

## PENDING LEGISLATION

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

<b>S. 876</b>	<b>S. 2556</b>	<b>S. 2688</b>
<b>S. 1890</b>	<b>S. 2657</b>	<b>S. 2702</b>
<b>S. 2425</b>	<b>S. 2660</b>	<b>S. 2714</b>
<b>S. 2508</b>	<b>S. 2668</b>	

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NOVEMBER 6, 2019

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## **PENDING LEGISLATION**

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**WEDNESDAY, NOVEMBER 6, 2019**

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

The Subcommittee met, pursuant to notice, at 10:03 a.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]. The hearing is now in order. Thank you, everyone, for being here. The purpose of this hearing is to receive testimony on several bills, and this Subcommittee is now convening its third legislative hearing.

The legislative hearing allows us to receive testimony and ask questions from the Assistant Secretary of the U.S. Department of Energy (DOE), Dan Simmons. Today's hearing is another opportunity to consider a wide range of bills aimed at emission reduction technology programs, cybersecurity and job training in the energy sector.

One of the bills being considered is a bill I introduced with my colleague, Senator Whitehouse, the Technology Transition Act. The Office of Technology Transition works across the Department of Energy to turn innovative ideas into commercialization. This legislation builds on previous efforts from Congress and the Department of Energy. It puts the Office of Technology Transition (OTT) in a better position for success.

In a competitive world, we need technology and innovation to lower emissions, and it is important we look for ways to speed scientific discovery and support national labs who carry out these efforts. We can show the world that through innovation, we can lower emissions and maintain a modern economy with robust employment. As this Committee continues to consider energy innovation bills, it is important that the right policies are in place to ensure research and development dollars are turned into commercialized technology.

I will now turn to my colleague and friend, Ranking Member Heinrich.

**STATEMENT OF HON. MARTIN HEINRICH,  
U.S. SENATOR FROM NEW MEXICO**

Senator HEINRICH. Thank you, Chairman Cassidy, for holding our third legislative hearing this year in the Energy Subcommittee, and welcome to our witness, Assistant Secretary Simmons. Thank you for being here and for testifying.

We have a good body of work to show for our efforts this year in the Energy Subcommittee. We reported out 22 energy bills in July, another 21 bills last month and we are moving another 11 bills through the Committee process in today's hearing.

Our agenda today includes a wide-ranging group of bills, including measures to improve DOE's role in innovation and technology commercialization, make the most of nuclear energy to help decarbonize the grid, promote a skilled energy workforce, advance renewable energy, keep the grid safe from cyber threats, and improve energy efficiency. These are the types of bills that we should be able to build into a broadly supported, I believe, bipartisan energy package.

I am especially pleased that Senator Cortez Masto's bill, the Renew America's Schools Act, is on the agenda. I am a co-sponsor of this bill which would establish a competitive grant program specifically targeted at low income populations to make energy efficiency upgrades, install clean energy and renewables for schools and, basically, lower schools' energy bills. Under this bill, grants could also be used to help schools transition to zero emissions vehicles and buses and install electric vehicle charging infrastructure. The bottom line is the bill would make our schools healthier with improved ventilation, daylighting, and air quality, and a number of studies have shown increased performance based on those kinds of changes.

I am also pleased to see research and development authorization bills from Senator Sinema for solar energy, and Senator Smith, who has joined us, for wind energy, on today's agenda. Advancing non-polluting technology should be a critical element of any energy innovation package that this Committee might put together in the coming weeks.

We also have two workforce and career development bills on the list. Ensuring that we have a strong energy workforce will be essential as we transition to a cleaner energy future. That is also why I have introduced S. 2393, the Clean Energy Jobs Act, with Senator Manchin, and I hope to see that bill on our next markup.

Finally, I am glad to see this Committee continues to focus on programs at DOE that are at the forefront of driving innovation in our economy. In particular, Senators Van Hollen and Alexander's ARPA-E reauthorization bill ramps up funding over the next five years to be more in line with what we need to keep us at the cutting edge of energy technology globally.

I also appreciate my colleague, Senator Cassidy, for introducing his Technology Transitions Act which codifies DOE's important Office of Technology Transitions. The bill is a companion to the bipartisan Technology Maturation legislation that Senator Gardner and I introduced earlier this year, and working to improve the process of tech transfer from DOE's 17 laboratories to the private sector is a key priority.

I look forward to working with Chairman Cassidy as well as the Chair and Ranking Member of the Full Committee to keep this momentum going. I think there has been some frustration with the pace of the Senate. I have certainly experienced that in this current legislative session and this current Congress, but we have some great bills here. I believe we can be the exception rather than the rule and really get some good energy bills done for our country.

Thank you, Chairman.

Senator CASSIDY. Senator Smith, I believe you have an opening statement.

**STATEMENT OF HON. TINA SMITH,  
U.S. SENATOR FROM MINNESOTA**

Senator SMITH. Thank you very much, Chair Cassidy and Ranking Member Heinrich. It's great to be back with the Energy Committee, and I really welcome the opportunity to testify here this morning.

So today you are considering several important bills that would advance clean energy, the clean energy transition, and I'm happy to have my bill be a part of this conversation. I'm pleased to speak about this bipartisan bill that I've introduced with Senator Collins, the Wind Energy Research and Development Act. This bill would extend and expand the Wind Energy program at the Department of Energy.

Now we know that wind energy is growing fast, and it now accounts for about 6.5 percent of total U.S. electric generation. And in Minnesota wind energy already accounts for nearly 20 percent of the electricity that we use in our state.

Increased use of wind energy is not just good for our environment, it is also good for our economy. Wind supports 114,000 jobs nationwide, and that number is growing. And importantly, wind energy boosts rural economies. Farmers can earn annual payments of anywhere between \$4,000 and \$8,000 per turbine and still farm underneath those turbines.

So the federal research and development funding is crucial for continuing advancements in wind technology. I want the world to be installing U.S.-made wind turbines containing U.S.-patented technology. Wind research and development is key to building U.S. leadership. And as with every aspect of the clean energy revolution, we can lead or we can follow and I want the United States to lead.

So, thank you, my colleagues, for hearing this bill today, and I ask for your support.

Senator CASSIDY. Are you moving back permanently to the Committee?

Senator SMITH. Well, that is a, I believe that that is above my pay grade, Senator, but I love this Committee very much and would love to be back.

Thank you.

Senator CASSIDY. Senator King.

**STATEMENT OF HON. ANGUS S. KING, JR.,  
U.S. SENATOR FROM MAINE**

Senator KING. Thank you, Mr. Chairman.

I think the common denominator, as we have been discussing this morning, is innovation which is really, I believe, the key to the energy future. Innovation in storage. Innovation in low-carbon fuels. Innovation in cleaner deployment of fossil fuels.

I think we have a lot on our plate here today. I am delighted to see Mr. Simmons here. We have worked together in the past, and I think they are really doing a great job.

The bill that I am particularly interested in involves something called CHP, combined heat and power. We used to call it co-generation but it is a very sensible technology to get both electricity and heat, use the heat made in the generation of electricity in useful ways and, therefore, much more efficiently, use whatever the resources are that are generating the electricity.

There is a technical assistance program Mr. Simmons knows about. The University of Maine is the center of this in New England. I think it has been very effective. The bill that I am proposing today would extend that program and, I think, underlies the benefits.

So innovation and the next generation of energy technology is really what we are after here. I look forward to working with the Committee. The Committee, as Senator Heinrich points out, has had a really good, great record this year of legislation. Now we have to see what we can do to get it across the finish line on the Floor of the Senate. But I am proud of the work that we have done thus far and look forward to our work today. Thank you.

Senator CASSIDY. Senator Murkowski.

**STATEMENT OF HON. LISA MURKOWSKI,  
U.S. SENATOR FROM ALASKA**

The CHAIRMAN. Mr. Chairman, Senator Heinrich, thank you for this Subcommittee hearing today. Good bills before the Subcommittee, and I wanted to just say a couple words about two of the bills that we have on the agenda today.

The first one I would like to address is the Protecting Resources On The Electric grid with Cybersecurity Technology, or PROTECT, Act. This is something that Senator Manchin has been working on with me, along with Senators Risch, King and Cantwell. What we do with this legislation is enhance the security of our nation's electric grid by providing electric utilities with incentives, grants and technical assistance to invest in innovative cybersecurity technology that improves their security posture over and above the level that is required by industry standards.

I think we all recognize the role, the importance of our electric grid, on really every sector of our economy. But what we are hoping to do with this Act is to strengthen the cybersecurity partnership between private industry and the Federal Government and to deploy more advanced cybersecurity technologies. This is something we talk a lot about in this Committee, and I think this is one of those just, again, commonsense measures that will move us one step closer.

The other bill that the Subcommittee is going to be taking up this morning is the Advanced Geothermal Innovation Leadership Act. We call this the AGILE Act. I am co-sponsoring this with Senator Manchin. Some might not think of West Virginia or Alaska as

being states that have geothermal resources, but that is really what this Act is all about. Hopefully it will enable us to unlock new technologies to allow for affordable geothermal heat and power, really anywhere, in the country.

So what we do is update our national assessment of geothermal resources to encompass new technologies and market opportunities like underground heat storage. We expand geothermal energy research into important secondary uses like mineral recovery. We create a prize competition for the co-production of minerals from geothermal brines. We also jump-start enhanced geothermal by authorizing four demonstration projects including, for the first time, one on the Eastern half of the United States, that is obviously of interest to Senator Manchin, but we also improve permitting for developing geothermal resources on federal lands. This is a process that right now is taking anywhere from seven to ten years. So you look at that and you just say, there has to be a better way.

When you think about geothermal as a baseload renewable energy resource with huge potential, any of you that have ever had an opportunity to go visit Iceland and see what that nation has done. It is really quite remarkable. Now obviously they have a resource that is much more accessible, but what we have learned is that the technologies that helped bring the shale revolution to this country are the same types of technologies that can help us with regards to geothermal.

So we are excited about that one and as we think about the different renewables that we are putting forward in this Committee, whether it is the solar, the wind, the geothermal. Senator Wyden has an ocean energies water resources bill. There are some good things that are coming together so it is quite exciting, and I am pleased that the Subcommittee is focused on it.

Thank you.

Senator CASSIDY. Thank you, Madam Chair.

Senator Cortez Masto.

**STATEMENT OF HON. CATHERINE CORTEZ MASTO,  
U.S. SENATOR FROM NEVADA**

Senator CORTEZ MASTO. Thank you. Thank you to the Chairman and Ranking Member.

Let me just say one thing about geothermal—we are very supportive in Nevada. We have a lot of geothermal energy, and it is not only a benefit to some of our commercial businesses, but residential as well. So I am a big fan and look forward to working with the Committee and my colleagues on promoting more geothermal.

I also want to thank both the Chairman and Ranking Member for including my bill, the Renew America's Schools Act, which is S. 1890, among the legislation being considered during today's hearing. This Committee has taken up the issue of energy efficiency and widely agrees that one of the most immediate actions we can take to reduce our greenhouse gas emissions is to improve our buildings and maybe even our vehicles to drive down the use of energy needed to power our everyday lives.

My bill would create a federal grant program available to K through 12 schools to make energy efficiency improvements to lighting, heating, cooling, and ventilation systems, install renew-

able energy technologies to power our public schools, and purchase zero emissions vehicles and install the necessary infrastructure for those vehicles. Modernizing our schools to make them more energy efficient not only helps drive down emissions in our communities, but it also helps reduce our school's energy costs, leaving more money in school budgets for supplies and programs that directly benefit our children.

That is just one example of what this bill aims to address. Millions of young students ride diesel buses to school every day. Studies have shown that the air inside of these buses can be up to five times more polluted than the air outside the bus. Transitioning away from diesel buses to electric vehicles would immediately improve the air our children breathe on their way to school and reduce the health risks that result from emissions exposure and impede a student's ability to learn.

The Renew America's Schools Act saves our schools money, and it makes our communities healthier. I invite my colleagues in the Senate to join me on this bill and look forward to the thoughtful discussion during today's hearing.

Thank you.

Senator CASSIDY. Mr. Simmons, I believe you are up.

**STATEMENT OF HON. DANIEL SIMMONS, ASSISTANT SECRETARY, OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY (EERE), U.S. DEPARTMENT OF ENERGY**

Mr. SIMMONS. Thank you.

Chairman Cassidy, Ranking Member Heinrich, Chairman Murkowski, thank you for the opportunity to testify today. And before I get to my testimony, I'll just note that a few minutes ago we announced \$128 million in selections on our Solar FOA for the year. That is \$23 million for photovoltaic solar research, \$30 million for CSP research and development, \$17 million for projects on balance in system soft costs, \$6.8 million for innovations in manufacturing for a hardware incubator and \$50 million for advanced solar systems integration technologies. That went out a few minutes ago. I don't even know if it's public yet, but it has been sent to your staff. So we're very excited about that, about those awards, and look forward to seeing the technologies and improvements that comes from that funding.

I've been asked to testify on 11 bills today addressing a range of important energy issues. The Administration continues to review all these bills, and I appreciate the ongoing bipartisan efforts to address our nation's energy challenges. I look forward to working with the Committee. The bills being discussed today address many important energy technologies and activities at the Department of Energy.

The Renew America's Schools Act would authorize and direct the Secretary of Energy to award competitive grants for energy efficiency and renewable energy projects at public schools. The Department currently provides technical assistance to a number of K through 12 schools across the country to help them achieve voluntary commitments of a 20 percent or better energy savings in their facilities through the Better Buildings Challenge. While the Department continues to review this legislation, we support im-

proving energy efficiency and reducing energy costs for schools and other buildings.

The CHP Support Act amends the Energy Policy and Conservation Act to establish a combined heat and power technical assistance partnership program, reauthorizing existing CHP technical assistance partnerships in the Department's Advanced Manufacturing Office. The program would continue to provide education and outreach to building, industrial, electric and natural gas utility professionals, state and local policymakers and other stakeholders with an interest in not only CHP but also in waste heat to power and efficient district energy technologies.

The Promoting American Energy Security Jobs Act would direct the Secretary to establish a council to conduct a survey and analysis of the employment figures and demographics in the energy, energy efficiency and motor vehicle sectors in the United States. Like many others in the Department of Energy, I recognize the need for a skilled and technical workforce for energy sector careers. I look forward to working with the Committee to identify and implement strategies to ensure that America continues to cultivate capable energy workforces.

The PROTECT Act amends the Federal Power Act to provide energy cybersecurity investment incentives to establish a grant and technical assistance program for cybersecurity investments. The Department understands the challenges and risks that cybersecurity poses to our energy infrastructure. The Department's Office of Cybersecurity, Energy Security, and Emergency Response addresses the emerging threats of tomorrow while protecting the reliable flow of energy to Americans today to improve energy infrastructure security and support the nation's national security, the Department's national security mission.

The AGILE Act aims to accelerate geothermal energy development in the U.S. by addressing technical and non-technical barriers to geothermal in both electric and direct use sectors. The bill would achieve this through promoting research and development, encourage technology transfer from the geothermal and oil and gas industries and explore ways to improve federal permit coordination. The Department's Geothermal Technology Office is currently working to address many challenges concerning geothermal development. The Office recently published the GeoVision analysis which found that optimizing permitting timelines could reduce costs and facilitate geothermal capacity development, potentially doubling installed geothermal capacity by 2050.

The Solar Energy Research Development and Demonstration Program Act reauthorizes the activities of EERE's Solar Energy Technology Office and outlines several research priority areas such as improving the energy efficiency, reliability and security of solar energy technologies while also focusing on reducing the overall cost of energy systems. The bill authorizes additional work to be carried out by the Solar Office such as providing technical assistance, supporting workforce development and training activities and awarding grants to carry out both research and development and demonstration projects.

The Wind Energy Research and Development Act reauthorizes the activities of EERE's Wind Office and outlines several research

priority areas such as improving the energy efficiency, reliability and capability of wind generation and supports the development of innovative designs for both land use and offshore wind technologies. The bill also outlines several grant subject areas including research and development on recycling and reuse of wind energy technology components and grants to help mitigate regulatory and market barriers.

