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U.S. Department of Energy

Before the

U.S. House Committee on Appropriations
Subcommittee on Energy and Water Development

May 12, 2022

Chairwoman Kaptur, Ranking Member Simpson, and Members of the Committee, it is an honor to appear before you today to discuss the President's FY 2023 Budget request for the Department of Energy ("the Department" or "DOE").

It is a privilege to serve as Under Secretary of Science and Innovation and have the responsibility of leading the Department in delivering technological advancements and scientific discoveries, advancing the energy, economic, and national security of the United States, and combatting the climate crisis. DOE is committed to securing and advancing environmental justice and equity and spurring economic opportunity for disadvantaged communities that have been historically marginalized and overburdened by pollution and experience underinvestment in essential services. DOE supports these missions through transformative science and technology solutions, partnerships with states, Tribes, municipalities, communities, and other nations, and the Nation's best scientists and scientific facilities at the National Laboratories.

Budget Topline

President Biden's proposed FY 2023 Budget request for the Department of Energy invests in key priorities including creating jobs through clean energy projects, bringing America to the forefront of clean energy innovation, tackling the climate crisis with the urgency that science demands, and investing in communities that have been left behind. DOE's FY 2023 Budget Request includes $14.7 billion focused on fundamental science, clean energy innovation and our

core research, development, and demonstration (RD&D) missions across existing programs and our National Labs. Of the $14.7 billion, $7.8 billion is for the Office of Science (SC) for increased investments in Administration priorities including basic research on climate change and clean energy, artificial intelligence (AI) and machine learning (ML), and bio preparedness. These missions all require strong science, technology and engineering capabilities and a modern, revitalized infrastructure.

Ukraine and the Need to Continue the Clean Energy Transition

I am appearing before you at a troubling, shocking time in world history. The bravery of the Ukrainian people should inspire all of us to do our part. In addition to the tragic impact on the people of Ukraine, I am focused on the enormous consequences of Russia's invasion on the future of energy. I appreciate the strong message Congress has sent, stating clearly along with President Biden, in banning Russian oil imports. Vladimir Putin's actions have sent the oil market reeling, raising oil prices and the price of gas at the pump, and affecting our daily lives, which underscores the need for clean energy deployment to increase national security through further energy independence. Stated bluntly, the situation in Ukraine and the impact on gas prices has highlighted the national security importance of our energy investments. We must rapidly deploy homegrown clean energy technologies like renewable energy and energy efficient electric appliances to stop relying on the volatile oil market and create price stability for American households and businesses. The FY 2023 request includes new and expanded investments to increase our energy security and deploy domestically manufactured clean energy.

Moving Beyond the COVID-19 Pandemic

Additionally, DOE's FY 2023 request will not only move DOE, its workforce, and the Nation toward a clean energy future, but also serve as a brick in the path to help the Nation move beyond the COVID-19 pandemic and build a better, stronger, more secure, and more inclusive America. DOE's 17 National Laboratories have and will continue to play a foundational role in U.S. leadership in science and technology and in tackling the pandemic and the most pressing challenges of our time as they emerge. They are our solutions factories where scientific collaboration takes place, where world-leading experimental tools provide crucial insights into

nature, and where solutions to our most urgent challenges are being developed. It was at DOE's scientific user facilities where researchers from the National Laboratories, universities, and industry collaborated to reveal the structure of the spike protein on SARS CoV-2, the virus that causes COVID-19, using X-ray and neutron sources, and where vaccine binding was modeled using DOE's high-performance computers.

Seeking to return to yesterday's normal is not realistic, nor is it enough. It is time to use the science and solutions from DOE's Laboratories and help the Nation address our challenges while reimagining our energy economy. And, as America goes back to work, we are going to help rebuild and refocus by creating millions of good-paying clean energy jobs in communities all over the country. The FY 2023 Budget Request will continue to advance our core science and security missions and create jobs supporting our clean energy infrastructure.

