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U.S. Department of Energy

Before the Committee on Energy and Natural Resources

U.S. Senate

July 28, 2022

Introduction

Thank you, Chairman Manchin, Ranking Member Barrasso, and distinguished Members of the Committee. It is an honor for us to appear before you today and represent the Department of Energy (DOE) at this hearing related to the various energy bills under consideration. Our written testimony addresses the Department's view on all the bills under consideration at this hearing. However, this morning we will speak to the legislation under our respective purviews, nuclear energy and energy efficiency and renewable energy, under consideration today by the Committee.

Nuclear Energy

The Administration's climate policy is informed by science, and the science tells us that the time for climate action is now. Nuclear energy is a key element of President Biden's plan to put the United States on a path to a net-zero carbon future by 2050. The United States pioneered the development of nuclear power to produce electricity in the late 1940s. Since then, U.S. leadership in nuclear energy technology has given us the benefit of carbon-free, reliable electricity for seven decades. In the United States, nuclear energy provides about 20% of our electricity and 50% of the nation's annual carbon-free electricity production, making it the largest and the most reliable source of carbon-free electricity, operating with an average 92% capacity factor, the highest in the world for nuclear generation and higher than any other generation source.

To meet our ambitious carbon reduction goals and rebuild U.S. leadership globally, the Biden-Harris Administration is prioritizing activities that keep the existing fleet of nuclear power plants in operation, deploy advanced reactor technologies, secure and sustain the nuclear fuel supply, and expand international nuclear energy cooperation. Nuclear energy will play a major role in the transition to a carbon-free energy economy by fundamentally underpinning our nation's target for carbon-free electricity as well as non-electric energy markets. New nuclear reactor deployments also have the potential to decarbonize many industrial sectors in the United States

and abroad. Ensuring this future for our nation and our allies must include a secure source of fuel for today's nuclear power plants and those of tomorrow.

The Russian Federation's further invasion of Ukraine has demonstrated the grave threat to global energy security posed by dependence on Russian-supplied fuels. Russia, the largest global enricher of uranium, currently supplies a significant fraction of the nuclear fuel supply chain to the United States and our international allies and partners. In particular, conversion and enrichment services from trusted sources are insufficient to replace current imports from Russia. Without expansion of the domestic fuel cycle capacity, the United States cannot securely support the low enriched uranium (LEU) needs of today's reactor fleet or make high-assay LEU (HALEU) available for advanced reactors, research reactors, and medical isotope production.

The Department is working to address these energy security challenges in the face of ongoing global events. I want to thank this Committee for your leadership in the development of proposed legislation aimed at tackling this very important issue facing our nation and the world.

As you know, there is no quick, easy path to reduce our dependence on Russian-supplied fuels. Expanding our domestic fuel capacity will require a significant strategic investment coupled with import policies that protect those investments well into the future.

S. 3856 – A bill to prohibit the importation of uranium from the Russian Federation (Barrasso et al)

S. 3856, a bill to prohibit the importation of uranium from the Russian Federation, bans the import of uranium from the Russian Federation.

American dependence on Russian uranium threatens our energy security. Energy security is national security and untrustworthy state-sponsored programs have no place in our energy policy. However, any uranium ban from the Russian Federation must be accompanied by strategic investments that strengthen our domestic nuclear fuel supply chain.

While a ban coupled with long-term assurances would provide long-term predictability that would de-risk investments in the domestic nuclear fuel supply chain, our nation's current nuclear power operators will need some time to wean themselves off this Russian supply. In the Presidential Proclamation that prohibits Russian-affiliated vessels from entering into U.S. ports, the Department was provided a method to exempt Russian-affiliated vessels transporting source, special nuclear, and by-product material, for such time, as the Secretary of Energy, in consultation with the Secretary of State and the Secretary of Commerce, determines that no viable source of supply is available that would not require transport on Russian-affiliated vessels. A similar exception to a ban on uranium and fuel services from the Russian Federation would be needed while new capacity is developed to ensure our nuclear power plants continue to generate carbon-free electricity.

S. 4066 – Fueling our Nuclear Future Act of 2022 (Barrasso HALEU bill)

S. 4066, the Fueling our Nuclear Future Act, would direct the Department of Energy to establish a program to accelerate the availability of commercially produced HALEU in the United States.

It would also direct DOE to make HALEU available from our inventories for advanced reactors until U.S. commercial enrichment is available.

DOE is supporting the development of two advanced reactor demonstrations that will require HALEU fuel. These Advanced Reactor Demonstration Program awardees have aggressive timelines for deployment. At DOE, we are working diligently to meet awardees' HALEU needs, which may be as early as 2025 for reactors that may go online as early as 2028.