The Technology Transition Act codifies the Office of Technology Transitions at the Department of Energy and to expand the commercial impact of the Department's research investments and focus on commercializing technologies that reduce greenhouse gas emissions. This bill reiterates the work of the Department under the leadership of the Secretary as undertaken as part of the existing Office of Technology Transitions. This Office will highlight the Department's vast research capabilities which are so important to ensuring our domestic energy and national security as well as American economic competitiveness.

The Integrated Energy Systems Act would direct the Secretary of Energy to establish an integrated energy systems research development and demonstration program between multiple department offices including the Nuclear Energy Office to be known as the Integrated Energy Systems Program. The intent of the program is to maximize energy production and efficiency; improve reliable, competitive, environmentally sustainable electricity to the grid; expand the use of emissions-reducing technologies and enable the U.S. energy infrastructure to support the quantity and variability of the types of size of generation devices and smart load devices of the future.

The Energy Jobs for our Heroes Act would establish the "Energy Ready Vets Program" which would help prepare veterans for careers in the energy industry. The program will allow eligible participants to earn an applicable energy industry-recognized entry level certificate or other credential which would be carried through the skill bridge program of the Department of Defense. The Department of Energy supports the bill's goals of strengthening energy job training opportunities for our nation's veterans.

And the ARPA-E Reauthorization Act would reauthorize, would authorize a significant increase in the Department's Advanced Research Projects Agency-Energy (ARPA-E) funding from \$428 million in FY 2020 to \$750 million in FY 2024. The bill would also reauthorize ARPA-E to support projects that improve the resilience, reliability and security of the nation's energy infrastructure. While the Department continues to review the legislation, we remain in strong support of ARPA-E's early-stage, high-risk energy technology solutions.

In conclusion, thank you very much for the opportunity to testify before the Subcommittee today. The Department appreciates the ongoing, bipartisan efforts to address our nation's energy challenges and look forward to working with the Committee on today's bills and any future legislation. I'd be happy to answer your questions.

[The prepared statement of Mr. Simmons follows:]

**Testimony of Assistant Secretary Daniel Simmons  
Office of Energy Efficiency and Renewable Energy  
U.S. Department of Energy**

**Before the  
Committee on Energy and Natural Resources  
Subcommittee on Energy  
United States Senate  
November 6, 2019**

## INTRODUCTION

Chairman Cassidy, Ranking Member Heinrich, and Members of the Energy Subcommittee of the Committee on Energy and Natural Resources, thank you for the opportunity to testify today on legislation pertinent to the Department of Energy now pending in the Senate. My name is Daniel Simmons, and I am the Assistant Secretary for the Office of Energy Efficiency and Renewable Energy (EERE).

As the Assistant Secretary, I am responsible for overseeing a broad portfolio of energy efficiency and renewable energy programs. The technologies in my portfolio advance America's economic growth and energy security while enhancing the reliability and resilience of the U.S. energy system. The Department of Energy supports improving the energy efficiency and reducing energy costs, while at the same time ensuring important performance standards are met or exceeded. For instance, we want to ensure schools and other buildings are sufficiently bright to ensure safety, and that water flow from faucets is strong enough to clean dirty hands. Today, I would like to share what relevant work my office has done and is doing in the areas that these bills address.

I have been asked to testify on eleven (11) bills today, addressing a range of important energy issues. The Administration continues to review all of these bills. I appreciate the ongoing bipartisan efforts to address our Nation's energy challenges and I look forward to working with the Committee.

## BILLS

### *S. 1890 – Renew America's Schools Act of 2019*

S. 1890, the Renew America's Schools Act, authorizes and directs the Secretary of Energy to award competitive grants for energy efficiency and renewable energy improvements at public school facilities. The Department currently provides technical assistance to a number of K-12 schools across the country to help them achieve voluntary commitments of 20 percent or better energy savings in their facilities through the Better Buildings Challenge.

The Department will continue to review the legislation and looks forward to working with Congress as the legislative process moves forward.

### *S. 2425 – CHP Support Act of 2019*

S. 2425 amends the Energy Policy and Conservation Act to establish the Combined Heat and Power (CHP) Technical Assistance Partnership Program. The program would provide education and outreach to building, industrial, and electric and natural gas utility professionals, State and

local policy makers, and other stakeholders with an interest in CHP, waste heat to power, and efficient district energy technologies. The bill would update the number of regional CHP Technical Assistance Partnerships from 8 to 10, as well as authorize annual appropriations of \$12 million for each of fiscal years 2020 through 2024.

The Department will continue to review the legislation and looks forward to working with Congress as the legislative process moves forward.

*S. 2508 – Promoting American Energy Security Jobs*

S. 2508 requires the Secretary of Energy to establish a council to conduct a survey and analysis of the employment figures and demographics in the energy, energy efficiency, and motor vehicle sectors of the United States. In addition to key stakeholders, the Council shall include representatives from Commerce, Transportation, Census Bureau, Bureau of Labor Statistics, EPA, State Energy Advisory Board and energy trade associations. It also directs the Department to publish a report, to be entitled the “U.S. Energy and Employment Report”, describing the employment figures and demographics in the energy, energy efficiency, and motor vehicle sectors of the United States based on the survey and analysis conducted.

The Department will continue to review the legislation and looks forward to working with Congress as the legislative process moves forward.

*S. 2556 – Protecting Resources On The Electric grid with Cybersecurity Technology (PROTECT) Act*

S. 2556, or the PROTECT Act, amends the Federal Power Act to provide energy cybersecurity investment incentives, to establish a grant and technical assistance program for cybersecurity investments. The bill directs FERC to issue a rulemaking on rate incentives for advanced cybersecurity technology, which will enable and incentivize utilities to invest in new technologies that improve their cybersecurity defenses. It also establishes a DOE grant program for utilities that are not regulated by FERC to deploy advanced cybersecurity technology, such as electric cooperatives and municipal utilities.

The Department will continue to review the legislation and looks forward to working with Congress as the legislative process moves forward.

*S.2657 – Advanced Geothermal Innovation Leadership (AGILE) Act of 2019*

S.2657, the AGILE Act of 2019 aims to accelerate geothermal energy development in the United States by addressing technical and non-technical barriers to geothermal development in both electric and direct use sectors. The bill achieves this through promoting research and development, encouraging technology transfer between the geothermal and oil and gas industries, and exploring ways to improve federal permit coordination.

Work currently underway in the Geothermal Technologies Office to address challenges to geothermal deployment includes: collaboration with the Vehicle Technology Office and Advanced Manufacturing Office to evaluate ways to improve the critical materials supply chain; technology testing opportunities with Wells of Opportunity that will allow stakeholders from geothermal, oil and gas, mining and other relevant subsurface industries to more rapidly adapt technologies to the Enhanced Geothermal Systems and conventional geothermal environments; innovative portfolios focusing on drilling, machine learning, and zonal isolation technologies; and continued investment at the Utah Frontier Observatory for Research in Geothermal Energy site.

In addition, the *GeoVision* analysis, published in May 2019, which found that optimizing permitting timelines could reduce costs and facilitate geothermal project development, potentially doubling installed geothermal capacity by 2050.

EERE has provided technical comments on this bill. The Department will continue to review the legislation and looks forward to working with Congress as the legislative process moves forward.

*S. 2668 – Solar Energy Research, Development, and Demonstration Program Act of 2019*

S.2668, the Solar Energy Research, Development, and Demonstration Program Act of 2019 reauthorizes the activities of EERE's Solar Energy Technology Office (SETO). The bill outlines several research priority areas, such as improving the energy efficiency, reliability, and security of solar energy technologies, while also focusing on reducing the overall costs of solar energy systems. The bill authorizes additional work to be carried out by SETO, such as providing technical assistance, supporting workforce development and training activities, and the awarding of grants to carry out both research and development and demonstration projects to advance the development of solar technologies.

Work currently underway in SETO to address near-term, mid-term, and long-term challenges to the advancement of solar energy technologies includes: the American-Made Solar Prize, a prize competition designed to revitalize U.S. solar manufacturing; photovoltaics and concentrating solar power research; and systems integration research, which works to improve situational awareness of solar energy systems on the grid.

The Department will continue to review the legislation and looks forward to working with Congress as the legislative process moves forward.

*S. 2660 – Wind Energy Research and Development Act of 2019*

S.2660, the Wind Energy Research and Development Act of 2019 reauthorizes the activities of EERE's Wind Energy Technology Office (WETO). The bill outlines several research priority areas, such as improving the energy efficiency, reliability, and capacity of wind energy generation, and supports the development of innovative designs for both land-based and offshore

wind energy technologies. The bill also outlines several grant subject areas, including research on the recycling and reuse of wind-energy technology components and grants to help mitigate regulatory and market barriers.

WETO is currently addressing challenges to reduce technology costs as well as regulatory and market barriers through investments in related science and modeling and analytical tools, complemented by selective, cost-shared projects, and carried out as collaborations with industry, academia, national laboratories and facilities, and other research enterprises.

The Department will continue to review the legislation and looks forward to working with Congress as the legislative process moves forward.

*S. 2688 – Technology Transitions Act*

S. 2688, the Technology Transitions Act would establish an Office of Technology Transitions (OTT) to expand the commercial impact research investments of the Department and focus on commercializing technologies that reduce greenhouse gas emissions.

S. 2688 reiterates work that the Department, under the leadership and direction of the Secretary, is already undertaking. Under authority provided in the Energy Policy Act of 2005, the Department established the Office of Technology Transitions in 2015. Under authority provided in the Department of Energy Organization Act, the Secretary can adjust offices of the Department to address circumstances that may arise in the future. The existing OTT will help in continuing to expand the commercial impact of DOE investment and highlight the vast research capabilities so important to ensuring our domestic energy and national security, as well as U.S. economic competitiveness.

The Department will continue to review the legislation and looks forward to working with Congress as the legislative process moves forward.

*S. 2702 - Integrated Energy Systems Act*

S. 2702, the Integrated Energy Systems Act, requires the Secretary of Energy to establish an integrated energy systems research, development, and demonstration program between multiple Department offices, to be known as the Integrated Energy Systems Program. The intent of the program is to maximize energy production and efficiency; provide reliable, competitive, and environmentally sustainable electricity to the grid; expand the use of emissions-reducing technologies into nonelectric sectors to achieve dramatic reductions in environmental emissions; and enable the energy infrastructure of the United States to support the quantity, variability in type, and variability in size of generation devices and smart load devices.

The Department has provided technical assistance on this bill and looks forward to working with Congress as the legislative process moves forward.

*S. 876 – Energy Jobs for Our Heroes Act of 2019*

S. 876, the Energy Jobs for Our Heroes Act of 2019 would establish the ‘Energy-Ready Vets Program’ that would prepare veterans for careers in the energy industry. The program will allow eligible participants to earn an applicable industry-recognized entry-level certificate or other credential. The program will be carried out through the SkillBridge program of the Department of Defense.

The Department will continue to review the legislation and looks forward to working with Congress as the legislative process moves forward.

*S. 2714 – ARPA-E Reauthorization Act of 2019*

S. 2714, the ARPA-E Reauthorization Act of 2019, would authorize a significant increase in the Department of Energy’s Advanced Research Project Agency-Energy’s funding, from \$428 million in Fiscal Year 2020 to \$750 million in Fiscal Year 2024. The bill also adds an annual reporting requirement for ARPA-E’s scale-up and demonstration activities and would broaden the authorized scope of ARPA-E to support not only projects that improve the resilience, reliability, and security of America’s energy infrastructure but also those that improve the management, clean-up, and disposal of radioactive waste and spent nuclear fuel.

The Department will continue to review the legislation and looks forward to working with Congress as the legislative process moves forward.

**CONCLUSION**

Thank you again for the opportunity to testify before the Subcommittee today. 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. I would be happy to answer your questions.

Senator CASSIDY. Senator Heinrich and I have to be here no matter what, so we are going to defer to Senator Cortez Masto to begin the questioning.

Senator CORTEZ MASTO. Thank you, I appreciate that.

Mr. Simmons, thanks for being here today. It is good to see you again.

Let me start with increasing energy efficiency in schools, and thank you for your comments regarding the Renew America's Schools Act.

Energy costs for K through 12 schools total approximately \$8 billion annually nationwide. But according to the EPA, \$2 billion of these dollars can be saved by improving energy efficiency. In your testimony you mentioned that the Department of Energy currently provides technical assistance to a number of K through 12 schools across the country to help them achieve voluntary commitments of 20 percent or better energy savings in their facilities through the Better Buildings Challenge. Thank you very much.

Do you believe that the Renew America's Schools Act will assist DOE in achieving these targets?

Mr. SIMMONS. What the—with achieving those—with helping those schools achieve those targets, yes. Anytime that we have increased emphasis coming from Congress, it is obviously very important to the Department because we strive to meet, well, we strive to follow Congressional guidance, but more important, we very much strive to meet our statutory obligations.

Senator CORTEZ MASTO. Thank you, I appreciate that.

Let's talk about conversations we have had on cybersecurity and workforce and the lack of the workforce to help us with cybersecurity needs. So let me ask you this. As we work to implement newer, smarter energy technologies, is there more DOE can be doing to reduce the risk of cyberattacks? And how can we help in this conversation?

Mr. SIMMONS. There is definitely more that we could be doing. We're obviously doing a lot. Our Office of—the Secretary has emphasized the cybersecurity work with the standing up of the Cybersecurity for Energy Security and Emergency Response. That office is a new office that there isn't, it is not—we do not have a ton of people currently working in that office, for example. So more people is one answer where—

Senator CORTEZ MASTO. And is that a challenge? Can you address that, I mean?

Mr. SIMMONS. Well, it would be—

Senator CORTEZ MASTO. Are we having an issue because there is a lack of the workforce, the skills needed to fill that office, or what are the challenges there?

Mr. SIMMONS. It would be easiest to address in questions for the record, just to be clear since it's not my office.

Senator CORTEZ MASTO. Okay, fair enough.

Mr. SIMMONS. I think that we have the skills but it's also, it is a new office that is dealing with a rapidly changing situation in cybersecurity and they definitely need appropriate resources to carry that out.

Senator CORTEZ MASTO. Okay, I appreciate that.

Geothermal, we talked a little bit about that earlier, and I so appreciate the work that our Chairman Murkowski and our Ranking Member Manchin have done to include geothermal in today's discussion. I know that geothermal energy will play a key role in the fight against climate change by providing clean, renewable, low-carbon energy to the U.S. electricity grid.

Looking into the future, the large-scale deployment of renewable electricity generation will require additional transmission to connect renewable resources which are widespread across the United States and regionally constrained, to load centers. Current interconnection issues facing geothermal power differ greatly from those affecting wind power or other renewable technologies, and assessing regional markets via new transmission largely depends on the ability to aggregate several geothermal plants in the same area or on aggregating geothermal with other complementary generating technologies in renewable energy zones.

Based on your expertise, what is the best way to accelerate transmission upgrades across the country and what is the best way for DOE to contribute?

Mr. SIMMONS. You know, that answer is, again, squarely within the Office of Electricity's area which, so we'll be happy to provide a more expansive answer with the testimony later.

Senator CORTEZ MASTO. I will submit those as well from—

Mr. SIMMONS. And it is really challenging to build transmission in this country, especially long-distance transmission. One good example of that is a power line called Sunrise Powerlink that took, that was, well, that currently takes electricity from the Imperial Valley in California to the coast.

It is California. They wanted to produce the, you know, they want to produce the solar power. They want to use it on the coast. Everything is a piece of cake in that sense. And it was incredibly difficult to permit and took years and tons and tons of money. And so, the regulatory challenges of power lines are very difficult.

Secretary Perry, when he was Governor of Texas, was able to do that in Texas but that is a single state. Anytime that we're also then crossing borders, when it is federal land, federal and state and private land, there are just incredible challenges to, incredible permitting challenges. And reducing those challenges are, is, I think, a priority, not only for geothermal, for wind, for solar, for all of our energy generating resources.

Senator CORTEZ MASTO. Yes, no, I appreciate that. Thank you.

Senator CASSIDY. Do you want to go?

