order to meet future demand. Do you believe that S. 1981 is a positive step forward in increasing US exports of LNG?
- A2. While the market will ultimately determine how much natural gas gets exported, reducing the regulatory barriers for companies wishing to participate in the export market is a key to developing that market. DOE's recent proposed rule on small scale natural gas exports maintained that natural gas applications would be considered in the public interest and therefore granted where two conditions were met. The two conditions were: 1) an application to export up to 0.14 billion cubic feet per day (or 51.1 billion cubic feet per

year) and 2) an application that qualified for a Categorical Exclusion under the National Environmental Policy Act (NEPA). S. 1981 takes DOE's proposed rule a step further in that any application that meets the first criterion—below the 0.14 billion cubic feet threshold—shall be deemed in the public interest and granted without modification or delay, without the need for DOE to conduct an environmental review under NEPA.

QUESTIONS FROM SENATOR KING

- Q1. Senator Cassidy's bill S. 1981 exempts small exports from needing to meet the public interest threshold. What is the current timeframe for making these public interest determinations? What is the average time it takes to make a public interest determination? Is there a backlog or delay in making these determinations?
- A1. The duration of review for natural gas export applications that require a public interest review varies significantly, from months to years, depending on several factors, including the environmental footprint of the export facility. In instances where an application includes exports from a facility that has only been proposed, the review can take up to a year or more depending on the level of environmental review required. Currently, proposed exports from small-scale export facilities are subject to the same public interest review, including a notice of application and an environmental review under the National Environmental Policy Act (NEPA). The Department of Energy (DOE) does not currently have a backlog of small-scale export applications that are ready for final action, meaning they have completed any required environmental review under NEPA. S. 1981, if enacted, would likely save several months of review by DOE for small-scale applications compared to DOE's current process.
- Q2. Is there a mechanism in place at the Department of Energy to ensure that one principal company isn't able to have multiple subsidiaries get approval for multiple small LNG exports as S. 1981 would allow?
- A2. DOE has structured its export authorizations such that the exports are tied to specific facilities and the export volumes authorized are subject to the export capacity of those facilities. If S. 1981 were to become a law, DOE would include guidance language in its natural gas import and export regulations in 10 CFR 590 that would prohibit exports in excess of the capacity of approved export facilities. This guidance would serve to prevent multiple entities from gaining additive authorizations beyond the capacity of approved export facilities.



STATEMENT

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For Immediate Release

NHA Calls for Passage of the RIVER Act to Grow Hydropower

Washington, D.C. (December 5, 2017) – The following is a statement from Linda Church Ciocci, Executive Director of the National Hydropower Association, on the introduction of the Reliable Investment in Vital Energy Reauthorization Act (S.1336).

“As an industry, we applaud U.S. Senator Cory Gardner (R-CO) for introducing the Reliable Investment in Vital Energy Reauthorization Act (S.1336) to spur the growth of new hydropower projects and incentivize reinvestment in upgrades. Attracting investment for hydropower projects is one of the biggest challenges we face as an industry. The Hydropower Production Incentive Program, within the U.S. Department of Energy, supports new project development on an existing non-powered dam or conduit. Unfortunately, this program has been allowed to expire and new projects will not be eligible to participate in the program. Hydropower has immense growth potential, and passing this bill will ensure we can provide more clean, renewable energy to communities throughout the country.”

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1700 North Moore Street, Suite 2250, Arlington, VA 22209

December 4, 2017

Senator Cory Gardner
 Subcommittee Chairman
 Subcommittee on Energy
 Senate Committee on Energy &
 Natural Resources
 304 Dirksen Senate Building
 Washington, DC 20510

Senator Joe Manchin III
 Subcommittee Ranking Member
 Subcommittee on Energy
 Senate Committee on Energy &
 Natural Resources
 304 Dirksen Senate Building
 Washington, DC 20510

Dear Chairman Gardner and Ranking Member Manchin:

The Retail Industry Leaders Association (RILA) appreciates the opportunity to comment on the bipartisan legislation S. 2030, the "Ceiling Fan Energy Conservation Harmonization Act" that is scheduled to be discussed at your legislative subcommittee hearing this week.

RILA is the trade association of the world's largest and most innovative retail companies. RILA members include more than 200 retailers, product manufacturers, and service suppliers, which together account for more than \$1.5 trillion in annual sales, millions of American jobs, and more than 100,000 stores, manufacturing facilities, and distribution centers domestically and abroad.

S. 2030, introduced by Senators Thom Tillis (R-NC) and Martin Heinrich (D-NM) seeks to align two Department of Energy (DOE) regulation dates on efficiency requirements for ceiling fans. Under the current enforcement structure, the ceiling fan light bulb implementation date is January 2019 and the ceiling fan motor date is 2020. These misaligned dates will create a significant problem for merchants of all sizes, including supply chain lead times, purchase orders, work schedules and other operations that require strategic planning. This legislation solves the issue with a commonsense change to streamline the enforcement date of both regulations to January 2020.

As Congress considers several pivotal legislative issues during the month of December, RILA encourages the subcommittee to expedite the passage of S. 2030 in the coming weeks. There is also companion legislation in the House of Representatives, H.R. 3477, that is moving through the legislative process. It is important this issue be resolved before the end of the calendar year to provide continuity to the broad array of supply chains. This simple correction will help American consumers from incurring any additional costs when purchasing a ceiling fan—a market of roughly \$1.8 billion, with 15 million units sold annually.

Thank you for the subcommittee's consideration on this important matter and RILA will continue to work with both legislative chambers to resolve this issue in a timely manner. If you have any questions, please contact Austen Jensen at austen.jensen@rila.org or 703-600-2033.

Sincerely,

Austen Jensen
 Vice President, Government Affairs