

**Statement of Dr. Lynn Orr
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**Before the
Committee on Energy and Natural Resources
United States Senate**

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Introduction

Chairman Murkowski, Ranking Member Cantwell, and Members of the Committee, thank you for the opportunity to testify today on behalf of the Department of Energy regarding energy accountability and reform legislation.

In support of the Administration's all-of-the-above approach to energy and the Climate Action Plan, DOE is leading efforts to move to a low carbon future and doing so by working with some of the Nation's best innovators and businesses to support high-impact applied research, development, and demonstration activities.

With Congress's support, the Department implements a range of strategies aimed at reducing U.S. reliance on oil, saving American families and businesses money, creating jobs, and reducing pollution. We work to ensure that the low carbon technologies of today and tomorrow are invented and manufactured in America.

As Under Secretary for Science and Energy, my job is to coordinate DOE's scientific research efforts and our portfolio of applied energy research and development (R&D) as we transition to a low carbon future. Fundamental science underpins everything we do in the energy sector, and the world of energy applications is rich with opportunity to put the science to work, and also for energy applications to illuminate the opportunities for science that could have game-changing impact. My office is working to enhance the productive links among the science and energy programs as we build and execute the Department's research, development, demonstration and deployment activities.

I have been asked to testify on a package of bills related to energy accountability and reform. The Committee is considering a broad range of 42 bills today, the majority of which have some nexus to the Department of Energy. The Administration continues to review all of these bills and has not formulated a position on them.

I appreciate the ongoing bipartisan efforts to address our Nation's energy challenges, and I look forward to working with the Committee.

Energy Landscape

There has been an energy revolution in the United States over the last decade. We are now the largest combined producer of oil and gas in the world and our oil imports are the lowest they have been in more than 40 years. Natural gas use in power generation has significantly increased and U.S. liquefied natural gas exports are scheduled to start within a year. Wind and solar power generation has grown dramatically, vehicles have reached historic levels of efficiency, and ethanol is now ten percent of U.S. gasoline supply.

The United States is, however, at an energy crossroad. As noted, our energy landscape is dramatically changing with implications for all parts of the energy sector and our economy as a whole. The rapid and dramatic changes in the Nation's energy landscape have created enormous opportunities. At the same time, they pose a set of challenges and opportunities for energy policy makers, investors, non-governmental organizations and industry. These opportunities and challenges come in many forms, and addressing them will require action by many parties, including Congress, the private sector, and public sector.

The Committee's last several hearings have focused on broad topics such as energy infrastructure, energy supply, and today on energy accountability and reform. Over the past year and a half, the DOE has led an Administration wide effort focused on the energy issues facing our Nation, specifically on infrastructure in the first installment of the Quadrennial Energy Review (QER). As you know, this first installment of the QER was released in April and, the Secretary testified in front of this Committee days after its release.

Quadrennial Energy Review (QER)

The first installment of the QER focuses specifically on the critical energy infrastructure that serves as the backbone of our nation's system for energy transmission, storage, and distribution. The development of the QER underscores the strong public interest in advancing key national goals of jobs, competitiveness, energy security and a cleaner energy future. It also provides policy makers with a roadmap for meeting key energy objectives: enhancing energy infrastructure resilience, reliability, safety and security; modernizing the electric grid and our energy security infrastructures; and improving "shared" energy infrastructures—railways, waterways, ports and roads—that move both energy and other commodities. Several crosscutting themes were also considered, including jobs, the environment, infrastructure siting, and integration of North American energy markets.

Some recommendations within the QER will require new authority from Congress, and we look forward to working with you on those issues, which include, but are not limited to:

- Financial assistance to help states make cost-effective improvements in the safety and environmental performance of natural gas distribution systems, focusing on offsetting incremental costs to low-income households and enhanced direct inspection and maintenance programs.
- Updating Strategic Petroleum Reserve release authorities to reflect modern oil markets, and funding for necessary infrastructure life extension and enhanced incremental distribution capacity.
- Analyzing the risks associated with the loss of large power transformers and approaches for mitigating this risk, possibly including the development of one or more transformer reserves, which would require congressional authorization.

To help guide the work of this Committee, a summary version of the QER was developed for policymakers. I ask the Chairman's permission to submit this summary for the record.

Quadrennial Technology Review (QTR)

Later this summer, DOE will complete the second-ever Quadrennial Technology Review (QTR). The QTR will offer a comprehensive analysis of energy technology trends and opportunities, with a focus on identifying the research, development, demonstration, and deployment pathways that will help the Nation achieve greater energy, economic, and environmental security. We look forward to briefing the findings of the QTR for the Committee and your Senate colleagues.

All-of-the-above Approach

An essential focus of the Department of Energy is helping our nation lead the transition to a clean, low carbon energy economy in order to enhance our energy security and mitigate the impacts of climate change. The Department serves this goal principally through supporting advancements in science and technology across the energy spectrum.