Senator HEINRICH. Sure.

Thank you for being with us. I want to piggyback on that because transmission has been something I have worked a great deal on in New Mexico. We have had luck on certain lines and been able to get big things done. At other times, we have experienced exactly what you said, although it has not always been the regulatory hurdles. Oftentimes, it has been, frankly, political hurdles. And we have seen that with lines, like Clean Line. There is a best-selling book out there about it right now. So we do need to figure this transmission thing out.

I gave a speech recently to a bunch of folks working on transmission in Canada and the United States. One of the things that

I talked about is the potential to look at financing incentives to make it easier to build those big, regionally significant, multistate projects.

One thing that would actually have a relatively low price tag would be extending an investment tax credit to regionally significant projects as a way to leverage the financing and buy more time to get those projects done. Is that something that you have looked at at DOE, and what are your thoughts, off the top of your head?

Mr. SIMMONS. That is not something that we have looked at at DOE, investment tax credits in that situation. But you know, from a very broad perspective, that financing is obviously critical and when we have these other hurdles, whether they're political, whether they're regulatory, it just increases those financing costs and makes those projects much more difficult.

Senator HEINRICH. Well, heads up, you may be seeing legislation on that front. So it is—would love DOE's thoughts.

The next big wave of wind power projects—and we have seen some incredibly successful wind power projects really reinvigorate rural communities in Eastern New Mexico, in particular. Some very healthy lease rates to farmers is making all the difference in the world. You know, when you can get over \$10,000 a turbine in terms of a payback, that can mean the difference between having a farm that is profitable and having one that is not, even if you only have one or two turbines on a farm.

But the next big wave of wind power projects is going to be offshore. That is not what we are going to do in New Mexico, but there is huge power demands all up and down the Eastern Seaboard, and very favorable conditions.

Senator KING. You will, unless we get climate change under control.

Senator HEINRICH. Okay.

Senator KING. The New Mexico coastline is what I am—

Senator HEINRICH. Yes, I gotcha, okay.

[Laughter.]

We may have offshore at some point in the future.

I would like to know, what is DOE doing now, specifically, to bring down the cost curve the way we have seen it in terrestrial wind for offshore wind?

Mr. SIMMONS. So offshore wind is one of the key areas of emphasis for us because it is a—as you mention we have seen that cost curve really decline in terms of onshore wind. Offshore, we haven't seen that as much, plus deployment in the United States we have, I think, four turbines in the water is all. So that there is a—

Senator HEINRICH. One project, Block Island.

Mr. SIMMONS. One project.

And so there is a lot of opportunity. So we have offshore wind demonstration projects. One is the University of Maine, another one in Lake Erie that we are funding. We also have, there's some new funding to look at ways to improve offshore wind technology, looking at things such as superconducting generators, for example, because one of the real challenges when you have these very large machines at 12 or, at 12 megawatt machines or even bigger, is that you want less weight in the nacelle in the top of those machines.

Senator HEINRICH. Right.

Mr. SIMMONS. And so, ways that we could drive down those—that weight.

Senator HEINRICH. So basically material science to—

Mr. SIMMONS. It is.

Senator HEINRICH. —to change the nature of what is currently very heavy machinery at the apex of the turbine and nacelle.

Mr. SIMMONS. Very heavy machinery and then as we have these longer blades, making sure that those longer blades are also, you know, structurally sound as well as, you know, looking to the future. And as we are recycling these blades, looking at ways to make sure that the wind blades are inherently recyclable.

Senator HEINRICH. Right. Good.

Mr. SIMMONS. That hasn't necessarily been a big issue so far because of—

Senator HEINRICH. But it will be in the future.

Mr. SIMMONS. But it will be in the future.

Senator HEINRICH. I think it is worth just pointing out what you said about, you know, a 10 to 12 megawatt, a single turbine producing 10 to 12 megawatts. I mean, that is pretty incredible when you think about that. And we are talking about capacity factors that are nudging above 50 percent. So capacity factors that are in excess of what we see from coal generation in the spring months in the United States. This is an enormous game changer.

Senator CASSIDY. Senator King, did you want to ask questions?

Senator KING. Well, I just wanted to add to that and thank the Department for its steadfast support of the Aqua Ventus program in Maine which, I think, is one of the most promising technologies. We are at the beginning of the cost curve because there are not significant or there are not a substantial number of projects. That will happen, but your support, the Department's support, consistently, has meant a lot. And I think that project is really getting very close to having all the pieces together. So I wanted to thank you for that.

And also, thank you for your interest in combined heat and power. That is a technology that we have in hand, and I know the Department has been supportive. You have been up to the University, and the technical support center, I think, is making a real difference for businesses throughout the country actually.

So I think the Department has identified something like 150 gigawatts of potential power from combined heat and power potential in the country. That compares to 300 good-sized power plants. So very efficient use, and I appreciate your work and look forward to continuing to work with you on these projects.

Mr. SIMMONS. Thank you.

Senator KING. Thank you, Mr. Chairman.

Senator CASSIDY. Mr. Simmons, thank you for being here.

So this is on my mind. I have a friend. He is very proud his son works for the Livermore lab. The bill that I and others are promoting is the Office of Technology Transitions, elevating it, if you will in the, kind of, chart, to have more authority, if you will.

How do you imagine your office working with an elevated authority OTT to take all this great research occurring at places like Livermore into the private sector? First question.

Mr. SIMMONS. Well, this is—this, I believe, is critical work. It is not enough for us to do science projects. We need to get those

science projects into the real world. They need to be, you know, our goal is obviously to commercialize those in the United States.

A good example of both us doing a fantastic job and maybe not the best job is the recent Nobel Prize for Chemistry. Two of the three winners of that award have been funded by the Department of Energy for years. So kudos to my predecessors in the Office. Kudos to the staff for funding those technologies, because lithium-ion battery technologies have literally changed the world.

That is fantastic. But we look at that today and we say, this technology was, you know, in large measure created in the United States and where are we today in terms of manufacturing? We need a focus on R&D around manufacturing so that we don't just create the knowledge but we're also then creating those, we're creating the manufacturing, those jobs here in the United States.

Senator CASSIDY. So, let me ask.

Mr. SIMMONS. That is a challenge.

Senator CASSIDY. So let me ask. You are obviously talking about not just the genesis of a new paradigm, but also the production process by which that becomes commercially viable. Fair statement?

Mr. SIMMONS. Correct, correct.

Senator CASSIDY. Now I find, I come from academia, and I find that there are some academic institutions—which I think of our major labs as being academic—that are very good at translation with an entrepreneurial spirit and others, not. There is some linchpin that is lacking.

And I think when you think of prestigious universities, Stanford's done a fantastic job of commercializing the product of their faculty and spin-offs from their grad students into things that we can all immediately recognize. Equally prestigious universities, not so much.

Is there something that we can add? Is there something missing? Is there something we can add? How do we foster that, sort of, entrepreneurial spirit? You see where I am going with this?

Mr. SIMMONS. Yes, and that's a really, really tough question, obviously. It is something that we are thinking about frequently at the Department. If we necessarily knew what that thing to add is, we would definitely be asking for it.

You know, the National Renewable Energy Laboratory, is the lab over which my office has stewardship, does really quite a good job in this area, for example. One of the things that we are thinking about and that we will be meeting with the Office of Science and the Office of Technology Transitions in the pretty near future on is a discussion of how do we incentivize that innovation? How do we do a better job? How do we have that focus on innovation?

We need to have a focus. We need the ideas. We need those basic ideas. But then, we also need a focus on innovation for getting those technologies into the real world. And it is an exceedingly hard challenge, especially because the speed of business is faster than the speed of government. And in some way, that's not a bad thing, it just is, because we are stewards of taxpayer dollars. So we need to be careful with how we're spending that money. That said, we need to figure out how to do that more efficiently, more quickly

and the Office of Technology Transition is focused on that right now.

Senator CASSIDY. Out of your purview, but are there offices say, NIH, NSF, others within the government that you see doing a good job of commercializing, that hopefully can provide an example of how we can do so elsewhere?

Mr. SIMMONS. I don't know of those, but that is, that is something that we will look into.

Senator CASSIDY. I will say it has been my observation there is a university in Louisiana, Louisiana Tech. They do a fabulous job of commercializing what they do. I think it is in part because they kill all the lawyers first.

I am just teasing, for the record.

[Laughter.]

But of course, lawyers are so concerned about what is going to happen if it doesn't go exactly right that nothing ever goes.

On the other hand, if you are willing to accept that occasionally there will be a rough edge, you end up with an ROI that is much greater than otherwise.

I will just point that out. If there is something that you need to do, I think, that would be bipartisan. If we need to get, cut a little slack on a regulation, that would allow more rapid commercialization because otherwise it dies aborning and we don't want that.

We have these great labs. We are investing, and we would invest more if we saw the fruits, if you will, rapidly being translated into benefit for all society.

Senator Heinrich, do you have a follow-up?

Senator HEINRICH. I do.

You know, some of that is our fault here in Washington, because if you look at programs like the revolving loan funds at DOE, we saw one company just absolutely pilloried a few years ago in that program. But if you look at the program overall, you have to accept the fact that a certain amount of risk is inherent in it. And the performance of that program has been spectacular.

You can always, you know, it is too easy for us to cherry-pick one thing or another and not look at the overall performance. Everyone knows the name Solyndra now, but the reality is the cost of solar is remarkably low because of the progress that was made overall.

I want to go back to the tech transfer issue for just a minute, because I think there is a lot that you can do to make tech transfer part of what DOE does.

I have had DOE, some very accomplished people, including a secretary, say things effectively like that is not in our lane. And I think making tech transfer a part of the culture at DOE will make an enormous difference at those individual national labs. Just being able to set a tone here in DC that says, this is part of what we do as being the Department of Energy. And we are going to encourage entrepreneurship. We are going to encourage efforts to transfer technology, I think, would be huge.

Secretary, you also mentioned soft costs when you were talking about the grants that you are awarding right now. Senator Collins and I have a bill that is designed really to streamline and, for that matter, create an easy, more standardized approach to soft cost, to permitting from a locality, whether it is a municipality, a county,

whoever the local regulatory agency is when you are doing distributed energy, not reinventing the wheel every time. Giving people the tools to be able to do something, sort of, off-the-shelf.

Australia kicks our butts at this. If you look at the cost of distributed energy in Australia, it is dramatically lower than the United States because of those soft costs. I would love to hear what you are doing now, since you are putting grant dollars out in that direction. Anything the Department is doing to bring those soft costs down and support those local municipalities, counties, et cetera.

Mr. SIMMONS. Well, one of the things we're doing is looking at those, looking at those best practices, providing information so that local authorities having jurisdiction can make—that they don't need to reinvent the wheel every single time because that is, that is critical. We all, you know, local officials are hardworking. They have many of things in their portfolio. They do not need to reinvent the wheel—

Senator HEINRICH. Right.

Mr. SIMMONS. —when it comes to what it takes to install solar—

Senator HEINRICH. Those regulations, those codes are designed for safety, but we know what the issues are. So, making sure that that is part of any, sort of, off-the-shelf solution is not a technically, particularly challenging challenge.

Mr. SIMMONS. Yeah. And that's, that is really what that funding is going to is to help reduce that, to help reduce that red tape of not only solar, but also, as we look to the future, solar plus batteries.

Senator HEINRICH. Sure. Oh, absolutely. When I say solar, these days, everybody is like, a large percentage of the installments in many places include some level of energy storage.

Power-to-gas, I want to ask you about that because it is something that I think we are going to hear more and more about on this Committee. The reality is for some applications we need molecules to have the energy density to do the things that we want to do.

One way to do that is through hydrolysis. And so, you are seeing now, you know, we have a nuclear power plant in Arizona that the New Mexico utilities use as a source of energy, but they are now talking about power-to-gas as a portion of their future. So basically, creating clean hydrogen, something that burns and gives off water, but doing it with electricity. How much work is DOE doing on power-to-gas right now?

Mr. SIMMONS. So this is a, I mean, this is an emerging area of emphasis for us. So, for our Office of, for our Hydrogen and Fuel Cell Technologies Office, one of the most important areas is this idea of what we call hydrogen at scale which is looking at a hydrogen economy and what are all the uses, possible uses of hydrogen, what are all the ways where we can generate hydrogen?

So, looking at it in that aspect, whether it is from nuclear power, whether it is nuclear power using the heat, not just necessarily electricity, whether it's from solar and electricity or the heat from solar energy. Looking at, making sure that we have everything on the table to figure out how to do this in the most cost-effective way possible because there is, the future is really wide open because of

how flexible hydrogen is as a fuel for vehicles, you know, for heavy duty vehicles. It is, that's a great opportunity for it, for example.

But also, it's, it can be a form of energy storage and long-term storage. There are many opportunities but, you know, one of the most important things is to then drive down the cost of generating it.

Senator HEINRICH. Right.

Mr. SIMMONS. And so, that's why it's critical.

And I'll also mention, along those same lines, is we're thinking about synthetic fuels—hydrocarbon fuels need hydrogen. It needs a source of carbon, whether that could come from well, wherever you're getting your carbon dioxide and then needs energy. Bringing those three things together to generate synthetic fuels so that we can afford things such as airplanes where we're not going to have electric airplanes in the next ten years, for example.

Senator CASSIDY. Senator McSally.

Senator MCSALLY. Thank you, I appreciate this hearing, Chairman Cassidy and Ranking Member Heinrich.

I have two bills that I am the lead Republican co-sponsor on that we are considering today: the Promoting American Energy Jobs Act with Senator Shaheen and the Solar Energy Research and Development Act with my fellow Arizona Senator, Senator Sinema.

Arizona truly is a leader in all-of-the-above energy. We have a large nuclear plant, natural gas, coal, but also hydro, a growing solar capacity and biomass. In fact, we are the fastest, one of the fastest growing anyway, in solar industry nationwide. We are currently number three in installed solar capacity. We were up from ninth place in 2018 and that is 7,500 jobs, \$11 billion in investment in the state.

So both of the bills that I am leading on with my colleagues will help support these diverse energy jobs in Arizona and across the country and allow us to invest in more innovation.

I did see today that DOE announced \$128 million in new research funding awards and there are several projects in Arizona. So I really do appreciate the Department's work in this area and continued investment in Arizona.

I want to first ask on the Solar Energy Research and Development Act that Senator Sinema and I are on that bill. We have, really, two of the most essential ingredients in Arizona for solar research. It is, obviously we have open space and we have sunshine. But we also have innovation in our universities and private companies have been really investing billions in solar technology development in Arizona, and we have lowered that cost of solar energy by 32 percent over the last five years.

Can you share your perspective on how this legislation will continue to incentivize and encourage breakthroughs in technology related to solar capability?

Mr. SIMMONS. Sure thing.

The one thing that is always, it is always good to have direction from Congress. We'll just put it that way.

Senator MCSALLY. Yes.

Mr. SIMMONS. And particularly in this, one of the things that I've talked to the program offices a lot about is what does our authorization say? What has Congress told us to do?

And so, it is very important for us to have updated authorizations to consider today's challenges versus what was maybe the, what people were thinking about the challenges for solar energy, say 30 years ago? And that added emphasis is important. We are obviously trying our best with the authorization that we have but we will continue to fund solar energy because the costs have come down so much. So it will only be a more vital part of our energy system in the future.

Senator MCSALLY. Great, thanks.

When we talk about clean energy technologies like solar, we also need to talk about supply chain issues. Whenever I meet with people who are very focused on these technologies like solar, I say, you must be pro-mining because we obviously need to be able to access important parts of the supply chain in order to create these technologies and to store energy. And that, sometimes, alarms people when they have to think about the connection with that.

But part of our bill also, the bill I have with Senator Sinema, is about authorizing innovative solar recycling R&D programs so that we can increase the recovery and reuse of materials including critical minerals. Can you just talk a little bit about how we can have more efficient recycling work in tandem with domestic mining operations to bring security and stability to the clean energy supply chain?

Mr. SIMMONS. Sure.

And I'll start by emphasizing the mining angle. The World Bank put out a report in 2017 and what they found in it is that the clean energy economy, as they defined it—wind, solar, additional batteries, EVs—is actually a more mineral intensive economy than a fossil fuel economy.

