

Testimony of Assistant Secretary Karen S. Evans
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U.S. Department of Energy Before the
Committee on Homeland Security and Governmental Affairs
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Chairman Johnson, Ranking Member Peters, and Members of the Committee, thank you for the opportunity to discuss the risks posed by electromagnetic pulses (EMPs) and highest extreme geomagnetic disturbances (GMDs) to our energy infrastructure and how the Department of Energy (DOE) is coordinating with other agencies and industry to help manage those risks.

Our economy, national security, and even the health and safety of our citizens depend on the reliable delivery of electricity. From his first days in office, Secretary Perry has conveyed that he has no higher priority than to support the security of our Nation's critical energy infrastructure. By the Secretary proposing and Congress affirming the Office of Cybersecurity, Energy Security, and Emergency Response (CESER), the Secretary clearly demonstrated his commitment to achieving the Administration's goal of energy security and, more broadly, national security.

CESER leads the Department's efforts to secure our Nation's energy infrastructure against all hazards, to reduce the risks of, and impacts from, cyber events and other disruptive events, and assist with restoration activities. This office works closely with the private sector, as well as Federal and SLTT (State, Local, Tribal, and Territorial) government partners, to enable more coordinated preparedness for and response to disruptions caused by natural and manmade events, such as severe weather, physical attacks, cyber-attacks, GMD, and EMP.

CESER has demonstrated our Emergency Response function through multiple weather events, including hurricanes, by activating our Emergency Response Organization. In 2018, CESER responded to a wide range of incidents, including six hurricanes, three wildfires, two typhoons, a cyclone, an earthquake, and a volcanic eruption. Recently, we worked closely with Federal, State, and industry partners to monitor the impacts to the energy sector from the January 2019 "arctic blast" that affected the central and eastern portions of the country.

Today, I would like to focus my testimony primarily on how CESER will meet the priorities of the Administration and Congress, and work in conjunction with our Federal agency, State, local, tribal, and territorial governments, industry, and National Laboratory partners to address enhancing security and resilience in the face of EMP and GMD risks.

Let me begin by discussing what these risks are and why DOE is addressing them. An electromagnetic pulse, or EMP, can be created by non-nuclear events and by the high-altitude detonation of a nuclear weapon. High-altitude electromagnetic pulse (HEMP) attacks have the potential to damage power delivery assets and impact bulk-power system reliability over a wide area. The resulting EMP is characterized by a high-magnitude, short duration pulse (E1), an intermediate pulse that has characteristics similar to lightning (E2), and a late-time pulse referred to as (E3), which is similar to an extreme geomagnetic disturbance (GMD) event.

GMDs caused by Coronal Mass Ejection (CME) may result in geomagnetically-induced currents (GIC) in man-made structures such as rail lines, pipelines, electric transmission lines, and some communications lines. DOE is concerned about the impacts of GIC flows on power transformers. Transformer damage, although highly unlikely even in the most extreme storms, is possible and in certain situations can destabilize the electric grid if proactive measures are not undertaken (e.g. reducing load).

DOE's role in addressing energy sector risks and energy sector security is well established. From the Department's role in nuclear security through the National Nuclear Security Administration (NNSA) to the ground-breaking grid modernization research at our National Laboratories, DOE has the expertise and relationships to support the energy sector and help protect its critical infrastructure in coordination with the Department of Homeland Security (DHS) and other Federal and non-Federal stakeholders. CESER is leading efforts within DOE to take the necessary steps to develop cost-effective strategies for all hazards to mitigate, respond to, and recover from potential disruptions. For addressing EMP risks, we have a multi-pronged approach: sharing knowledge and expertise with industry on a timely basis; allowing the electric subsector to advance readiness for potential EMP impacts through research to quantify the risk; and scientific development of mitigation strategies, and analysis of the policies needed for the future.

DOE's role in energy sector security is described in both statute and Presidential directive. For example, Section 215A of the Federal Power Act provides that the Secretary of Energy may order emergency actions related to grid operations during a Presidentially-declared grid security emergency caused by a high impact event, such as an EMP attack. In light of that statutory responsibility, the Department has enhanced planning for events such as EMP to ensure the President and our Nation are ready to respond.

Within the very first few days of CESER's establishment in 2018, our senior staff reached out to key Federal agency officials that have shared responsibilities in the energy sector. As an example, in our initial discussions with the Nuclear Regulatory Commission (NRC) on the issue of EMP risks, a study commissioned by the NRC that concluded that nuclear power plants can safely shut down following an EMP event was reviewed.

DOE's work on EMP builds upon the findings of the [Joint Electromagnetic Pulse Resilience Strategy \(Joint Strategy\)](#) issued in 2016, which represented a collaboration between DOE and the Electric Power Research Institute (EPRI). The Joint Strategy reflects a shared vision of how industry and government should best proceed to understand, manage, and mitigate EMP risks to the electric grid. The Joint Strategy included five strategic goals: 1) Improve and Share

Understanding of EMP: Threat, Effects, and Impacts; 2) Identify Priority Infrastructure; 3) Test and Promote Mitigation and Protection Approaches; 4) Enhance Response and Recovery Capabilities to an EMP Attack; and 5) Share Best Practices Across Government and Industry, Nationally and Internationally. In furtherance of the Joint Strategy, DOE developed an Electromagnetic Pulse Resilience Action Plan that refines and directs the Department's efforts to reduce EMP vulnerabilities and improves the energy sector's response and recovery after EMP events through coordination with the whole of government, national labs, industry, and international partners.