The Department shares the Committee's concern about HALEU availability, and it is a topic that DOE's Office of Nuclear Energy (NE) is actively addressing, in coordination with the Environmental Management program and the National Nuclear Security Administration (NNSA), given the importance to our domestic industry and national security.

Prior to Russia's further invasion of Ukraine, the Department was already working to address HALEU needs for commercial deployment and uranium needs for its other missions. However, given global events, a new and more urgent path is needed. The Department recently issued a request for proposal for a competitively awarded cost share procurement to complete construction and operate the centrifuge cascade at Piketon, Ohio, with options to continue to operate the cascade subject to appropriations.

The President's Fiscal Year 2023 budget request proposes to make available small quantities of HALEU from limited DOE inventories and support the private sector in establishing a limited U.S. commercial HALEU production and supply chain capability. The Department's highest priority for its enriched uranium inventories has been and will remain NNSA's national security missions. The Department will ensure that any material provided will not impinge on those missions.

This includes the recovery and down-blending of material stored at Y-12 and Savannah River in a cost share program between NE and NNSA and producing HALEU material in the 2025-2026 timeframe. It would also support completing construction of the enrichment demonstration facility in Piketon, Ohio, and continued operation of the centrifuge cascade at Piketon, Ohio, to produce 900kg HALEU per year, enriched to a nominal 19.75% U-235.

The Department is concerned that the bill would eliminate consideration of potential harm to the natural or cultural resources of Tribal communities or sovereign Native Nations. I look forward to working together with you toward investments that secure our supplies of low enriched uranium (LEU), including HALEU, in a just and equitable manner.

Energy Efficiency and Renewable Energy

The Department of Energy's Office of Energy Efficiency and Renewable Energy (EERE) program's primary focus is on funding technology research, development, demonstration and deployment (RDD&D) through competitive solicitations open to the public and through support for the National Laboratories, which play a central role in advancing America's leadership in science and technology and developing innovative solutions to decarbonize our economy equitably and affordably for all. Additionally, academic institutions, such as universities and

colleges, are a resource for innovation, R&D, and training sponsored by EERE. The knowledge generated by EERE research, development, demonstration, and deployment drives down the costs of new technologies, supporting the efforts of U.S. industries, businesses, and entrepreneurs to commercialize, manufacture and deploy innovative energy technologies. These technologies also reduce harmful emissions that disproportionately affect lower income and minority populations.

Work across EERE's portfolio of sustainable transportation, renewable power, energy efficiency programs demonstrate how we can use new technologies and strategies to expand access to clean energy and transportation in underserved communities and support a range of programs that provide workforce development and equitable access. We plan to continue to build on these efforts moving forward and ensure a just, equitable transition to a clean energy future is a cornerstone of DOE and EERE's mission and work.

Climate change is one of the greatest challenges facing our nation and our planet today. DOE is working to address the climate emergency and lead through the power of example, by issuing funding and supporting policies to help ensure that the U.S. builds a 100% clean energy economy and reaches net-zero emissions no later than 2050, which is essential if we are to avoid the worst impacts of climate change. We must also ensure that the benefits from a clean energy future are equitably shared by all Americans, from clean air to good-paying jobs, from farmers to factory workers and from cities to the rural economy.

The Committee is considering five bills today that address a range of important energy issues across the transportation and buildings sectors, two of the five largest sources of greenhouse gas emissions in the U.S. today. The Administration continues to review each of these bills. We appreciate the ongoing bipartisan efforts to address our Nation's energy challenges, and the Department looks forward to working with the Committee.

S. 3543--Vehicle Innovation Act of 2022 (Peters, Haggerty, Stabenow)

This bill authorizes through FY2027 the Department of Energy (DOE) to research, develop, demonstrate, and commercialize innovative vehicle technologies. Reauthorization of this bill is needed to consolidate and update authorities. This bill would reauthorize and complement the critical work already underway in EERE's Vehicle Technologies and Hydrogen and Fuel Cells Technologies Offices to increase innovation and increase the efficiency of transportation, and the Department looks forward to continuing to work with the committee to advance mutual goals of transportation innovation.

The transportation sector accounts for the largest share of greenhouse gas emissions (33%) and is the second highest expenditure for U.S. households. The work authorized under this bill could assist DOE's work to continue driving down costs, improving accessibility, and reducing emissions produced by the transportation sector. EERE recognizes that to decarbonize transportation, we need to invest in innovation across all modes of transportation (light-, medium-, heavy-duty, marine, aviation, rail). EERE is currently working on all modes and feels it is important that the act recognize and acknowledge the role that all modes play in working towards overall transportation decarbonization.