Senator MCSALLY. Exactly.

Mr. SIMMONS. And so, as we think about the future, it is very important that we're thinking about where those minerals come from. The United States is going to produce those minerals, that we are going to produce them at the highest environmental standards, the highest labor standards in the world. So I think that is, first of all, that is an important issue.

Second, when we have those, when we have these critical minerals, in many cases, in the United States, it is very helpful that we can do a good job recycling them.

With solar panels, in the very beginning they weren't necessarily manufactured with recycling in mind. Now that is a consideration that we're thinking about. That is an area of, that our office is considering how do we take these solar panels and make them more inherently recyclable? When wind, when solar was a very small part of the electricity system, it didn't matter so much. But it is not that way now and we need to think about, like, the end of life considerations from the very beginning because that is the way to make them inherently recyclable as opposed to, you know, running into some real serious recycling challenges.

Senator MCSALLY. Great. Thank you, I appreciate it. My time is up.

Senator CASSIDY. I think we have come to the end——

Senator HEINRICH. Can I——

Senator CASSIDY. Sure.

Senator HEINRICH. So I will put one more thing on your radar screen. Since we were talking about power-to-gas, one of the reasons why I have an interest in that is because of the broad challenges that we see in the industrial heat sector.

If you look at electric generation, I think the end of the story is practically written. We know where we are headed. We know how it is going to decarbonize over time. We can see our way to maybe 80 percent clean energy on the grid, and by the time we get there we will be able to see, I believe, some of the solutions for seasonal storage that get us to 100 percent.

We don't have those same solutions yet, and certainly not the cost curve, which you referenced, when it comes to the industrial heat sector. You can make hydrogen with a nuclear power plant but a nuclear power plant can't create the heat that you need for some of these processes.

So if you look at steel, aluminum, ammonia, glass, concrete, all of the industrial heat processes, we are talking about roughly ten percent, I think, of worldwide emissions. And most of that is not necessarily process emissions as opposed to generation emissions.

What we are doing at a holistic level is to look across the board at that and say, here is one of the toughest places for us to decarbonize, and we need a solution set that either isn't available today or isn't cheap enough today, and how do we work with industry to maybe create a center of excellence somewhere in the DOE network and work with industry to bring those emissions down?

Mr. SIMMONS. So the issue of process heating is one that our Advanced Manufacturing Office is spending a lot of time thinking about, about what that, for exactly the challenges that you laid out, it is a huge consumer of energy. Ways to make that more efficient results in, you know, U.S. businesses being more, U.S. manufacturing being more competitive in a global economy.

Again, it's not obvious what a lot of those solutions are, but it is an area that we are actively thinking about whether it is things such as microwaves, for example, in certain applications, for heating or drying technologies. But we recognize the challenge.

Senator HEINRICH. It sounds like we have a lot of work to do.

Mr. SIMMONS. We definitely have a lot of work to do.

Senator CASSIDY. Thank you, Mr. Simmons.

Questions for the record are due by close of business today.

Again, I thank you for your presence and thank my colleagues for their presence.

This concludes the hearing.

[Whereupon, at 10:57 a.m. the hearing was adjourned.]

## **APPENDIX MATERIAL SUBMITTED**

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U.S. Senate Committee on Energy and Natural Resources  
Subcommittee on Energy  
November 6, 2019 Hearing: *Pending Legislation*  
Questions for the Record Submitted to the Honorable Daniel Simmons

QUESTIONS FROM SENATOR JOE MANCHIN III

- Q1. In last year's Energy and Water appropriations report, the Senate recommended the Office of Energy Efficiency and Renewable Energy establish a program to ensure cybersecurity is built into early-stage R&D for distributed energy, storage, smart buildings, and EV technology. The appropriations report directed the Secretary to submit to Congress a multi-year program plan for this effort within 180 days. What is the status of this multi-year plan? When should we expect to see this report?
- A1. The Cybersecurity report has been drafted, and is currently in Departmental review. EERE will have invested nearly \$50M in FY 2019 funds in cybersecurity efforts, including significant investments in the clean energy manufacturing cybersecurity, as well as cybersecurity of distributed solar generation, electric vehicle, charger, grid interfaces, federal facility-related control systems, and flexible building technologies that include adaptive building controls for cybersecurity.
- Q2. We must continue to innovate so that the renewable technologies being developed are applicable across the country. How do you see the technologies under discussion in the wind, solar, and geothermal bills tailored to places like West Virginia?
- A2. The authorizing language in the Wind Energy Research and Development, Solar Energy Research and Development, and Advanced Geothermal Innovation Leadership bills would direct research that can be applied broadly across the United States. Below are some examples from the Wind Energy Technologies Office (WETO), Solar Energy Technologies Office (SETO), and Geothermal Technologies Office (GTO).

**Wind Energy Technologies Office (WETO)**

The *Wind Energy Research and Development Act of 2019* is aligned with WETO's current and planned activities, much of which is applicable broadly across the United States. WETO's primary goals are: cost-reduction, while also informing market choices; ensuring the reliability, resilience, and security of wind power and the grid; developing means for mitigating siting and environmental challenges; and advancing a robust U.S. manufacturing sector and related workforce. These goals will benefit all areas of the country.

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One area of research that will benefit West Virginia is an improved understanding of wind flow in complex terrain, including its effects on wind forecasting and turbine-to-turbine interactions. This area of research is aligned with two subject areas of *the Wind Energy Research and Development Act*. West Virginia has lower wind speeds than many other areas of the country and will benefit from research into taller wind turbine towers and longer blades that make wind energy more economically feasible for low wind speed areas.

**Geothermal Technologies Office (GTO)**

Similarly, the *Advanced Geothermal Innovation Leadership (AGILE) Act of 2019* aligns with the current priorities of GTO. Historically, geothermal power production has been centered in the West, where conventional resources have been relatively easy to access. Harnessing geothermal energy for both heat and power throughout the United States will require innovation across the geothermal spectrum.

Several sections of the AGILE Act address opportunities that could make harnessing geothermal energy throughout the United States more efficient and cost-effective, including low-temperature uses which are more common east of the Mississippi River. For example, Section 4 of the bill expands the definition of renewable energy to include thermal energy and any energy consumption that is avoided through the use of renewable energy, which will be critical as eastern states look to increase their use of renewable energy sources. The bill also authorizes enhanced geothermal systems (EGS) demonstration projects in varied geological environments, one of which must be located east of the Mississippi River.

**Solar Energy Technologies Office (SETO)**

The *Solar Energy Research and Development Act of 2019* aligns with the research and development activities of SETO. SETO's goal is to improve the affordability, reliability, and performance of solar technologies on the grid. By making solar more affordable and reliable, SETO is helping all states, including West Virginia, realize greater net benefits from installing solar. SETO's research on increasing efficiency, lowering material and process costs, and improving solar module reliability and durability can help lower system costs.

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- Q3. How do we better use the commercialization activities at DOE, including changes proposed in Senator Cassidy's Technology Transitions Act, to make sure renewable technologies are accessible across the country?
- A3. DOE's science mission is broad and deep, and many different disciplines directly affect access to renewable energy technologies, including materials science, smart grid, machine learning/Artificial Intelligence, complex modeling and simulation, and advanced manufacturing. Promoting the successful transition of all of these research areas contributes to the ultimate proliferation of new technologies, including energy technologies.

In November 2018, DOE elevated its technology transition mission by naming the Director of the Office of Technology Transitions (OTT) as the Department's first Chief Commercialization Officer (CCO). This was done to better coordinate and enhance energy technology transfer efforts across the DOE complex. The CCO coordinates across DOE elements to review and improve DOE's ability to successfully transfer new energy technologies to the private sector, in accordance with P.L. 115-246, Section 106.

OTT's CCO is also actively working to more proactively engage potential partners (both traditional and non-traditional), promote current transition efforts, and address gaps in the policies and mechanisms aiding commercialization. While the following list is not exhaustive, a few of the engagement activities OTT is supporting are highlighted below:

- PACT Lab Call: In October 2019, OTT announced its first Practices to Accelerate the Commercialization of Technologies (PACT) Laboratory Call. The PACT Lab Call project promotes the transition of research developed at the Department's National Laboratories toward the marketplace to promote U.S. competitiveness and national security. The PACT Lab Call specifically encourages the Labs to develop new ways to increase technology commercialization by reducing barriers to accessing Labs' capabilities, lowering transaction costs, and improving the lab complex's ability to serve the private sector effectively.

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- InnovationXLab Summits: DOE is leading a series of summits called InnovationXLab. These summits are designed to increase the engagement of the National Labs with the private sector on high-impact, and potentially transformative, innovations and technologies. At these summits, OTT both highlights research from the laboratories that is approaching commercial application and, just as importantly, hears from industry about its current and emerging technical challenges, risk appetite, and investment criteria.
- DOE Technology Transfer Working Group: The DOE Technology Transfer Working Group (“TTWG”), overseen by the CCO per EPO 2005, consists of representatives from the National Labs and DOE. The TTWG coordinates technology transfer activities occurring at the Labs and makes recommendations for improvements.
- OTT Strategic Programs: The CCO also leads OTT in managing several programs that improve availability of and streamline access to the expertise, facilities, and technologies of the Labs. These programs include Energy I-Corps and Lab Partnering Service (LPS).

Q4. A major problem with the current nuclear fleet is cost competitiveness, yet recent efficiencies have demonstrated that we can bring costs down. In 2018, our nuclear fleet, which was down to 98 reactors, generated more electricity than at its peak with 112 nuclear reactors. The Integrated Energy Systems Act will promote more of this type of innovation to keep our energy systems economically competitive, resilient, and clean. What other opportunities and partnerships with private industry do you see for making existing nuclear plants more competitive? Can we achieve a net-zero emission economy without the Integrated Energy Systems program?

A4. To become more competitive in the domestic electricity market, existing nuclear plants need to continue to become more efficient and reduce their overall operations and maintenance costs, as well as develop new sources of revenue. The Office of Nuclear Energy (NE) is partnering with other offices within DOE, national laboratories and universities, and with industry to the extent appropriate while prioritizing taxpayer equities, to support early-stage R&D that advances modern plant automation technologies, remote online monitoring, and risk-informed maintenance practices. DOE is also working with industry to develop accident tolerant fuel concepts that can allow for higher burnup, reduced waste, and extended operating cycles of the existing fleet.

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- Q5. Senator Duckworth's bipartisan bill would help veterans gain the skills and credentials they need to seek out jobs in the clean energy sector. Where does DOE see the most potential for long-term, well-paying job creation in the energy field that could be filled by our nation's veterans, and what is DOE currently doing to encourage and assist veterans in finding these opportunities?
- A5. We are at the forefront of what has been called the "New American Energy Era", an era of vastly improved energy choice, in which we use the power of innovation to reach our energy and our environmental goals. As a nation we are supporting environmentally responsible oil and natural gas development and fostering clean coal technologies. Revitalization of nuclear energy is also a part of an innovation-driven energy strategy for our country. Our solar generation has increased by nearly 90 percent over the past two years, and wind power has also grown dramatically. Finally, opportunities are evolving in areas dedicated to enhancing the cybersecurity of our nation's critical energy infrastructure and the cybersecurity of energy-efficient manufacturing processes.

In September, the Department announced that it is planning to expand the VETS2TECH program. This vital initiative builds up on the successes of the VET2TECH pilot program initiated through Lawrence Livermore National Laboratory, and aims to provide veterans and transitioning active duty service members clear educational and developmental pathways to careers in our world-class National Laboratories.

To provide an example outside the National Laboratories system, the Solar Energy Technologies Office (SETO) within the Office of Energy Efficiency and Renewable Energy announced on October 23, 2018, funding to support growing the solar workforce, which include workforce development programs explicitly focused on training veterans for careers in the solar industry. Project examples include: The Multi-Sector Solar Career Training Initiative for Native Americans and Veterans; The National Solar Jobs Accelerator, which builds upon the DOE's Solar Ready Vets Program; and Cyberguardians and STEM Warriors, which supports veterans with cybersecurity and information technology training to further develop these skills through new online training modules, accredited curricula, and hybrid training programs in Distributed Energy Resources (DER) system designs, grid operations, data analytics, cyber security, and investment decision support.

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- Q6. Lithium-ion batteries are currently only collected and recycled at a rate of less than 5%. However, recycled material could potentially provide one third of United States cathode material needs for lithium-ion batteries by 2030. I understand that the Vehicles Technology Office (VTO) at DOE is investing in battery recycling. What suggestions do you have for us on policies that could increase the recycling rates of lithium-ion EV batteries in the United States?
- A6. VTO has two major initiatives in the battery recycling space: the ReCell Center and the Battery Recycling Prize. The Recell Center is an R&D consortium that brings together three National Laboratories (Argonne, Oak Ridge, and National Renewable Energy Labs) and three Universities (Worcester Polytechnic Institute, Michigan Technological University, and University of California San Diego). The consortium's mission is to minimize the cost of recycling lithium ion batteries to ensure supply availability of critical materials and decrease energy usage of recycling and recycled material. As of November 2019, \$4.47M has been obligated to the Recell Center to support R&D focused on novel processing approaches to enable a long term, profitable domestic recycling industry.

The Battery Recycling Prize, co-funded by the Advanced Manufacturing Office (AMO) within EERE, focuses on solving the collection problem of battery recycling. The prize funds innovative business concepts to increase collection and improve the logistics of getting lithium ion batteries to recycling centers. The goal is to enable concepts that, when scaled, have the potential to capture 90% of the lithium ion batteries across all applications for a total of \$5.5M.<sup>1</sup>

A challenging area for collection is consumer electronics. This is the case for a variety of reasons, but the two biggest ones not addressed by the prize are the increasing difficulty of removing batteries in consumer electronics and the large export market for refurbished consumer electronics to developing countries. These two technical initiatives will provide critical technical information to overcome battery collection and recycling barriers and could provide valuable information for effective policies.

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<sup>1</sup> <https://americanmadechallenges.org/batteryrecycling/>

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- Q7. In 2016, DOE released the “first annual” United States Energy and Employment Report (USEER) as an initial step toward providing a more complete definition and quantification of energy employment across the economy. DOE has not produced another USEER since 2017. Why did DOE stop producing the USEER?
- A7. Energy employment across the U.S. economy has grown to such an extent that other federal agencies, notably the United States Department of Labor’s Bureau of Labor Statistics (BLS), are providing complete definition and quantification of energy employment across the economy. For example, BLS’s *Occupational Outlook Handbook* provides quick facts (number of jobs, median pay, and job outlook over a 10 year period) in addition to more descriptive narratives. Furthermore, in just the last two years BLS has released two *Career Outlooks* on green occupations with projected employment growth and wages and employment data.

The National Association of State Energy Officials (NASEO), those most connected with regional and local energy development activity, joined with Energy Futures Initiative (EFI) to produce the *2019 U.S. Energy and Employment Report*. The survey instrument and underlying methodology is identical to that used in the primary data collected on behalf of the U.S. Department of Energy (OMB Control No. 1910-5179) for the *2017 U.S. Energy and Employment Report* and secondary data from the United States Department of Labor’s Quarterly Census of Employment and Wages for the second quarter of 2018.