Energy Earthshots Initiative

President Biden declared to the world in 2021 that America is back at the table for climate action and followed it up with the FY 2022 request, which included new funding opportunities for technologies ranging from carbon capture to geothermal energy to extracting critical minerals from coal waste. The climate crisis is our generation's moonshot. Less than a decade after Kennedy declared our Nation's choice to go to the moon we planted an American flag on that cratered surface, and today we choose to solve the climate crisis.

The FY 2023 Request continues that fight with its inclusion of activities supporting the Energy Earthshots Initiative. DOE's Energy Earthshots Initiative will accelerate breakthroughs of more abundant, affordable, and reliable clean energy solutions within the decade. They will drive the major innovation breakthroughs that we know we must achieve to solve the climate crisis, reach our 2050 net-zero carbon goals, and create the jobs of the new clean energy economy. The Energy Earthshots Initiative targets the most challenging technical problems across our energy economy and sets ambitious but achievable cost and performance goals to accelerate the necessary innovation. In FY23, DOE has requested $204 million for the Office of Science to establish Energy Earthshot Research Centers to support the achievement of the stretch goals of the Department-wide Energy Earthshots. DOE plans to launch additional decadal goals in FY

2023 to address remaining solutions that are critical to the climate goals and require coordinated, targeted efforts from DOE to unlock.

FY 2023 President's Budget Request: Supporting Innovation through Research, Development, and Demonstration

In FY 2023, DOE will continue to play an important role in advancing and shaping clean energy innovation. Through its applied sciences offices, the Department catalyzes the discovery and development of new clean energy technologies and prioritizes scientific innovation as a cornerstone of U.S. economic prosperity.

In FY 2023, the Department of Energy will increase its emphasis on technology crosscutting efforts to accelerate progress on climate and energy goals through fully integrated science and applied energy research, development, demonstration, and deployment (RDD&D). DOE's crosscuts enhance collaboration across its basic science, applied energy and the new infrastructure programs to ensure that available resources are focused on achieving the Nation's most critical energy and climate challenges. Priority crosscuts in FY 2023 are a combination of existing and new topics including: Advanced Manufacturing, Biotechnology, Carbon Dioxide Removal, Critical Minerals and Materials, Energy Storage, Energy-Water Nexus, Grid Modernization, Industrial Decarbonization, Hydrogen, and Subsurface Clean Energy Applications. These crosscuts enable the Department to align major DOE wide activities and make optimal use of these investments and support deployment of clean energy solutions enabled by the implementation of BIL funding.

In order to support the innovation efforts of DOE's basic science and applied offices, the FY 2023 Budget Request includes:

- $7.8 billion for the Office of Science (SC) for basic research to expand our understanding of the universe and to accelerate innovation, including basic research on climate change and clean energy, fundamental science to transform manufacturing, bio-preparedness, and participation and retention of underrepresented groups in research

activities, and support for the construction and operation of world-leading tools and scientific user facilities for discovery and technology development;

- $4.0 billion for the Office of Energy Efficiency and Renewable Energy (EERE) to accelerate the research, development, demonstration, and deployment (RDD&D) of technologies and solutions to reduce energy costs for households and businesses, increase U.S. competitiveness, create good-paying clean energy jobs, and equitably transition America to net-zero greenhouse gas emissions economy-wide by no later than 2050;

- $297 million for the Office of Electricity (OE) to lead the Department's efforts to strengthen, transform, and improve electricity delivery infrastructure so that consumers have access to resilient, secure, and clean sources of electricity;

- $1.675 billion for the Office of Nuclear Energy (NE) to support civilian nuclear energy programs and Federal efforts to research and develop nuclear energy technologies, including generation, safety, and security technologies. The Request consolidates and focuses nuclear energy related research and development (R&D) activities conducted by small businesses and supports university level engineering and science through competitively awarded, university led research and development and infrastructure, universities' research reactor fuel services, scholarships, and fellowships; and

- $893.2 million for the Fossil Energy and Carbon Management (FECM) office to conduct research, development, demonstration and deployment (RDD&D) that focuses on technologies to reduce carbon emissions and other environmental impacts of fossil fuel production and use, particularly the hardest-to-decarbonize applications in the electricity and industrial sectors.