S. 3769--Weatherization Assistance Program Improvements Act of 2022 (Reed, Collins, Coons, Shaheen)

This bill establishes a Weatherization Readiness program with $65M appropriated for work, FY23-FY27. In addition, the legislation increases the Average Cost Per Unit (ACPU) to $12,000 under the Weatherization Assistance Program and allows the Secretary to determine if additional increases in ACPU is necessary due to market conditions. The bill also addresses issues from the WAP Reauthorization, Energy Act of 2020, by correcting the reweatherization date language to allow for braiding of multiple funding sources in a home. Furthermore, the legislation increases the statutory limit for renewable energy systems under the Weatherization Assistance Program to $6,000.

This bill would assist in making more homes ready to weatherize while increasing the amount of work that can be done on homes receiving assistance from the Weatherization Assistance Program and gives the Department flexibility to issue further increases if needed. These outcomes are consistent with DOE goals of a more energy efficient and equitable future.

S. 4038 – Renewable Diesel/Sustainable Aviation Fuel (Barrasso/Feinstein/Cassidy/Lujan/Daines)

This bill limits the definition of sustainable aviation fuels (SAF) to those that conform to the methodology contained in the Clean Air Act or the most recent Carbon Offsetting and Reduction Scheme for International Aviation, as adopted by International Civil Aviation Organization with the support of the United States. The proposed legislation amends DOE's authorizations to clarify that DOE is authorized to a) conduct R&D on regenerative farming practices within the Bioenergy research program and b) provide loan guarantees to facilities that produce biofuels from a range of biomass and waste feedstocks (excluding palm oil). The bill also updates labeling requirements for renewable diesel and renewable diesel blends and requires Energy Information Administration (EIA) to track and report data related to the production of renewable diesel and SAF.

Work on SAF will be critical to achieving the USG goals for decarbonizing aviation fuel and is a critical part of EERE's overall transportation decarbonization strategy. The Department supports the updated definition of SAF and requiring that it has at 50% lower lifecycle greenhouse gas emissions than petroleum jet fuel. However, there are SAF production strategies that could achieve significantly lower lifecycle emissions—net-zero emission, and even net-*negative* emission fuels are possible. To achieve the aggressive but achievable goals set for SAF, EERE needs flexibility to work on all available feedstocks, including municipal solid waste (MSW). We recommend that this authorization include an update the current language in the Bioenergy Program that restricts research on MSW and landfill gas. Specifically, we recommend striking the language below:

"…but not including municipal solid waste, gas derived from the biodegradation of municipal solid waste.."

This bill would complement DOE's Bioenergy Technologies priorities on sustainable aviation fuels. It would update definitions of sustainable aviation fuels and renewable diesel, as well as

the labeling requirements, DOE authorizations and EIA data collection and reporting requirements related to these fuels.

S. 4061 – Water heater bill (Blackburn/Stabenow/Hirono)

This bill provides an exclusion for certain categories of water heaters that the draft legislation is defining as intended exclusively for commercial use, but that are currently regulated as consumer products under the Energy Policy and Conservation Act (EPCA). The bill establishes criteria that define those water heaters that should be "excluded" from the consumer part of EPCA and regulated as commercial equipment allowing DOE to regulate them using commercial test procedures, metrics, and associated energy efficiency standards. The bill sets forth a backstop provision if the shipments increase by 25% and requires compliance with the consumer regulations within one year if evidence from the market in terms of shipments shows they are being purchased for and installed in residences.

The bill also adds a new category of water heaters referred to as "multi-input electric storage water heater," which are defined as a non-heat pump electric storage which can have multiple configurations at, above, or below 12kw. The legislation specifies that multi-input electric storage water heaters would be subject to the test procedures and standards for both consumer and commercial water heaters because they are offered in multiple markets allowing them to compete in both marketplaces equitably.

In addition, the legislation allows DOE to consider demand response requirements for water heaters if certain conditions are met, which acknowledges the potential grid-benefits of thermal storage capacity from water heaters. More specifically, the legislation requires DOE to consider setting standards for demand response based on the statutory criteria for promulgation of a rulemaking. In setting such standards, DOE is required to consider industry consensus standards, such as Air-Conditioning, Heating, and Refrigeration Institute (AHRI) 1430, as part of its test procedure and metric. The legislation addresses preemption from State standards if DOE moves forward with Federal standards, including an allowance for those State standards already in effect such as California, Washington, and Oregon, and future Federal harmonization.

The bill aligns with the Department's goals of encouraging cost-effective resource conservation and consumer utility bill savings, while maintaining product utility, a level playing field for manufacturers, and encouraging grid benefits for utilities. We look forward to continuing to work with the committee to advance mutual goals on appliances and equipment efficiency, especially in the area of water heating.