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QUESTIONS FROM SENATOR JAMES E. RISCH

- Q1. The Department of Energy recently chose the three electric utilities and the Idaho National Lab to lead an effort to demonstrate an integrated energy system at the David Besse nuclear power plant. The project is seeking to demonstrate that nuclear energy can be used to produce commercial quantities of hydrogen for industrial, transportation and other important uses. Can you please explain how your office, our national laboratories, and industry can work together to demonstrate this capability and how my legislation will help advance these efforts?
- A1. The Department of Energy's (DOE) Office of Nuclear Energy, DOE's national laboratories, and the domestic nuclear energy industry can work together on research and development in a number of areas that can help reduce the technical risks of commercial deployment of advanced energy technologies. Specifically, DOE and the national laboratories will work with industry on technical challenges that face systems with the potential to supply electricity and produce non-electricity products; energy dispatch systems; and conduct of safety assessments to inform plant owners on license modifications for relatively large percentages of thermal energy delivery to an industrial user.
- Q2. To date, our nuclear fleet have served a single purpose – generating electricity. Nuclear does this very well, but we're learning that this is only the tip of the iceberg. When we talk about developing hybrid energy systems – why is nuclear power at the center of that conversation? What makes nuclear power so valuable as a potential clean source of hydrogen production and can you discuss the market for hydrogen?
- A2. Nuclear power and hybrid energy systems are often discussed together because they are well-matched and mutually beneficial. In the United States, the 96 operating nuclear power plants provide a reliable source of electricity to the grid with no carbon emissions, with advanced designs in the works that could offer these same benefits with higher efficiency, lower cost, and enhanced safety features. Nuclear power's "always-on" operating approach means that, when electricity demand is low, excess energy from these plants can be used for other purposes, such as hydrogen production, allowing an additional revenue stream for the nuclear plants while ensuring they remain at the ready to provide a stable, clean electricity supply to the grid. The hydrogen produced could be used to meet the onsite needs of nuclear plants or nearby industry. Hydrogen is already an important chemical commodity in petroleum refining, ammonia production, and methanol production. The demand will only increase if fuel cells become more widely used for

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transportation. The U.S. currently produces more than 10 million tons of hydrogen, one sixth of the global supply. R&D is underway to show the feasibility of producing hydrogen economically from electrolyzers integrated with baseload and variable electricity generation sources such as nuclear and wind. Future advanced reactors that operate at higher temperatures may enhance this further by allowing more efficient, high-temperature methods to reduce the production cost.

- Q3. In July 2018 Under Secretary of Energy Mark Menezes hosted a workshop that brought the three applied energy labs: Idaho National Laboratory, the National Energy Technology Laboratory and the National Renewable Energy Laboratory, together with their DOE headquarters programs to develop an integrated view of the DOE applied energy and identify research gaps and opportunities for additional collaboration.

Can you comment on how you view the collaboration between your office, the hydrogen fuel cell office and the Office of Nuclear Energy in support of these goals? Also, as integrated energy systems develop, can you discuss how that will improve the resiliency of the grid?

- A3. As the U.S. electric grid evolves, greater coordination among energy systems (i.e., energy sources and supply chains, generation assets, distribution infrastructure, and end users) can enable more resiliency and reliability. This coordination is the basis for the Tri-Lab effort led by DOE's applied energy labs.

Idaho National Laboratory and the National Renewable Energy Laboratory have been working collaboratively for several years via NE and EERE funding streams – this new effort brings the National Energy Technologies Laboratory into the fold, and allows for a more comprehensive approach to be adopted for the development and deployment of advanced energy systems to meet our future energy needs and improve the resiliency of the grid.

The Tri-Lab team jointly developed 5 concept proposals related to future tightly coupled hybrid energy systems with the goal of providing solutions for complex, multi-disciplinary challenges across the energy ecosystem.

These concept proposals include:

1. Hydrogen Production
2. CO2 Utilization

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3. Carbon Conversion
4. Thermal Energy Storage
5. Low Temp Thermal Energy Utilization

Examples of integrated energy systems capabilities related to hydrogen that will support grid resiliency and stabilization include the following:

- Electrolyzers which can respond quickly (in sub-seconds), and can compensate for grid fluctuations, while producing and storing hydrogen for other applications.
- Production of hydrogen when generation exceeds load on the grid can reduce curtailment of renewables and optimize existing baseload assets, such as nuclear. The hydrogen can be stored, distributed, and/or used as a fuel for transportation, stationary power, process or building heat, energy storage, and in industrial and manufacturing sectors (such as steel manufacturing), creating an additional revenue stream and increased economic value.
- Electrolyzers can also enable nuclear reactors to produce steady power while shifting product heat between electrical generation and hydrogen production as needed. This approach helps to ensure the reliable availability of nuclear power to the electrical grid by efficiently operating the plants even during times of lower electricity demand.

The Office of Nuclear Energy (NE) and the Office of Energy Efficiency and Renewable Energy's (EERE) hydrogen and fuel cell office collaboration directly aligns with the priorities outlined in the July 2018 Applied Energy Lab workshop. These priorities focus on integrated energy systems, which involve coupling baseload and flexible generation assets or loads to provide stable, reliable power, including associated modeling, engineering, development, testing, and optimization.

Examples of EERE-NE-FE collaboration related to hydrogen include:

- Development of a world-class high temperature electrolyzer test capability at Idaho National Lab (INL) to evaluate electrolyzers (which split water into hydrogen and oxygen) using both electricity and thermal sources to enable integrated/hybrid energy systems.

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- Unique, real-time grid simulation and signal connection between INL and the National Renewable Energy Lab (NREL) that allows electrolyzers located at NREL to be tested using grid profiles from INL.
- First validation of the dynamic response of electrolyzers to match grid signals at sub-second response times.
- Two project selections announced at over \$12 million in FY 2019 funds to produce hydrogen for practical industry applications at two nuclear plants in the mid-west.
- A new collaborative project (funded by FE) on hybrid carbon conversion that is leveraging investments in electrolyzers at INL to enable a more comprehensive program coupling FE's Solid Oxide Fuel Cell (SOFC) capabilities with Solid Oxide Electrolyzer Cell (SOEC) to consider more tightly integrated hybrid systems.

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QUESTIONS FROM SENATOR MARTIN HEINRICH

- Q1. I am again working with Congressman Rush on legislation to improve education and training for energy- and manufacturing-related careers. Our bill directs DOE to create a comprehensive strategy to better align today's energy workforce needs and increase the participation of women and minorities throughout the energy sector. Do you agree DOE has a strong interest in ensuring we have the trained energy workforce we need to support transitioning to a low-carbon economy?
- A1. The Department of Energy (DOE) has a strong interest in ensuring we have strong and well-trained energy workforce to support all of our future energy needs. The Department recognizes that a world class workforce is critical to our success and that continued investment in our workforce ensures that we have the talent needed to meet mission requirements both now and in the future. The Office of the Chief Human Capital Officer (OCHCO) leads DOE's efforts to attract, develop and retain a world class workforce and partners with leadership across DOE to manage and deliver programs to support employee development. With a dual focus on strengthening technical competence while developing the critical leadership competencies needed for career advancement, DOE has a wide-range of programs and resources available to help employees achieve their development goals.
- Q2. Do you agree DOE should play a role in helping improve education and training programs for careers in energy-related industries?
- A2. Yes DOE has an active role in these activities. See response to question 3 for additional information on these ongoing activities.
- Q3. What are DOE's existing programs and FY19 funding levels that support career training and workforce development?
- A3. The President's Budget focuses resources on early-stage R&D, while maintaining a limited number of STEM, training, and early-career fellowship activities. However, in response to Congressional guidance in report language to subsidize later-stage deployment oriented activities, EERE manages several workforce efforts across our programs, focusing in different technology areas. Some examples include:
- FEMP works to increase the agility and skills of the federal workforce to foster and maintain a high-performance workforce that constructs, operates, and maintains energy-

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efficient and cost-effective federal facilities through over 200 live and on-demand accredited training, with emphasis on DOE priorities on cybersecurity, resiliency, and buildings as storage. FEMP continues to lead the annual Energy Exchange training event which serves to support Federal efforts to implement efficient, resilient, and secure energy and water projects and practices by providing technical training on core competency skills, demonstrating replicable and deployable technologies, and enhancing collaboration and sharing of best practices among Federal agencies and private sector. AMO supports a number of Industrial Assessment Centers around the country, which conduct energy efficiency, productivity improvement, industrial information technology and waste reduction assessments for small- and medium-sized manufacturers. The IACs utilize university-based engineering faculty and engineering students to do the assessments and teach the students hands-on skills and knowledge of industrial systems and practices. The Solar Decathlon is one of DOE's highest profile competitions for collegiate students. It comprises 10 contests, challenging student teams to design and build highly efficient and innovative buildings powered by renewable energy. One of the primary goals of the competition is to inspire next-generation building professionals to apply the latest building science innovations in new and existing homes and commercial buildings.

- In October 2018, EERE announced nearly \$13 million for solar workforce initiatives as part of a larger funding opportunity announcement. These projects will support training and curriculum development for students and professionals at all stages of their careers, and participants will combine classroom learning with hands-on experiences in both the lab and real world.
- EERE is also working with stakeholders to train and inform over 36,000 first responders and code officials on the use and safety of hydrogen and fuel cell technologies, particularly reaching out to industry and veterans to identify key skillsets required to enter the hydrogen and fuel cells workforce.
- The Vehicle Technologies Office (VTO) invests in both research to develop cleaner, safer, more affordable vehicles and education to ensure a strong workforce that can develop, build, repair, and respond to these vehicles. VTO helps to develop the nation's workforce

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through student competitions and partnerships with educational organizations to provide training for mechanics, first responders, code officials, and electricians on advanced and alternative fuel vehicle technologies.

- DOE's Weatherization Assistance Program (WAP) developed and maintains a foundational workforce training and certification program to ensure quality work is performed in WAP residential weatherization retrofits for low-income homes. WAP provides accreditation and support for 21 training centers involved in training weatherization crews, a number of which operate out of universities and other organizations. Among them, these centers offer a combined 65 accredited training programs.

In addition to these ongoing activities, EERE is preparing to launch a \$20 million partnership to pursue leading-edge interdisciplinary research that promotes workforce development in emerging fields by supporting a coordinated expansion of existing joint graduate education programs with national laboratories to prepare the next generation of scientists and engineers.

Additionally, DOE has supported paid STEM internships for minority and female students through the Office of Fossil Energy, paid internship opportunities for community college students at DOE labs through the Office of Science, established pipelines between DOE labs and minority-serving institutions in STEM disciplines through the National Nuclear Security Administration's Minority Serving Institution Partnership Program (MSIPP), the VETS2TECH summit to help veterans fill critical STEM workforce shortages at national labs, and the Wounded Warrior Career Development Program through Sandia National Lab.

- Q4. As co-founder of the Senate Artificial Intelligence Caucus and author of the Artificial Intelligence Initiative Act, I was pleased to see DOE establish a new office focused specifically on AI. Where do you see the near-term opportunities to apply artificial intelligence and machine learning to renewable energy technologies? Are the DOE labs doing work on application of AI to renewable energy deployment?
- A4. The Artificial Intelligence and Technology Office (AITO) is the enterprise coordinating function for advancing the frontiers of Artificial Intelligence (AI) at the Department of Energy (DOE). The

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vision is to transform DOE into a world-leading AI enterprise by accelerating the research, development, delivery, and adoption of AI. Its mission is to accelerate the delivery of AI-enabled capabilities, scale the department-wide development and impact of AI, and synchronize AI activities to advance the agency's core missions. AITO accelerates the development, delivery, and adoption of AI by coordinating and overseeing efforts across DOE and implements the Secretary's vision for cross-cutting, mission relevant AI projects that are aligned with the Office of Science and Technology Policy (OSTP) AI strategic priorities.

DOE-fueled AI is already being used to strengthen our national security and cybersecurity, improve grid resilience, increase environmental sustainability, enable smarter cities, improve water resource management, as well as speed the discovery of new materials and compounds, and further the understanding, prediction, and treatment of disease.

One example, is the Adaptive Control of Electric Grid Components for Cyber-Resiliency project that seeks to develop supervisory control algorithms to counteract cyber-physical attacks that might attempt to compromise multiple independent systems in the electric grid. The project team will analyze the stability of various feedback control systems (e.g., distributed energy resources (DER), and voltage regulation and protection systems) in the electric grid to determine what parameters an attacker would change if DER and utility voltage regulation and protection systems were compromised. The research may develop reinforcement learning algorithms to characterize the complex interaction between the DER and the electric grid to facilitate a better defense against cyber-attacks.

DOE is executing over 600 AI research projects across the enterprise, including existing energy efficiency and renewable energy research projects. For example, DOE lab research has resulted in the development of learning algorithms that measure and evaluate environmental performance of tidal turbine projects. Pacific Northwest National Laboratory scientists and engineers created a software tool—EyeSea—that automates the analysis of underwater video footage. EyeSea uses machine vision algorithms to “watch” video footage for any incidents where a fish or mammal is near a marine and hydrokinetic (MHK) turbine. The tool automatically detects when a fish or

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mammal enters the frame and alerts an operator to which segments of footage should be evaluated. This solution balances regulatory needs against the future promise of using MHK resources to harness wave energy.

- Q5. There is a disconnect right now between transmission access and the best large-scale clean energy resources. Full utilization of our renewable potential will only be possible when we have the transmission capacity in place to deliver that power to market. Investment in new power transmission lines can also help improve grid reliability and resilience. Has the department evaluated the growing need for additional transmission capacity, including offshore, to enable deployment of clean-energy resources? What support is DOE currently providing specifically for planning of additional transmission capacity to help maintain system reliability and resilience?
- A5. In recent years, the Department of Energy (DOE) has not done independent assessments of the need in economic terms for additional transmission capacity. The regional transmission organizations (RTOs), independent system operators (ISOs), or regional groups of utilities (where RTOs or ISOs have not been established) do systematic transmission planning for their respective areas, under processes established by the Federal Energy Regulatory Commission (FERC) in its Orders 890 and 1000. As an aid to this planning process, DOE has supported the development of an energy zone mapping tool (EZ Mapper), which enables users to quickly assess the suitability of alternative routes for transmission lines (and other linear facilities) across user-selected land areas. DOE is also working with its National Laboratories and the electricity industry to develop and apply a North American Energy Resilience Model (NAERM), which will gauge the resilience of a region's grid against natural threats (hurricanes, floods, wildfires, etc.) and man-made threats (e.g., cyber or physical attacks), or some combination of them, and will help the industry and its regulators to focus grid investments where they will be most beneficial. These calculations must take into account the likely benefits from improving the economic efficiency of the grid under normal operating conditions and from ensuring that defense critical electric infrastructure will remain functional even under extreme stress.

In addition, it is important to note that new technologies are enabling improvements in the functional performance of existing transmission facilities. The Office of Electricity's Transformer Resilience and Advanced Components (TRAC) program supports research and development in next-generation grid hardware that makes it more cost-effective to upgrade transmission for

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increased access, utilization, and resilience. Innovative technologies such as dynamic line rating (DLR) may provide congestion relief in the near term at lower cost than adding new lines. DLR systems are one of many options for addressing grid congestion; other solutions such as power-flow controllers, energy storage, distributed energy resources, and demand response also play key roles in modernizing the grid. An additional benefit of implementing DLR and associated sensors is increased situational awareness of the transmission system and the potential for condition-based monitoring of transmission lines, which can help reduce the risk of events that could lead to wildfires.

The Department of Energy regards energy storage as a technology of national interest and the backbone of a future resilient energy system. Bi-directional, grid-scale energy storage will play a critical role in the deployment of renewable energy while also providing resilience to the Nation's grid for critical infrastructure. An Office of Electricity initiative called the Grid Storage Launchpad (GSL), proposed to be funded in FY 2020, will validate new storage chemistry innovations at earlier maturity stages, thus reducing the time and expense of making them commercially available. Through collaboration with universities and the commercial sector, the GSL will augment the industry with enhanced testing protocols and characterization capabilities. Finally, the GSL will accelerate and de-risk new technologies by propagating rigorous grid performance requirements to all stages of storage development, from benchtop to systems.

- Q6. The American wind industry continues to expand, driving economic growth and increased energy security, especially in rural areas. Currently, we know how to recycle or reuse about 90% of a typical wind turbine; however, there is a gap in technology for recycling the fiberglass used in the turbine blades. What work is DOE doing to address recycling of turbine blades so they aren't sent to landfills?
- A6. Wind turbine blades commonly use thermoset materials such as glass fiber polymer composites, which are difficult to recycle. DOE, including EERE's Advanced Manufacturing Office, worked with the National Renewable Energy Laboratory (NREL) to increase recyclability by using a new composite of reactive thermoplastics that are recyclable and are also less expensive to manufacture. Blade manufacturing would be markedly improved if thermoplastic resins could be proven viable for blades, allowing secondary welding of the composite structural elements,

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damage repairs, and perhaps most importantly, recyclability at the end of life. NREL is working with an industry partner to validate this new technology.