To implement the Joint EMP Resilience Strategy, DOE has been working on GMD and EMP projects over the past several years to improve our understanding of the effects and expected impacts and to share these findings with government and industry partners. DOE is continually undertaking efforts to address the EMP risks to the electric grid and to understand what measures can mitigate its potential adverse impacts. We are continuing to close gaps we have identified in our understanding and beginning to test, evaluate, and validate mitigation and protection technologies on the grid.

DOE's recently completed reports include: the "Vulnerability of the Electric Grid to an Electromagnetic Pulse and the Potential Impact on Electric Power Delivery and Reliability" released in June 2018; the "Geomagnetic Disturbance Monitoring Approach and Implementation Strategies" dated November 2018; an unclassified EMP overview titled the "High Altitude Electromagnetic Pulse (HEMP) and The Electric Grid; A Brief Overview" report; and an October 2018 classified tri-lab assessment of the impacts of EMP on the electric grid titled "Assessment of the Impacts of EMP on the Electric Grid."

Ongoing projects include: improving unclassified E3 waveforms, code and databases, (to be able to share EMP effects with our partners); enhancing the Nation's EMP and GMD capabilities through CE-SMART (Center for EMP/GMD Simulation, Modeling, Analysis, Research, and Testing); and implementing a pilot project to field deploy and evaluate technologies to mitigate the effects GMD and the E3 from EMP on the electric grid. We also plan to develop a hardening and resilience roadmap this year specifying what can and should be done, working with industry partners with available resources, to deploy technologies to protect critical components, equipment, and systems on the electric grid from EMP and GMD effects and impacts.

DOE is also collaborating with the CEO-led Electricity Subsector Coordinating Council's (ESCC)'s task force to coordinate with the government and other critical infrastructure sectors on a national effort to enhance resilience against EMP, GMD, and other high-impact, low frequency events. Notably, DOE and the ESCC task force are supporting EPRI's EMP Project, which will determine the vulnerability of and mitigation approaches for high-voltage and electronic equipment installed on the transmission system to EMP/GMD; provide a scientific basis for investments to mitigate EMP/GMD risks to the energy grid; and inform response and recovery efforts.

DOE is fully committed to helping forge the grid of the future that will be more resilient to all hazards, including EMP/GMD. Continued progress in grid modernization is vital to helping us protect the grid from EMP and GMD.

Furthering those goals, CESER considers one of its core missions to be the improvement of the mutual understanding and trust between the electric industry and government. These productive relationships are necessary to improve our ability to respond to EMP and GMD and other potential high impact but low frequency events. One measure of success of the productive nature of our relationships is evidenced in the exercises undertaken and the lessons learned from those exercises.

DOE sponsors and participates in hundreds of preparedness exercises annually, focusing on the energy sector, as well as and broader emergency management hazards and situations. Two DOE-sponsored exercise series include Clear Path, the Department's cornerstone all-hazards-focused exercise series, and Liberty Eclipse, the flagship cybersecurity-focused exercise series. Both exercise series stress the building of relationships within the energy sector and the importance of closing identified gaps found in past exercises and real world incidents.

In 2018, DOE also participated in a National Security Council (NSC)-sponsored exercise which focused on a GMD incident for the purposes of reviewing government authorities under the Fixing America's Surface Transportation (FAST) Act (Public Law 114-94). Findings from that exercise contributed to the strengthening of the NSC's communications protocol and expectations in the event of a GMD.

Similarly, DOE understands the importance the results of these exercises have on informing updates to our response plans on a continuous basis, and specifically addressing identified gaps in coordination with our industry, government, and coordinating council partners.

Communications capabilities that are survivable, reliable, and accessible, by both industry and government, will be key to coordinating various efforts showcased in the exercise, including the unity of messaging required to successfully coordinate recovery from a real-world version of the exercise scenario.

In preparation for any future grid security emergency, it is critical that we continue working with our government and industry partners to further shape the types of orders that may be executed under current authorities, while also clarifying how we communicate and coordinate the operational implementation of these orders. We recently worked with the North American Transmission Forum as they developed proposed Fast Act Grid Security Emergency options that could be directed before, during, and after the highest extreme GMDs. Continued coordination with Federal, SLTT, and industry partners and leadership in preparedness activities such as Liberty Eclipse, enables DOE to identify gaps and develop capabilities to support appropriate responses.

Establishing CESER was the result of the Administration's commitment to and prioritization of energy security and national security. Our long-term approach strengthens our national security and positively impacts our economy.

I appreciate the opportunity to appear before this Committee to discuss efforts to address EMP and GMD risks to the energy sector, and I applaud your leadership. I look forward to working with you and your respective staffs to continue to address EMP and GMD risks, as well as other cyber and physical security challenges.