In the last year, we have seen important accomplishments across the Department's technology portfolio that highlight this all-of-the-above approach. We have geologically sequestered 10 million metric tons of CO₂ through DOE-supported projects. Two commercial-scale cellulosic ethanol facilities supported by DOE grant or loan guarantees have commenced operations. We have commissioned one of the world's largest battery storage systems at the Tehachapi Wind Energy Storage Project. ARPA-E's grant program has attracted more than \$850 million in private follow-on funding to 34 projects, with 30 ARPA-E teams forming new companies.

The Office of Energy Efficiency and Renewable Energy (EERE) has launched the Frontier Observatory for Research in Geothermal Energy (FORGE), a first-of-a-kind field laboratory to deploy enhanced geothermal energy systems, and the first round of awardees was announced last month. The Office of Nuclear Energy has successfully completed the first five-year program at the Consortium for Advanced Simulation of Light Water Reactors (CASL) nuclear modeling

Hub at the Oak Ridge National Laboratory, and continues its work toward design and licensing support of a small modular nuclear reactor with advanced safety features.

I would like to take this opportunity to talk about a few existing programs that focus on the work represented by legislation being considered today.

Office of Energy Efficiency and Renewable Energy

EERE's energy efficiency portfolio seeks to improve the energy efficiency of the Nation's homes, buildings, and industries. The Building Technologies, Advanced Manufacturing, Weatherization and Intergovernmental Programs, and Federal Energy Management Program Offices develop and help provide businesses, consumers, and government agencies with innovative, cost-effective energy-saving solutions to improve their energy efficiency. This includes the development of higher-efficiency products, new ways of designing homes and buildings, and new ways of improving the energy intensity and competitiveness of American manufacturers. EERE's energy efficiency portfolio also supports better integrating the built environment with our energy system to combat costly peaks in energy demand and to increase the capabilities and value of buildings and facilities.

EERE's renewable power portfolio supports developing solutions to significantly increase the amount of cost-competitive electric power that is generated from renewable resources across the Nation. The Solar, Geothermal, and Wind and Water Power Technologies Offices within EERE help advance technology RD&D to cost-effectively harness the United States' abundant and diverse supply of renewable resources. While each renewable power technology has unique tradeoffs, EERE seeks to ensure the development of multiple renewable power technology options for every region of the country, enabling the U.S. to diversify its energy portfolio and better protect our environment and respond to the threat of climate change.

EERE's sustainable transportation portfolio supports research, development, and demonstration work and efforts to break down market barriers for a variety of domestic and cost-effective sustainable transportation technologies. Broadly, the Vehicle, Bioenergy, and Hydrogen and Fuel Cell Technologies Offices support two key parallel solution pathways: (1) using less energy to move people and freight and (2) replacing conventional fuels with cost-competitive, domestically produced, sustainable alternative fuels with lower greenhouse gas emissions. Because most petroleum use in the transportation sector occurs in personal vehicles and heavy trucks, EERE's portfolio emphasizes transportation technologies in these areas.

Office of Electricity Delivery and Energy Reliability

The Office of Electricity Deliverability and Energy Reliability's (OE) mission is to lead national efforts to modernize the electricity delivery system, enhance the security and reliability of America's energy infrastructure, and facilitate recovery from disruptions to the energy supply. OE leads the Department's efforts to strengthen, transform, and improve our energy infrastructure so that consumers have access to reliable, secure, and clean sources of energy. The

goal for the future grid is to provide a platform that delivers reliable, affordable, and clean electricity to consumers where they want it, when they want it, and how they want it.

To accomplish this vital mission, OE works closely with private industry and Federal, state, local, and tribal governments on a variety of initiatives to modernize the electric grid and enhance key characteristics of the U.S. electric transmission and distribution systems, which include:

- Reliability – consistent and dependable delivery of high quality power;
- Flexibility – the ability to accommodate changing supply and demand patterns and new technologies;
- Efficiency – low losses in electricity delivery and more optimal use of system assets;
- Resiliency – the ability to withstand and quickly recover from disruptions and maintain critical function;
- Affordability – more optimal deployment of assets to meet system needs and minimize costs;
- Security – the ability to protect system assets and critical functions from all hazards; and
- Minimal environmental footprint – grid system designs that reduce total environmental impact of grid components and connected systems.

Improvements to all of these operational capabilities, together with end-to-end protection from manmade and natural threats, are necessary for a modern and reliable grid.

Office of Fossil Energy

The Office of Fossil Energy (FE) advances technologies related to the reliable, efficient, affordable, and environmentally sound use of fossil fuels which are essential to our Nation's security and economic prosperity. FE leads Federal research, development, and demonstration efforts on advanced carbon capture, and storage (CCS) technologies to facilitate achievement of the President's climate goals. FE also develops technological solutions for the prudent and sustainable development of our unconventional domestic resources.