In order to address the existing fleet of glass fiber composite blades, DOE is working with Carbon Rivers LLC through the Small Business Innovation Research Program to develop a novel pyrolysis process to reclaim glass fiber without damaging its mechanical properties. This process yields second-generation materials that are of interest to the automotive, consumer products, marine, and aerospace industries.

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QUESTIONS FROM SENATOR CATHERINE CORTEZ MASTO

Q1. During Wednesday's legislative hearing, you noted the lack of staff currently employed within the Department of Energy's new Office of Cybersecurity, Energy Security, and Emergency Response. What obstacles have the new office faced as it works to find and retain technically qualified specialists to support the Office's mission? How might Congress help support the Office as it works to overcome these obstacles?

A1. In 2018, the Department of Energy (DOE) stood up the Office of Cybersecurity, Energy Security, and Emergency Response (CESER). CESER's mission is to lead DOE's emergency preparedness efforts and coordinated response to disruptions to the energy sector, including physical and cyber-attacks, natural disasters, and man-made events. The identifying and hiring of highly qualified cyber professionals has been, and remains to be, a priority for the newly established office.

There is currently steep competition with the private sector for top talent with cyber and technical knowledge and experience. As such, CESER's ongoing efforts to hire highly qualified cyber professionals are varied and substantial. CESER is working in coordination with the Office of Management and Budget (OMB), the Office of Personnel Management (OPM) and the Federal Chief Information Officer (CIO) Council, to fully leverage current hiring authorities under the Cybersecurity Enhancement Act of 2014. The Office is also working to identify and hire highly qualified cyber professionals by using cyber competition announcements as preliminary job announcements, and using competition scores to identify highly qualified cyber professionals for potential placement and retention into the Federal Government.

Q2. Current interconnection issues facing geothermal power differ greatly from those affecting wind power or other renewable technologies. Accessing regional markets via new transmission largely depends on the ability to aggregate several geothermal plants in the same area, or on aggregating geothermal with other complementary generating technologies, in renewable energy zones. Based on your expertise, what is the best way to accelerate transmission upgrades across the country? And what is the best way for DOE to contribute?

A2. In recent years, the Department of Energy (DOE) has not done independent assessments of the need in economic terms for additional transmission capacity. The regional transmission organizations (RTOs), independent system operators (ISOs), or regional groups of utilities (where RTOs or ISOs have not been established) do systematic transmission planning for their respective

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areas, under processes established by the Federal Energy Regulatory Commission (FERC) in its Orders 890 and 1000. As an aid to this planning process, DOE has supported the development of an energy zone mapping tool (EZ Mapper), which enables users to quickly assess the suitability of alternative routes for transmission lines (and other linear facilities) across user-selected land areas.

DOE is also working with its National Laboratories and the electricity industry to develop and apply a North American Energy Resilience Model (NAERM), which will gauge the resilience of a region's grid against natural threats (hurricanes, floods, wildfires, etc.) and man-made threats (e.g., cyber or physical attacks), or some combination of them, and will help the industry and its regulators to focus grid investments where they will be most beneficial. These calculations must take into account the likely benefits from improving the economic efficiency of the grid under normal operating conditions and from ensuring that defense critical electric infrastructure will remain functional even under extreme stress.

In addition, it is important to note that new technologies are enabling improvements in the functional performance of existing transmission facilities. The Office of Electricity's Transformer Resilience and Advanced Components (TRAC) program supports research and development in next-generation grid hardware that makes it more cost-effective to upgrade transmission for increased access, utilization, and resilience. Innovative technologies such as dynamic line rating (DLR) may provide congestion relief in the near term at lower cost than adding new lines. DLR systems are one of many options for addressing grid congestion; other solutions such as power-flow controllers, energy storage, distributed energy resources, and demand response also play key roles in modernizing the grid. An additional benefit of implementing DLR and associated sensors is increased situational awareness of the transmission system and the potential for condition-based monitoring of transmission lines, which can help reduce the risk of events that could lead to wildfires.

The Department of Energy regards energy storage as a technology of national interest and the backbone of a future resilient energy system. Bi-directional, grid-scale energy storage will play a critical role in the deployment of renewable energy while also providing resilience to the Nation's

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grid for critical infrastructure. An Office of Electricity initiative called the Grid Storage Launchpad (GSL), proposed to be funded in FY 2020, will validate new storage chemistry innovations at earlier maturity stages, thus reducing the time and expense of making them commercially available. Through collaboration with universities and the commercial sector, the GSL will augment the industry with enhanced testing protocols and characterization capabilities. Finally, the GSL will accelerate and de-risk new technologies by propagating rigorous grid performance requirements to all stages of storage development, from benchtop to systems.

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QUESTIONS FROM SENATOR JOHN HOEVEN

- Q1. Ranking Member Manchin and I introduced the All-the-Above Federal Building Energy Conservation Act, which would repeal the ban of fossil fuels used to heat federal buildings under section 433 of the Energy Independence and Security Act of 2007. This would give the ability to the federal government – which owns and operates thousands of energy-intensive buildings across the country – to continue to follow a true, all-of-the-above energy policy that reduces costs and improves efficiency and its overall environmental footprint. Combined heat and power (CHP) technologies could be one way to improve energy efficiency in federal buildings and elsewhere.

Does the Energy Department agree that the current 433 policy is overreaching and could have negative consequences? Does the Energy Department believe that innovative technologies which use fossil fuels – including combined heat and power (CHP) – have a role to play in meeting federal building energy targets? Would you agree that the best path forward to reduce energy consumption in our federal buildings – as well as commercial and privately owned buildings – is to encourage the commercial viability and adoption of both innovative and existing technologies?

- A1. The current 433 policy precludes the use of numerous technologies, including CHP, that improve the energy efficiency of federal buildings. Precluding these technologies from implementation could have negative consequences for federal energy efficiency. The U.S. Department of Energy (DOE) believes that innovative technologies that use fossil fuels – including combined heat and power (CHP) – can have a role to play in meeting Federal building energy efficiency targets. CHP technologies have the ability to improve energy efficiencies and reduce the energy generation requirements to serve federal buildings. CHP systems are typically onsite generation resources that produce both heat and power concurrently to improve efficiencies. Traditionally, federal buildings may purchase power from a generation facility tied to the grid and use a separate source of fuel to provide hot water and/or space heating. This separate generation and delivery of these resources can be inefficient. The use of a CHP system to provide both heat and electrical power from a single source of fuel (typically fossil fuel, but also potential renewable fuel sources such as biomass and geothermal) can reduce overall energy usage and thus provide energy cost savings to a building as well, improving efficiencies. CHP is particularly effective in buildings (or bases or campuses) where there is a year-round need for hot water in addition to electricity, such as facilities with large hot water needs like laundries, barracks, and housing. The DOE has long maintained a programmatic interest in CHP as illustrated by its existing CHP website<sup>2</sup>. DOE's

<sup>2</sup> <https://www.energy.gov/eere/amo/combined-heat-and-power-chp>

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current focus on CHP is how CHP can support the Nation's electric grid. DOE also has programs focused on the innovative use of natural gas in fuel cells<sup>3</sup>.

- Q2. As a member of the Senate Appropriations Committee, I have advocated for the hiring of veterans especially in areas of critical need.

For example, last week, the Senate passed its fiscal year 2020 transportation funding bill. Working with Senator Baldwin, we were able to include in the bill, provisions of our American Aviator Act, which will help expand commercial pilot training opportunities for veterans. This is good for our country and good for our veterans.

Can you briefly discuss how the skills that our veterans learned in the military fit well for good jobs in the energy space? What are some veteran hiring initiatives currently underway at DOE? Do you think there are good opportunities for veterans to be hired in new energy fields such as the deployment of Carbon Capture Utilization and Storage (CCUS) technologies?

- A2. Those who serve in our Armed Forces don't stop serving when they leave military service – they find new and meaningful ways to give. I'm proud of the fact that veterans make up some 36 percent of the Department's workforce, positioning us as a leader among similarly sized agencies.

At DOE we need to recruit individuals with a unique combination of character and skills to serve at our National Labs. Our veterans have a combination of leadership, experience, discipline, and sheer grit, as well as highly developed technical skills. This is precisely why the Department is making it our mission to recruit and train more of these dedicated Americans. In September, Secretary Perry announced that the Department is planning to expand the VETS2TECH program. This vital initiative provides veterans and active duty members clear educational and developmental pathways to careers in our world-class National Laboratories.

What's more, the sensitive nature and often highly technical mission and workforce needs of the Department translate, at least in part, to the needs of energy related companies across the industry. Veterans account for approximately 10 percent of workers across energy sectors, higher than the national average of six percent. There are several key factors which may contribute to these positive trends, to include prior experience in cybersecurity, computer science, project

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<sup>3</sup> <https://www.energy.gov/eere/fuelcells/fuel-cells>

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management, engineering, and other applied and cross-functional disciplines, as well as proven readiness, leadership, teambuilding and teamwork experience, demonstrated problem-solving and decision-making skills, and diversity and cross-cultural experience. The aforementioned factors provide valuable insight into the adaptability capabilities of prior service members and the opportunity for reskilled or upskilled efficiently in support of efforts to build, maintain, and protect major energy infrastructure. There is high-demand for skilled workers across energy sectors; especially workers with knowledge of safety protocols, logistics, and technology deployment, teamwork and leadership experience, and those accustomed to project-driven (mission-oriented) assignments. These skills are often found in those who have served in the U.S. Armed Forces.

- Q3. Whether it is the Office of Fossil Energy, ARPA-E, or the Office of Energy Efficiency and Renewable Energy, it's important that the full technology pipeline be a priority for the Energy Department. Instead of focusing exclusively on basic research – as important as it is – the Energy Department must also assist in bringing those promising technologies to the next level. Both pilot- and demonstration-level fossil fuel research are vital so that what is developed in the lab can become commercially viable.
- Q3a. Can you speak to the importance of both pilot and demonstration level research in terms of the commercial viability of innovative technologies such as carbon capture, utilization, and storage?
- A3a. In the research continuum, advancing from the bench-scale to a pilot scale will aid in reducing risks for further scale up to demonstration and ultimately commercial operations of a technology. The pilot scale research is important to learn about a new technology and process, and the data gathered will inform the design of full-scale production. Demonstration proves out the technology and is required for operation over an extended period to prove operational stability and potential optimization of a system, including opportunities for further cost reductions in the next plant built. Additionally, as a technology development scales up, the degree of system integration usually also increases. Early research is performed on an individual component; a pilot scale will integrate multiple components to work together, and a demonstration is fully integrated at scale for the technology.

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In innovative technologies such as carbon capture, utilization, and storage, the ability to advance to a pilot scale operation is key to gathering enough information to determine if it is technological and economically feasible, as well as identify further areas of research for potential reductions in cost and technical obstacles. By advancing toward commercial demonstration, the risk and uncertainty along with cost of the technology should decrease, and the commercial viability of the technology should increase.

DOE looks to advance many of the technologies being researched up through large-scale pilots to reduce the risks associated with innovative technologies. For a demonstration plant, DOE looks toward industry to take the technology developed and advanced by DOE up through the pilot-scale to further its pull into the marketplace at an appropriate time.



Dear Senator,

The first installment of the Quadrennial Energy Review (QER), released in 2015, recommended producing a report “to reform existing data collection systems to provide consistent and complete definitions and quantification of energy jobs across all sectors of the economy.” Thus the U.S. Department of Energy (DOE) compiled and published the U.S. Energy and Employment Report (USEER) starting in 2016 and continuing in 2017.

The 2016 and 2017 editions of the USEER addressed several gaps in energy employment data as collected at the time by the Bureau of Labor Statistics (BLS) for business activities essential to the operation of traditional energy companies and utilities, including coal, natural gas and nuclear. The 2016 and 2017 versions of the USEER also was able to more accurately account for jobs associated with the installation and generation of renewable energy technologies – like wind, solar and geothermal power, while also accurately counting those in various professions tied to energy efficiency. These reports were essential to states and communities alike, helping to outline opportunities and shortfalls in community training programs and public education generally, as well as policies which might aid in the appropriate deployment of energy resources. The reports are also a valuable tool for businesses, since they contain data on hiring practices and anticipated growth in years ahead.

Unfortunately, DOE elected to not undertake a similar report after the 2017 edition of the USEER. Instead, the 2018 and 2019 editions have been organized and implemented by the Energy Futures Initiative (EFI) and the National Association of State Energy Officials (NASEO) – and many partner organizations representing a wide swath of state energy organizations and energy associations, some of whom are outlined above. These reports were expanded in 2019 to include grid energy storage, crosscutting analyses of the nuclear,

natural gas, and petroleum industries, greater detail on energy infrastructure jobs, and a first-ever wage survey. The reports were published using the identical survey instrument developed by the DOE and approved by the Office of Management and Budget (OMB Control No. 1910-5179) for the 2017 USEER to provide continuity with the previous editions of the USEER in data collection and accuracy in year-to-year comparisons. The USEER report is an excellent example of a balanced employment report with an unbiased “all of the above” data collection methodology.

Though the 2018 and 2019 reports are consistent with the professional and detailed editions first published by DOE – with several helpful new additional categories and questions – it is our strong belief that the collection of data and publishing of this report is best undertaken by the Department of Energy. DOE has the resources and expertise across the spectrum of the nation’s energy system. More importantly, DOE can provide an open platform to share energy employment data with the broader public and create a forum for addressing workforce development needs at the national and regional level. We encourage you to support legislation that accomplishes this end.

Sincerely,

Advanced Energy Economy  
 Alliance to Save Energy  
 American Wind Energy Association  
 American Council on Renewable Energy  
 Building Performance Association  
 Business Council for Sustainable Energy  
 Clean Energy Trust  
 Copper Development Association  
 E2 (Environmental Entrepreneurs)  
 E4TheFuture  
 Energy Storage Association  
 Environmental and Energy Study Institute  
 National Association Energy Service Companies  
 National Association State Energy Officials  
 Nuclear Energy Institute



November 6, 2019

The Honorable Lisa Murkowski  
522 Hart Senate Office Building  
Washington, DC 20510

The Honorable Bill Cassidy  
520 Hart Senate Office Building  
Washington, DC 20510

The Honorable Joe Manchin  
306 Hart Senate Office Building  
Washington, DC 20510

The Honorable Martin Heinrich  
303 Hart Senate Office Building  
Washington, DC 20510

Dear Chairman Murkowski, Ranking Member Manchin, Chairman Cassidy and Ranking Member Heinrich,

We are delighted by the bipartisan leadership of Senators King and Collins in introducing the **CHP Support Act** (S. 2425) to authorize Combined Heat and Power (CHP) Technical Assistance Partnerships (TAPs). We are writing to you on behalf of the Alliance to Save Energy (ASE), American Chemistry Council (ACC), the American Council for an Energy-Efficient Economy (ACEEE), and the Combined Heat and Power Alliance to thank the Subcommittee on Energy for holding a hearing on this important, timely, and non-controversial legislation providing continued authorization of the CHP TAPs and related support activities at the U.S. Department of Energy (DOE).

The CHP TAPs and related activities at DOE encourage the use of technologies that reduce energy use, save consumers money, increase economic competitiveness, enhance electric reliability, and reduce emissions at the nation's hospitals, universities, and manufacturing sites. We urge members of the Senate Energy and Natural Resources Committee to further these important national priorities by advancing this bill to the Senate floor.

The TAPs and supporting activities at DOE have long received bipartisan support and continued funding since 2001. Unfortunately, the underlying authorization for this program was inadvertently allowed to expire in 2012. The CHP Support Act reauthorizes the program for five years, at \$12,000,000 for each fiscal year to ensure its continued operation and effectiveness in the years ahead. This is consistent with current levels of funding for these activities.

Since their inception, the CHP TAPs have educated potential end users and the public about the benefits of CHP and waste heat to power (WHP), encouraging greater use of these economically and environmentally beneficial technologies. This national network identifies markets for CHP and WHP, offers education and outreach about CHP and WHP potential, and

provides technical assistance to end users to help determine if these technologies are a good fit for their facilities.