Office of Science (SC)

The DOE Office of Science (SC) is a cornerstone of the research ecosystem in the United States (U.S.). Through basic and use-inspired research and the development and operation of cutting-edge tools, SC supports different types of research programs—from single investigators and

small teams to large, multi-disciplinary, multi-institutional collaborations. These programs probe fundamental questions to address nature's most compelling mysteries—from fundamental subatomic particles, atoms, and molecules that form the building blocks of our universe, to highly complex and dynamic systems, such as energy storage processes, microbial cells, and carbon cycling in the environment. The knowledge gleaned from this research provides the foundation for new discoveries and innovations that are essential to fulfilling the Department's missions. Over decades, the investments and accomplishments in basic research and enabling research capabilities we have made have provided the foundation for countless new technologies that have benefited large and small businesses and launched new industries. These investments have contributed immensely to our Nation's economy, national security, and quality of life.

The FY 2023 budget request for the DOE Office of Science (SC) balances support for forefront research to advance the frontiers of science, the construction and upgrade of world-leading scientific user facilities, and the operation and maintenance of these facilities. Each facet of this portfolio is essential to maintaining international competitiveness and advancing the energy, economic, and national security of the U.S. The $7.8 billion request for SC continues our robust investments in Administration priorities, including basic research on climate change and clean energy, fundamental science to transform manufacturing, bio-preparedness, and participation and retention of underrepresented groups in research activities. It maintains robust support for fundamental research to expand our understanding of the universe from the subatomic to the cosmic scale, ensuring the U.S. maintains its leading role in these highly international efforts. Critically, the request increases our investments in initiatives to increase participation in DOE research by communities underrepresented in SC's portfolio and forge stronger links between Historically Black Colleges and Universities, other Minority Serving Institutions (MSIs), and the DOE's National Laboratories. Finally, the FY 2023 Request supports continued investment in priority areas that enable advances across the SC portfolio, including critical materials, quantum information science (QIS), artificial intelligence (AI) and machine learning (ML), and exascale computing.

The DOE laboratory complex and the facilities they support are the backbone of our discovery and clean energy mission. In the FY 2023 budget request, all of the scientific user facilities are

funded at approximately 90% of optimum. The FY 2023 SC budget request also supports the Department's effort to pursue a robust portfolio of maintenance and modernization construction projects across the entire DOE laboratory complex. These projects are necessary for our continued innovation in the conduct of science itself to address modern problems, including the application of AI and automation to scientific discovery.

Office of Energy Efficiency and Renewable Energy (EERE)

EERE's mission is to accelerate the research, development, demonstration, and deployment (RDD&D) of innovative technologies and solutions to equitably transition America to net-zero greenhouse gas emissions economy-wide by no later than 2050. EERE seeks to create good-paying clean energy jobs, and ensure the clean energy economy benefits all Americans, especially workers and communities impacted by the energy transition and those historically underserved by the energy system and overburdened by pollution. The FY 2023 Request represents a substantial increase for EERE, with a focus on investments to drastically reduce emissions in the near term, while investing in research to ensure American leadership and competitiveness in advanced clean energy technologies.

EERE's FY 2023 investment strategy focuses on making investments in five programmatic priority areas which are central pillars to reducing the U.S. greenhouse gas profile: decarbonizing the electricity sector, decarbonizing transportation across all modes, decarbonizing energy-intensive industries, reducing the carbon footprint of buildings, and decarbonizing agriculture through the development of biofuels. EERE also houses the bulk of DOE's work on the buildings, transportation, and industrial sectors. These efforts are essential to addressing the climate crisis, as well as cutting costs for families and businesses and maintaining U.S. manufacturing and technology leadership.