FE also manages the Nation's Strategic Petroleum Reserve (SPR). The SPR, with a capacity of 727 million barrels, serves as the largest stockpile of government-owned emergency crude oil in the world. The SPR helps ensure U.S. energy security by providing protection against disruptions in U.S. oil supplies. It also allows the United States to meet, in combination with commercial stocks, its International Energy Agency (IEA) obligation to maintain strategic oil stocks equal to ninety days of net oil imports.

In addition to the SPR, FE oversees the Northeast Home Heating Oil Reserve, which provides a short-term supplement to commercial home heating oil supplies in the Northeast in the event of a supply interruption.

Office of Science

The Office of Science (SC) continues its distinguished history of making important investments in basic research, scientific user facilities, and facility construction across our six program areas:

- Advanced Scientific Computing Research (ASCR) supports research to discover, develop, and deploy computational and networking capabilities to analyze, model, simulate, and predict complex phenomena important to DOE.
- Basic Energy Sciences (BES) supports research to understand, predict, and ultimately control matter and energy at the electronic, atomic, and molecular levels in order to provide the foundations for new energy technologies.
- Biological and Environmental Research (BER) supports fundamental research and scientific user facilities to achieve a predictive understanding of complex biological, climatic, and environmental systems for a secure and sustainable energy future.
- Fusion Energy Sciences (FES) supports research to expand the fundamental understanding of matter at very high temperatures and densities and to build the scientific foundation of fusion energy.
- High Energy Physics (HEP) supports research to understand how the universe works at its most fundamental level by discovering the most elementary constituents of matter and energy, probing the interactions among them, and exploring the basic nature of space and time itself.
- Nuclear Physics (NP) supports research to discover, explore, and understand all forms of nuclear matter, including experimental and theoretical research to create, detect, and describe the varied forms of nuclear matter that can exist, including those that are no longer found naturally.

Other Topics of Legislation

This hearing also includes bills that, while not under my direct purview, are related to DOE. There are several bills relating to the Loan Program Office, which issues loans and loan guarantees to accelerate the commercial deployment of clean energy projects and advanced vehicle manufacturing in the U.S. The program works with the private sector to fill a critical role in the marketplace because commercial banks and bondholders are often unwilling to finance the first few commercial-scale projects that use a new technology since there is not yet a history of credit performance or operation.

The LPO currently manages a more than \$30 billion portfolio of projects, including the first new nuclear power plant to be licensed and constructed in the United States in more than thirty years,

some of the largest utility-scale solar facilities in the world, dozens of retooled auto manufacturing plants producing some of America's best-selling vehicles, the world's largest solar thermal energy storage system, and many other ground-breaking projects. Overall, these loans and loan guarantees have resulted in more than \$50 billion in total project investment. As of March 2015, \$22.3 billion has been disbursed and \$5.4 billion of principal and interest has been repaid to the U.S. Treasury; actual and estimated losses to date represent approximately 2% of the more than \$30 billion of closed and committed loans and loan guarantees which compares favorably to the private sector.

Further, there are several bills regarding the national laboratories, of which 13 come within the purview of my office. In fact, I have been fortunate enough to visit all of DOE's national laboratories. The Energy Secretary has made it a cornerstone of his tenure to strengthen and enhance the relations between the Department and the national laboratories. To this end, we have established a regular strategic dialogue with the labs through leadership councils involving lab directors, Chief Operating Officers, and other key managers. Those coordinated efforts include standing up the National Laboratory Policy Council, which consists of the National Lab Directors Council leadership and senior Departmental leadership, and the National Laboratory Operations Board, led by the Office of the Under Secretary for Performance and Management which includes representatives from the labs' Chief Operating Officers and Chief Research Officers, as well as programs within the Department that steward labs.

There are also a number of ongoing efforts to review lab issues, including the congressionally directed Commission to Review the Effectiveness of the National Energy Laboratories and the Secretary of Energy Advisory Board, which is looking at important issues to keep DOE's national laboratories on the cutting edge of scientific development.

We are making good progress in these efforts, and are continuing to strengthen and enhance our national laboratory system, a priority that the Secretary and I share with you. While it is important to look at streamlining and improving the operations of our national labs, I am concerned that some of the proposed provisions in introduced legislation would weaken DOE oversight of the laboratories.

Conclusion

Through research and development, deployment, and collaborations at all levels of government and the private sector, the Department of Energy aims to support an efficient transition during our Nation's energy revolution. While significant progress has been made, continued investments are necessary to capture the full set of opportunities.

The Administration looks forward to continuing to work with the Congress on bipartisan energy legislation to boost U.S. competitiveness and job creation.

Thank you again for the opportunity to be here today, and I would be happy to answer your questions.