DOE has identified 149 gigawatts of remaining technical potential for CHP in the United States – the energy equivalent of nearly 300 large conventional power plants. The CHP TAPs and the complementary activities at DOE are helping realize this tremendous potential, enhancing manufacturing competitiveness and encouraging job creation in the design, construction, installation, and maintenance of CHP and WHP equipment.

The Alliance to Save Energy, American Chemistry Council, ACEEE, and Combined Heat and Power Alliance respectfully request the Senate Energy and Natural Resources Committee continue supporting the CHP TAPs and favorably report the CHP Support Act to the Senate floor.

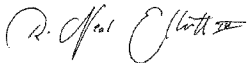
Sincerely,



Ben Evans  
Vice President  
Alliance to Save Energy



Owen Kean  
Senior Director, Regulatory and Technical Affairs  
American Chemistry Council (ACC)



R. Neal Elliott, Ph.D., P.E.  
Senior Director for Research  
American Council for an Energy-Efficient Economy (ACEEE)



David Gardiner  
Executive Director  
Combined Heat and Power Alliance



External Affairs & Communications  
 Anthony Pitagno  
 Director

November 6, 2019

The Honorable Lisa Murkowski  
 Chair  
 Senate Committee on Energy &  
 Natural Resources  
 304 Dirksen Senate Building  
 Washington, D.C. 20510

The Honorable Joseph Manchin  
 Ranking Member  
 Senate Committee on Energy &  
 Natural Resources  
 304 Dirksen Senate Building  
 Washington, D.C. 20510

Dear Chairwoman Murkowski and Senator Manchin:

On behalf of the American Chemical Society (ACS), I am writing to endorse S. 2714, the ARPA-E Reauthorization Act of 2019, S. 2660, the Wind Energy Research and Development Act of 2019, and S. 2668, the Solar Energy Research and Development Act of 2019. ACS represents over 150,000 chemists and chemical engineers and was chartered by Congress in 1937 to provide policymakers with advice on issues of importance to the nation and scientific community.

Energy production and use have significant implications for our environment, economy, and national security and is a critical and complex policy issue. Federal, state, and local governmental actions help shape U.S. energy production, distribution, and consumption. The ACS acknowledges that currently, no single energy technology is simultaneously reliable, affordable, clean, and secure for all people in the United States. Addressing our long-term energy needs in a sustainable, climate-friendly manner will require a host of new technological innovations; ACS believes S. 2714, S. 2660, and S. 2668 are essential to meeting these needs.

ACS also believes it is vital to take into account the full lifetime costs for new technologies and ensure that research to mitigate waste from manufacturing and disposal accompanies new technology deployment. In order to reduce the life cycle costs of new energy technologies, we strongly endorse the provisions of S. 2668 calling for the incorporation of sustainable chemistry principles as research and development of solar energy technology continues.

The Advanced Research Projects Agency-Energy (ARPA-E) is a critical component of our energy research and development infrastructure. By pursuing high risk, high reward technologies, ARPA-E will ensure cutting-edge innovations reach the marketplace. S. 2714 robustly supports ARPA-E to guarantee its long-term viability and success.

Please accept my thanks for your hard work on behalf of ARPA-E, wind, and solar energy research. I look forward to working with you to pass this important legislation. Should you have any questions, please do not hesitate to contact me, or Carl Maxwell ([c\\_maxwell@acs.org](mailto:c_maxwell@acs.org)).

Sincerely,

*Anthony Pitagno*

Anthony Pitagno

CC:

The Honorable Tina Smith

The Honorable Kyrsten Sinema

The Honorable Christopher Van Hollen



Thomas C. Kiernan  
CEO  
202.383.2557  
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[www.awea.org](http://www.awea.org)

November 8, 2019

The Honorable Lisa Murkowski  
Chair  
Senate Committee on Energy and Natural  
Resources  
304 Dirksen Senate Office Building  
Washington, DC 20510

The Honorable Joe Manchin  
Ranking Member  
Senate Committee on Energy and Natural  
Resources  
304 Dirksen House Office Building  
Washington, DC 20510

Chair Murkowski and Ranking Member Manchin,

On behalf of its members, the American Wind Energy Association (AWEA) submits this letter pertaining to the November 6<sup>th</sup> Energy and Natural Resources Subcommittee on Energy legislative hearing. AWEA is a national trade association comprised of over 1,000 member companies representing a broad range of entities with a common interest in encouraging the expansion and facilitation of wind energy resources in the United States. AWEA members include wind turbine manufacturers, component suppliers, project developers, project owners and operators, financiers, researchers, renewable energy supporters, utilities, marketers, customers, and their advocates.

AWEA would like to express support for the following three bills the Committee considered at the November 6<sup>th</sup> hearing:

S. 2660, the "Wind Energy Research and Development Act of 2019:"

Introduced by Senators Smith (D-MN) and Collins (R-ME), this legislation would authorize the Department of Energy Wind Energy Technologies Office (WETO) for 5-years, providing policy direction to WETO to carry out research to improve wind project performance and operations, test new materials and wind component designs, address obstacles that inhibit turbine transportation, and mitigate market barriers and wildlife impacts.

As with other energy technology programs within DOE, the DOE WETO brings unique assets to the R&D space, including datasets, modeling and supercomputing capabilities. DOE's investments and capabilities have enabled higher risk, higher reward research projects and analysis that individual companies cannot carry out on their own, facilitated industry collaboration to resolve tough technical challenges, and provided third-party research results that are more credible to federal, state and local regulators, which can reduce permitting red tape.

Spurred in part by WETO, U.S. wind deployment has more than tripled over the last decade. Today wind is the largest source of renewable generating capacity in the country. The R&D, innovation and collaboration undertaken by the Wind Energy Technologies Office has helped increase output, improve reliability, and reduce costs, all of which benefits consumers. However, continued progress in all these areas will be critical for the U.S. to attain global leadership in wind energy and maximize benefits for the U.S. economy and electricity consumers.



Thomas C. Kiernan  
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[www.awea.org](http://www.awea.org)

S. 876, the “Energy Jobs for our Heroes Act of 2019.”

Introduced by Senator Duckworth (D-IL), this legislation would direct the Department of Energy to create a program that would prepare veterans for careers in the clean energy economy. The “Energy-Ready Vets Program” would offer standardized training courses, internship opportunities, and industry certification/credentialing to prepare veterans for careers in the solar, wind, and cybersecurity sectors, as well as in positions involving low-carbon emissions.

Veterans’ unique skillsets make them particularly qualified for wind energy industry jobs that require operating machinery and heavy equipment, persevering through various weather conditions in remote areas, and thriving in demanding and often unpredictable situations. Accordingly, the wind industry hires veterans at a rate 67% higher than the national average. Providing veterans with job training opportunities, as S. 876 seeks to accelerate, facilitates their transition from military to civilian life while also benefiting wind project owners and operators, who can capitalize on the qualities that make veterans especially equipped for positions in the wind energy economy.

S. 2508, the “Promoting American Energy Jobs Act of 2019”

Introduced by Senators Shaheen (D-NH) and McCally (R-AZ), this legislation would task the Department of Energy with collecting and analyzing energy job data across all energy sectors, including clean technology, like wind energy. Understanding the scope and demographics of the wind sector, as well as the workforce development needs, is critical to continue to grow the 114,000 U.S. wind jobs. AWEA believes DOE is best equipped to lead this effort.

Thank you again for your consideration of AWEA’s position. Please reach out to Maggie Lemmerman ([mlemmerman@awea.org](mailto:mlemmerman@awea.org) or 202-552-8103) if you have any questions or would like to have further discussion on these issues.

Best Regards,

Thomas C. Kiernan



October 22, 2019

Senator Lisa Murkowski  
Senator Joe Manchin  
Senate Energy and Natural Resources Committee  
304 Dirksen Senate Building  
Washington, DC 20510

Dear Chairman Murkowski and Ranking Member Manchin:

On behalf of ClearPath Action, a 501(c)4 organization working to accelerate policies for clean energy innovation, I am writing to support the *Advanced Geothermal Innovation Leadership Act of 2019* or *AGILE*. This legislation would support innovation for advanced geothermal research and development. Specifically, the legislation will:

- Increase collaboration between relevant DOE Offices and the private sector through knowledge and technique sharing with the oil and gas industry;
- Encourages new research opportunities and areas to demonstrate geothermal capabilities;
- Ensures the continued operation and expansion of field research sites and;
- Helps streamline and reduce unnecessary barriers through coordinated federal permitting.

Geothermal energy is a flexible and reliable clean energy resource with immense untapped potential. A recent Department of Energy report indicated there is enough geothermal resources in the United States to produce electricity for half of the country. Advanced techniques are capable of tapping into additional resources in cooler rock or regions without water. These techniques will allow us to tap into resources originally thought to be impossible - nearly everywhere in the US.

The *AGILE Act* has the potential to play a crucial role in a clean energy economy. The expansion of baseload clean and zero emissions energy resources will be necessary to help reduce global carbon emissions. Geothermal resources will greatly benefit through the *AGILE Act*, through robust research and development across the entire economy, ranging from industrial applications to new enhanced geothermal electric power resources.

Thank you for your continued leadership to advance American clean energy and we stand ready to help pass this important legislation this Congress.

Sincerely,

A handwritten signature in black ink, appearing to read "Rich Powell".

Rich Powell  
Executive Director, ClearPath Action



23 October 2019

The Honorable Lisa Murkowski  
Chairman,  
U.S. Senate Committee on Energy  
and Natural Resources  
304 Dirksen Senate Building  
Washington, DC 20510

The Honorable Joe Manchin  
Ranking Member,  
U.S. Senate Committee on Energy  
and Natural Resources  
304 Dirksen Senate Building  
Washington, DC 20510

RE: Advanced Geothermal Innovation Leadership Act of 2019 ("AGILE Act")

Dear Chairman Murkowski and Senator Manchin:

Cyrq Energy is the fourth largest geothermal energy provider in the United States and an active member in the Geothermal Resources Council (GRC). Cyrq is pleased to join the GRC in its support of the AGILE Act. The team at Cyrq is 100% convinced that it is within the nation's best interest to promote and invest in innovation to advance the state of art in geothermal energy; technology improvement and development are particularly critical in the areas of:

- Integration of geothermal energy with energy storage and grid resiliency technologies.
- Enhanced geothermal systems (EGS) that allow access to previously untappable resources.
- High temperature and supercritical geothermal systems.

With the adoption of more renewables and higher state-level RPS requirements, the need for baseload renewable generation that is always available will only increase. The AGILE Act will help commercialize technologies that will make geothermal energy more cost effective, more productive, more efficient, and less location dependent.

Encouraging geothermal development east of the Mississippi is also a crucial step forward for the geothermal industry. There is a tremendous potential for geothermal development on the East Coast and in Eastern Texas that these new technologies will help realize.

Cyrq graciously acknowledges that each of these key areas of innovation amongst others are addressed in the Act. We therefore stand in strong support of this bill and we are happy to make our team available to help answer questions that may arise during its consideration. We thank you again for putting this measure forward and strongly encourage Congress and the President to sign it into law.

Sincerely,

Cyrq Energy, Inc.

By:   
Susan Petty  
Chief Technology Officer

**Testimony of the Electric Power Supply Association  
Regarding S. 2556  
Protecting Resources On The Electric grid with Cybersecurity Technology Act of 2019  
Senate Energy and Natural Resources Committee  
November 6, 2019**

The Electric Power Supply Association (EPSA)<sup>1</sup> and its members thank you for addressing the critical issue of ensuring the cybersecurity of the nation's electric grid. Cybersecurity is a top priority for EPSA and its members, and we appreciate the opportunity to contribute to this, and any other, initiative that strengthens the electric grid against cyber threats. Cyber (and physical) security are essential to electricity generation operations and represent a clear and extensive commitment by EPSA members, competitive power suppliers, to the delivery of safe and reliable power to customers across the U.S. The electric power supply sector recognizes that its operations are the targets of increasingly sophisticated cyberattacks executed by a variety of attackers including nation-states and organized international criminals and is taking broad-based action to confront and prevent known and emerging threats.<sup>2</sup>

The Protecting Resources On The Electric grid with Cybersecurity Technology Act of 2019 (PROTECT Act of 2019) is an important step forward in ensuring the nation's electric grid remains protected and reliable in light of an ever-increasing threat of cyber-attacks. The PROTECT Act of 2019 amends the Federal Power Act by adding new section 219A. The immediately preceding section, section 219, is focused on transmission infrastructure investment.

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<sup>1</sup> Launched over 20 years ago, EPSA is the national trade association representing leading competitive power suppliers and marketers. EPSA members provide reliable and competitively priced electricity from environmentally responsible facilities using a diverse mix of fuels and technologies. Power supplied on a competitive basis collectively accounts for 40 percent of the U.S. installed generating capacity. EPSA seeks to bring the benefits of competition to all power customers. This testimony represents the position of EPSA as an organization, but not necessarily the views of any particular member with respect to any issue.

<sup>2</sup> Cybersecurity in the Electric Power Supply Sector, Electric Power Supply Association, available at: <https://epsa.org/wp-content/uploads/2019/09/EPSA-Cybersecurity-in-the-Electric-Power-Supply-Sector.pdf>

The Committee should be careful not to, either implicitly or explicitly, limit the PROTECT Act of 2019 to transmission investments or investments made only by public utilities that own transmission.

Electric generators are not transmission assets. However, electric generation is an integral component of the electric grid and requires significant expenditures to ensure protection against cybersecurity attacks and vulnerabilities. To date, EPSA members have made significant investments to ensure the cyber and physical security of their generation assets. Further, competitive power suppliers that own and operate generation assets in competitive wholesale power markets are public utilities as defined in the Federal Power Act.<sup>3</sup> Therefore, investments made by competitive power suppliers in generation assets should be eligible for the type of cost recovery contemplated by the PROTECT Act of 2019. The PROTECT Act of 2019 should compensate competitive power suppliers for their investments no differently than regulated electric utilities.

Whereas regulated electric utilities receive guaranteed cost recovery from captive customers, competitive power suppliers are compensated entirely from the wholesale electricity markets, a fundamentally different approach. In most cases, competitive power suppliers must recover their costs through market-based payments, not single-issue rate filings before the Federal Energy Regulatory Commission (FERC) or a state public utility commission. However, competitive power suppliers routinely file via section 205 single-issue rate filings to receive compensation for providing reactive power to the grid. The Committee should allow competitive power suppliers to submit single-issue filings before FERC to receive cost recovery for investments made in advanced cybersecurity technologies or advanced cybersecurity technology

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<sup>3</sup> 16 U.S.C. § 824(e)

information. Such a mechanism will place competitive power suppliers on equal footing with traditionally regulated electric utilities for purposes of being compensated for investments that enhance the cybersecurity of the electric grid.

As an alternative to single-issue rate filings, performance-based ratemaking allows public utilities to profit from investments that enhance the protection of the electric grid against cybersecurity attacks as opposed to earning cost recovery for capital spent on advanced cyber security technologies. In general, performance-based ratemaking will encourage more effective investments by public utilities at a more reasonable cost to consumers. Since competitive power suppliers are not guaranteed a rate of return like regulated electric utilities, there is no mechanism to “tack on” an incentive like the one contemplated in the PROTECT Act of 2019. Any performance-based mechanism must also allow competitive power suppliers to receive compensation from their investments.

Finally, we encourage the Committee to ensure the PROTECT Act of 2019 does not allow for public utilities to “double dip” by earning returns through both incentive-based rate treatment and single-issue filings. A regulated electric utility could potentially receive two forms cost recovery and return from the same investment; one from the performance-based mechanism contemplated in the PROTECT Act of 2019, and one through a single-issue rate filing.

EPSA appreciates the attention given by the Committee to this critical issue and we look forward to working with the Committee going forward. This concludes our written testimony.