Office of Electricity (OE)

The Office of Electricity (OE) leads the Department's efforts to strengthen, transform, and improve electricity delivery infrastructure with a commitment to energy justice and disadvantaged community benefits so consumers have access to resilient, secure, and clean

sources of electricity. OE provides solutions to technical, market, institutional, and operational failures that go beyond any one utility's ability to solve. A dramatic structural transformation of the electricity delivery system is needed to ensure reliability is maintained considering the rapid integration of renewable generation and customer-based technologies, including the electrification of transportation and building infrastructure. The future grid will be a more dynamic and structurally complex system, with bidirectional power flows. Managing this transition will require significant reengineering, involving advancements in grid technology, system architecture, and infrastructure investment strategies.

In July 2021, DOE announced the Long Duration Storage Energy Earthshot. The initiative establishes a target to reduce the cost of grid-scale energy storage by 90 percent within a decade for systems that deliver 10+ hour durations. Developing the technology and manufacturing to reach the Long Duration Storage Shot cost targets will establish a new, U.S.-based manufacturing industry for storage products.

Office of Nuclear Energy (NE)

The Office of Nuclear Energy is making significant investments to ensure our current fleet of nuclear reactors continues to produce clean-emissions-free electricity and to demonstrate and deploy the next generation of advanced reactor technologies. Doing so will support our clean energy transition and ensure our Nation's energy security. NE is also expanding support of the next generation of nuclear energy science and technology researchers, including an additional $40M to initiate an MSI-focused university consortium to bring NE research and professional development to more universities.

A large portion ($491M) of the DOE-NE budget is dedicated to Idaho National Lab (INL) operations and facilities. NE is the responsible DOE program for INL and is currently operating 25 hazard category and nuclear facilities, the most of any laboratory in the DOE complex. These facilities are critical to the United States nuclear research and development infrastructure,

especially in light of current world events. In FY23, an additional $46M will fund capability improvement projects at the Advanced Test Reactor and at the Materials and Fuels Complex.

Some Fiscal Year 2022 accomplishments from the Office of Nuclear Energy include: The internal core changeout at the Advanced Test Reactor at Idaho National Lab; initiating a consent based siting process to identify Federal interim storage facilities as directed in the FY21 Consolidated Appropriations Act, and issuing a request for information to inform the structure of the High-Assay, Low-Enriched Uranium Availability program

Office of Fossil Energy and Carbon Management (FECM)

The Office of Fossil Energy and Carbon Management (FECM) works to minimize the climate and environmental impacts of fossil energy and advances carbon management to make significant contributions to achieving the Nation's net-zero goals by mid-century. This approach will help create cleaner and better paying American jobs that do not leave communities behind and allows FECM to serve as a global leader for maintaining environmental stewardship while enhancing America's economy. FECM will use research, development, demonstration, and deployment (RDD&D) approaches to advance technologies to reduce carbon emissions and other environmental impacts of fossil fuel production and use, particularly committed emissions in the hardest-to-decarbonize applications in the electricity and industrial sectors. Priority areas of technology work include point-source carbon capture, hydrogen with carbon management, methane emissions reduction, critical mineral production, and carbon dioxide (CO_2) removal to address the accumulated CO_2 emissions in the atmosphere.

FECM recognizes that global decarbonization is essential to meeting climate goals and the Office works to engage with international colleagues to leverage expertise in these areas. The Office is also committed to improving the conditions of communities impacted by the legacy of fossil fuel use and to supporting a healthy economic transition that accelerates the growth of good-paying jobs.

Conclusion

In conclusion, I reaffirm my commitment to lead science and innovation at the Department of Energy. I look forward to our continued partnership to achieve these ambitious yet necessary goals.

Thank you for the opportunity to be here today. I am happy to answer your questions.