Other DOE Bills

S. 3145 – Small LNG (Cassidy et al) (FECM)

S. 3145 appears similar to the rule on small-scale natural gas exports finalized by DOE in 2018. The Administration does not have a position on S.3145, but DOE offers the following observations:

Similar to S.3145, DOE's rule on small scale exports allows for expedited treatment of applications to export of up to 51.75 billion cubic feet of natural gas per year (bcf/y). DOE's rule was designed to help facilitate exports to smaller markets.

To date, DOE has granted five applications under the rule on small-scale exports. In the applications processed to date, there has been a combination of approaches where some applicants sought to source LNG from existing small-scale facilities that they owned or were otherwise affiliated with, and some applicants sought to export volumes of LNG that would be sourced from one or more small- and large-scale LNG facilities that they were not affiliated with.

Should S.3145 be codified, DOE would be ready to provide technical support as needed.

Some parameters of the DOE rule on small scale exports have helped to assure that authorizations issued under the rule to date are not mis-used. For instance, DOE does not allow a single applicant to have multiple authorizations under the rule on small scale exports because if combined may enable the applicant to achieve a volume of export above 51.75 bcf/y. Additionally, DOE has clarified that approval of small-scale exports cannot serve as authority to exceed a liquefaction facility's authorized capacity; several of the small-scale applicants have requested to source volumes from one or more facilities that have received authorizations to site, construct, and operate liquefaction facilities from the Federal Energy Regulatory Commission (FERC). In those instances, DOE has clarified that authorizations under the small-scale rule cannot allow the FERC-authorized capacities of the liquefaction facilities that may be the source of the small volume exports to be exceeded.

DOE looks forward to working with the sponsors of S.3145.

<u>S. 3740—Micro Act of 2022 (Kelly/Blackburn)</u>

The microelectronics industry faces formidable challenges as it approaches fundamental limits of today's manufacturing technologies, and new technology pathways are needed to enable the next generation of semiconductor manufacturing and products. These challenges, in turn, pose challenges to DOE, which both relies on state-of-the-art microelectronics to pursue its mission and plays an important role in maintaining American microelectronics leadership through support for leading-edge R&D. The Micro Act of 2022 would expand DOE's capacity for early-stage research in pursuit of some of the most transformative technologies to advance the microelectronics industry and reinforce DOE's position as a leader in this field.

DOE's microelectronics efforts seek to advance the state-of-the-art for future sensors, detectors, wired or wireless communications, control, and computing technologies that are critical for national priorities in science, energy efficiency, clean energy, and national security. To this end, the Department's activities span the RDD&D continuum—from the development of novel materials and technologies to prototyping and commercialization of these technologies in the private sector. The national laboratories, Office of Science user facilities, and National Nuclear Security Administration (NNSA) facilities provide the most advanced tools for scientific research, as well as intellectual property and technical expertise in microelectronics. In addition, the increased focus on DOE programs to drive demonstration, deployment, commercialization

(including loan programs), and manufacturing scale-up, are key to enabling greater U.S. competitiveness. And even beyond its role in RDD&D, DOE is an important consumer of the most advanced microelectronics technologies with the world's most advanced high-performance computing systems. Microelectronics are essential to the execution of DOE missions in science and engineering, clean energy and energy security, national security, and for stewardship of the Nation's nuclear stockpile.

Building the U.S. semiconductor R&D and industry ecosystem of the future requires an interdisciplinary approach to R&D, manufacturing, and commercial deployment, involving communication between disparate parts of the value chain. Likewise, as wide bandgap devices are increasingly incorporated into systems with electronics controls, a multidisciplinary research ecosystem must evolve to ensure understanding, performance, reliability, and safety. DOE is uniquely positioned to engage the entire value chain and has a strong role to play at this nexus. With the broad range of capabilities and opportunities that DOE brings to the microelectronics space, we expect the Department to remain a hub for realizing the Nation's microelectronics competitiveness in the years to come.

S.4280 – Federal Carbon Dioxide Removal Leadership Act of 2022 (Coons, Whitehouse) (FECM)

S.4280 "Federal Carbon Dioxide Removal Leadership Act of 2022" complements provision 40308- Regional Direct Air Capture Hubs passed under the Bipartisan Infrastructure Law and also provisions 41005a and 41005b for both Precommercial and Commercial Prizes for Direct Air Capture technologies. The technologies that are developed and matured by S4280 may eventually be located in one of the four Direct Air Capture Hubs that are envisioned by BIL provision 40308. Furthermore, the technologies from S4280 likely may leverage geological storage sites that will be developed from BIL provision 40305- Carbon Storage Validation and Testing.

Conclusion

Thank you for the opportunity to appear before the Committee today. We look forward to working with you to provide American families and businesses with a wider range of energy and mobility options that offer more affordability, reliability, and security of our nation's energy.

We look forward to your questions.