October 22, 2019

Senator Lisa Murkowski  
Chairman  
522 Hart Senate Office Building  
Washington, DC, 20510

Senator Joe Manchin  
Ranking Member  
306 Hart Senate Office Building  
Washington, DC, 20510

Dear Chairman Murkowski and Ranking Member Manchin,

On behalf of Fervo Energy, an advanced geothermal technology company, I am writing to support the *Advanced Geothermal Innovation Leadership Act (AGILE Act)*. The act implements vital policy updates that will guarantee the US' continued leadership in geothermal technology. As a private sector developer, Fervo focuses on development of novel technology to increase the potential of geothermal and can appreciate the importance of public-private partnership to drive new innovation.

The US leads the world in geothermal generation, but has recently lagged the international community in growth. In 2018, the US installed just 48 new MW of geothermal, versus 294 MW in Turkey and 139 MW in Indonesia. Federal support for geothermal in the most recent year totaled \$86 million, just 4% of support for solar (\$2,231 million) and 3% that of biofuels (\$2,813 million).

The AGILE Act will take several key steps that will help private-sector companies like Fervo continue to support American leadership in the field of advanced geothermal technology, including:

- Updates the Geothermal Resource Assessment by the USGS, which will facilitate identification of attractive new prospects by the private sector.
- Facilitates the transfer of technology from the oil and gas sector to the geothermal sector.
- Increases resources for promising initiatives such as strategic mineral coproduction.
- Provides support for the Frontier Observatory for Research in Geothermal Energy (FORGE), the most important geothermal test bed ever developed, including the selection of a second site, which will greatly increase the efficacy of FORGE.
- Enables the creation of four demonstration sites in diverse geologies, including one in the eastern US, to ensure that the learnings from FORGE are rapidly transferred to the private sector and deployed at sites with potential for commercial viability.
- Increases appropriated funds for geothermal development to \$150,000,000 to better reflect geothermal's growing importance in America's new energy economy.

Continued American leadership in geothermal power means energy security, improved readiness for climate change and the energy transition, and developing a valuable, exportable American technology. The AGILE Act is a crucial step to maintaining that tradition of American leadership.

Sincerely

Tim Latimer  
Co-Founder and CEO, Fervo Energy



## Geothermal Exchange Organization

312 South 4<sup>th</sup> Street • Springfield, IL 62701

*Douglas A. Dougherty* • President and Chief Executive Officer

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November 6, 2019

The Honorable Lisa Murkowski  
Chairwoman  
Senate Energy and Natural Resources  
Committee  
304 Dirksen Senate Office Building  
Washington DC, 20510

The Honorable Joe Manchin  
Ranking Member  
Senate Energy and Natural Resources  
Committee  
304 Dirksen Senate Office Building  
Washington, DC 20510

Dear Chairwoman Murkowski and Ranking Member Manchin:

I am writing on behalf of the Geothermal Exchange Organization (GEO) to express our strong support for your legislation, S. 2657, the Advanced Geothermal Innovation Leadership (AGILE) Act. This important bill would modify the federal definition of "renewable energy" to include thermal energy.

The current federal definition of "renewable energy" excludes thermal energy sources like geothermal heat pumps (GHPs) because they do not generate electricity in a traditional sense. However, GHPs use the ground as a source of renewable energy by harnessing the constant temperature of the earth as heated by the sun. GHPs can reduce energy consumption by as much as 70 percent in a typical building, yet they are excluded from helping to meet the federal renewable energy purchase requirement. The current federal definition of renewable energy also disadvantages GHPs at the state level, where some states choose to base their own definitions of renewable energy on the federal definition.

As the national trade association for the GHP industry, GEO is appreciative of this support for ensuring GHPs are appropriately recognized by federal law as a renewable energy source. GHPs have the potential to dramatically reduce the residential and building energy consumption that constitutes the bulk of our nation's carbon emissions and monthly energy bills.

Thank you again for your leadership on this issue, and we look forward to working with you to advance S. 2657.

Sincerely,

Douglas Dougherty  
President and CEO  
Geothermal Exchange Organization



Geothermal Resource Group, Inc.  
77530 Enfield Lane, Building E  
Palm Desert, CA 92211  
Phone: 760-341-0186

October 23, 2019

**The Honorable Lisa Murkowski**

Chairman,  
U.S. Senate Committee on ENR  
304 Dirksen Senate Building  
Washington, DC 20510

**The Honorable Joe Manchin**

Ranking Member,  
U.S. Senate Committee on ENR  
304 Dirksen Senate Building  
Washington, DC 20510

Dear Chairman Murkowski and Ranking Member Manchin:

On behalf of the geothermal industry we would like to thank you for introducing the “Advanced Geothermal Innovation Leadership Act of 2019”, otherwise known as the “AGILE Act”.

As the professional association for the geothermal industry and community, the Geothermal Resources Council (GRC), strongly supports the AGILE Act and applauds your leadership in bringing forth the various parts of the act:

- Updating Geothermal Resource Assessments;
- Authorizing a Secondary Use Subprogram focused on direct use, minerals recovery (lithium), desalination, industrial applications, and grid management;
- Authorizing two \$10M prizes in a competition for the demonstration of coproduction of critical minerals;
- Authorizing two publicly operated FORGE sites (Frontier Observatories for Research in Geothermal Energy);
- Authorizing four EGS projects (Enhanced Geothermal Systems) with one east of the Mississippi River;
- Authorizing \$150M to the DOE geothermal program;
- Reauthorization of High-Cost Region Geothermal Energy Grant Program;
- Authorizing the Geothermal Energy Permit Coordination Program which will provide permitting expertise.



The GRC kindly urges the Senate to take up this bill as soon as possible and for the House to follow suit expeditiously. Quick action on this issue is critical to the long-term future of geothermal energy and how we make a significant impact to:

- 1) building jobs and economic benefits in local communities across the nation;
- 2) helping to fight climate change through electrification and decarbonizing our economy; and,
- 3) being a reliable source of energy that gives clean renewable power and heat that's always on.

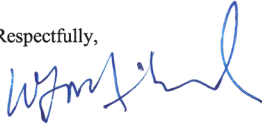
The AGILE Act impacts the whole geothermal energy spectrum across low temperature and high temperature resources. It aims to develop technical innovations through EGS and FORGE research, as well as increase value of geothermal operations through co- production with other critical minerals.

These actions will help build a future where geothermal power and heat can be rolled out across the nation as a critical source of renewable energy for U.S. households and businesses as we transition to a clean energy future. Geothermal energy is affordable and reliable and will play a substantive role in maintaining a functioning electricity grid – due to its position as a flexible, clean, 24/7 resource that can complement other intermittent renewable resources.

The GRC is a non-profit professional association for the geothermal industry and community in the USA and abroad. We were founded in 1972 and are headquartered in Davis, California. We have over 1,300 members from around the world and are working to advance our industry by supporting the development of geothermal energy resources through communication of robust research, knowledge and guidance.

We thank you for your consideration. We are available to answer questions and discuss further at your convenience.

Respectfully,



William M. Rickard  
President  
billrickard@geothermalresourcegroup.com





October 22, 2019

**The Honorable Lisa Murkowski**  
Chairman,  
U.S. Senate Committee on Energy and  
Natural Resources  
304 Dirksen Senate Building  
Washington, DC 20510

**The Honorable Joe Manchin**  
Ranking Member,  
U.S. Senate Committee on Energy and  
Natural Resources  
304 Dirksen Senate Building  
Washington, DC 20510

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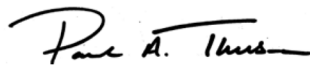
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We thank you for your consideration. We are available to answer questions and discuss further at your convenience.

Respectfully,



Paul Thomsen  
GRC Policy Committee Chair  
pthomsen@ormat.com



Will Pettitt, PhD  
GRC Executive Director  
wpettitt@mygeoenergy.org

**Statement for the Record: Senator Jeanne Shaheen (D-NH)**  
**Senate Committee on Energy & Natural Resources**  
**Subcommittee on Energy Legislative Hearing**  
**116<sup>th</sup> Congress**  
**November 6, 2019**

Chairman Cassidy, Ranking Member Heinrich and Members of the Energy Subcommittee of the Senate Committee on Energy & Natural Resources:

Thank you for the opportunity to submit testimony today before the Energy Subcommittee of the Senate Committee on Energy & Natural Resources.

I am pleased that the Committee has decided to consider my legislation, the Promoting American Energy Jobs Act (S. 2508) during today's legislative hearing. I joined Senator Martha McSally in introducing this legislation, which will improve our understanding of the energy sector's economic contributions by requiring the Department of Energy (DOE) to restart the practice of publishing an annual energy and employment report to quantify energy jobs in the United States and examine energy production and distribution sectors of the economy. In addition to my statement, I would also ask that the Committee include in the record a letter I received from a group of 15 energy organizations, a letter from the U.S. Green Building Council and a letter from the American Wind Energy Association, all in support of our legislation.

In 2015, DOE published the first installment of the Quadrennial Energy Review, which examined how to modernize the nation's energy infrastructure. Among other recommendations, the Review suggested that DOE reform existing data collection systems in order to provide a consistent and comprehensive report quantifying energy jobs in the United States. DOE published the first U.S. Energy and Employment Report (USEER) in 2016 and the second in 2017. These reports examined four sectors of the economy—electric power generation and fuels; transmission; wholesale distribution and storage; energy efficiency; and motor vehicles—which cumulatively account for almost all of the U.S.' energy production and distribution system and nearly 70 percent of U.S. energy consumption.

Despite the critical importance of understanding the economic contributions of our energy sector to make informed policy and business decisions, no USEER has been published by DOE since 2017. Two non-profit organizations in the energy sector are now paying to collect, analyze and publish the data in lieu of the federal government. Though the reports published by these organizations are consistent with the editions first produced by DOE, the collection of data and publishing of the USEER is best administered by the Department. DOE has the resources and expertise across the spectrum of the nation's energy system to ensure continuity of the energy employment reports. Moreover, DOE can provide an open platform to share energy employment data with the broader public and create a forum for addressing workforce development needs at the national and regional level.

As Members of this Subcommittee know, the U.S. energy sector is a major driver of job creation and economic growth. The Promoting American Energy Jobs Act will improve our understanding of the employment makeup of this industry, which is critical to making informed policy and business decisions that will address workforce challenges and assist in the deployment of energy resources.

Again, thank you for the opportunity to submit testimony in support of the Promoting American Energy Jobs Act. I look forward to working with the Committee to advance this bipartisan proposal.

**THIRD WAY**

October 22, 2019

The Honorable Lisa Murkowski  
Chairman, Senate Energy and Natural Resources Committee  
United States Senate  
522 Hart Senate Office Building  
Washington, DC 20510

The Honorable Joe Manchin  
Ranking Member, Senate Energy and Natural Resources Committee  
United States Senate  
306 Hart Senate Office Building  
Washington D.C. 20510

Dear Chairman Murkowski and Ranking Member Manchin,

I would like to express Third Way's support for the Advanced Geothermal Innovation Leadership Act (AGILE) of 2019. This legislation increases the research, development, and deployment of advanced geothermal energy and streamlines permitting processes. Robust funding and direction from Congress will allow the Department of Energy and the private sector the ability to innovate and deploy advanced geothermal at a greater scale and with greater speed.

Geothermal energy is a clean, flexible, and dispatchable technology that has enormous potential to help in the fight against climate change. A study from the Massachusetts Institute of Technology found that firm low carbon resources like geothermal energy can reduce the cost of decarbonizing a power grid by up to 62%. While the development of natural geothermal is constrained, there is a major opportunity to scale up geothermal energy through enhanced geothermal systems that can tap resources across a much larger region of the country.

The AGILE Act recognizes clean energy innovation as a national priority. This legislation provides geothermal energy with the opportunity to play an instrumental role in the United States as we strive to achieve the fastest, fairest path to net-zero emissions by 2050. Third Way appreciates your leadership in securing robust funding for advanced geothermal and strongly supports this legislation.

Sincerely,

Josh Freed  
Senior Vice President for Clean Energy



USGBC  
2101 L STREET, NW  
SUITE 500  
WASHINGTON DC 20037  
202 828-7422  
USGBC.ORG

FOUNDERS  
David Gottfried  
Michael Italiano  
S. Richard Fedrizzi

November 5, 2019

The Honorable Bill Cassidy  
Chairman  
Subcommittee on Energy  
Energy and Natural Resources Committee  
304 Dirksen Senate Building  
Washington, DC 20510

The Honorable Martin Heinrich  
Ranking Member  
Subcommittee on Energy  
Energy and Natural Resources Committee  
304 Dirksen Senate Building  
Washington, DC 20510

Dear Chairman Cassidy and Ranking Member Heinrich:

On behalf of the U.S. Green Building Council (USGBC), a national nonprofit representing nearly 9,000 member companies and organizations committed to cost-effective and high-performing buildings, I write to provide comments for the Subcommittee on Energy Legislative Hearing. We commend the committee for convening this hearing. We believe that the bills being considered today would condition of infrastructure, expand workforce opportunities across the country.

USGBC is dedicated to transforming the way buildings and communities are designed, built and operated, enabling an environmentally and socially responsible, healthy, and prosperous world. Best known for the successful Leadership in Energy & Environmental Design (LEED) green building certification system, we leverage our education, credentials, events, communications, and policy advocacy activities to support the public and private sectors in advancing high-performance, cost-effective buildings that save energy, water and money. Reducing the contribution of buildings to greenhouse gas emissions has been a core area of our work along with a focus on supporting local economic development and job creation.

#### **S. 2508 – Promoting American Energy Jobs Act of 2019:**

USGBC supports the proposed legislation to better understand the economic contribution of energy sector to the U.S. economy. This information can in turn assist policy makers and the private sector in understanding the strengths and gaps that may exist for the American energy workforce.

#### **S. 1890 – Renew America's Schools Act:**

In 2016, the Center for Green Schools at USGBC, the 21st Century School Fund and the National Council on School Facilities released the State of Our Schools report. The report compares historic spending levels to the investment to maintain today's school building inventory and finds a projected gap of \$46 billion the nation must overcome to provide healthy, safe, and adequate school facilities for our children and teachers.<sup>1</sup> We believe

<sup>1</sup> 21st Century Schools Fund Inc., U.S. Green Building Council Inc., and National Council on School Facilities, "State of Our Schools: America's K-12 Facilities" (Washington: 2016), available at <https://kapost-files->



that all levels of government need to urgently help improve the condition of school facilities, including energy use, across the country.

USGBC supports the goals of the bill but believes the legislation can be improved in a number of areas:

- The health and safety enhancements referenced in the bill could be more broadly defined. Improving these outcomes for children and educators is vital and can be integrated into the implementation of an energy project.
- The application should make note of the estimates of maintenance and operations of the equipment being installed. As a matter of best practice, school districts should have a good understanding of equipment maintenance costs.
- We would also suggesting adding criteria for energy audits or having the Secretary of Energy recognize appropriate audit standards. This addition would help safeguard schools from lower quality audits and protect them from potentially poor investments.

**S. 876 – Energy Jobs for Our Heroes Act of 2019:**

As you may know, the [LEED Green Associate](#) and [LEED AP with specialty exams](#) are available for reimbursement by the [U.S. Department of Veterans Affairs](#) (VA). We are proud of this partnership and believe that S. 876 could be an additional means of expanding workforce opportunities in targeted energy markets.

The bill could be improved in a number of areas:

- The renewable energy categories in the bill could include other technologies.
- USGBC supports clarifying that the federal government would not create new education or testing materials in support of this program and would instead utilize industry or private sector certification or accreditation tools.

Thank you for the opportunity to provide this information. Please do not hesitate to contact me if you have any questions or wish to discuss these issues further.

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[prod.s3.amazonaws.com/published/56f02c3d626415b792000008/2016-state-of-our-schools-report.pdf?kui=wo7vkgV0wW0LG5jxek0N5A](https://prod.s3.amazonaws.com/published/56f02c3d626415b792000008/2016-state-of-our-schools-report.pdf?kui=wo7vkgV0wW0LG5jxek0N5A).



Sincerely,

A handwritten signature in black ink, consisting of two stylized, connected 'Z' or '2' shapes.

Bryan Howard  
Legislative Director  
U.S. Green Building Council

