

Harnessing Innovation for a More Secure and Resilient Critical Energy Infrastructure

A secure and resilient power grid is vital to national security, a strong economy, and the services Americans rely on every day. The Department of Energy's (DOE) Office of Electricity (OE) works closely with its private and public partners to ensure the nation's critical energy infrastructure is secure and able to recover rapidly from disruptions. Through a mix of technology and policy solutions and in partnership with the private and public sectors, OE is harnessing innovation for a stronger, more reliable North American energy system.

- **Advancing Technology Solutions**
OE's Advanced Grid Research and Development (AGR&D) Division invests in next-generation technologies and tools that will improve the security and resilience of the nation's critical energy infrastructure.
- **Analyzing Policies, Laws, Regulations, and Trends**
OE's Transmission Permitting and Technical Assistance (TPTA) Division evaluates existing laws, policies, and regulations to better understand the changing regulatory landscapes, and provides technical assistance to States, regional entities, and tribes to help them facilitate the development of secure and resilient electricity infrastructure. TPTA also authorizes electricity exports, issues permits for construction of cross-border transmission lines, and leads efforts to improve the coordination of Federal transmission permitting on Federal lands.

OE's Priorities

The Office of Electricity's (OE) mission of security and resilience is reflected in its four priorities.

- **North American Energy Resiliency Model**
Working with DOE's National Laboratories and relevant stakeholders, OE will develop an integrated North American Energy Resiliency Model (NAERM) to conduct planning and contingency analysis to address vulnerabilities in the North American energy system.
- **Megawatt Scale Grid Storage**
OE will pursue megawatt scale storage capable of supporting regulation, ramping, and energy management for bulk and distribution power systems.
- **Revolutionize Sensing Technology Utilization**
OE will pursue integration of high-fidelity, low-cost sensing technology for predictive and correlation modeling for electricity.
- **Transmission**
OE will pursue electricity-related policy issues by carrying out statutory and executive requirements, while also providing policy design and analysis expertise to states, regions, and tribes.

Making the Nation's Grid More Secure and Resilient

Working closely with its partners, OE continues to make significant progress in making the nation's electric grid more secure and resilient for America's communities and businesses. Below are a few examples of recent accomplishments.

- **Innovative R&D in Big Data, Artificial Intelligence (AI) and Machine Learning:** OE [announced](#) awards of nearly \$7 million to improve existing knowledge and discover new insights and tools for better grid operation and management. These projects are expected to inform and shape the future development and application of faster grid analytics and modeling, better grid asset management, and sub-second automatic control actions that will help system operators avoid grid outages, improve operations, and reduce costs.
- **Two R&D 100 Awards:** Two projects supported by OE received prestigious R&D 100 [awards](#). The Dynamic Contingency Analysis Tool (DCAT) developed by Pacific Northwest National Laboratory (PNNL) identifies weaknesses, determines impacts that would result from a cascading power outage, and notifies the power operator of actions needed to stop an outage before it occurs. The Mobile Universal Grid Analyzer (m-UGA), co-developed by Oak Ridge National Laboratory (ORNL) and the University of Tennessee, allows grid operators and utilities to assess the health of the grid in real time on their mobile devices.
- **Grid-Scale Energy Storage Cost Reductions:** A reduced cost of grid-scale (over 1 megawatt MW) energy storage technologies has been demonstrated at \$275 per kilowatt hour for a 4-hour system based on a new aqueous soluble organic electrolyte. Energy storage is emerging as an integral component to the grid modernization strategy to provide a diverse range of services including energy management, backup power, load leveling, frequency regulation, voltage support, and grid stabilization.
- **Critical Electric Infrastructure Information (CEII):** OE [proposed](#) a rule that would allow DOE to designate submitted electric infrastructure information as critical, safeguarding the security of this information from bad actors. Comments received are available for public inspection on the [regulations.gov](https://www.regulations.gov) website. All comments received by December 28, 2018, and all other relevant information will be considered by DOE before final action is taken on this proposed regulation.
- **Electricity Industry Technology and Practices Innovation Challenge:** OE [launched](#) this contest to seek innovative ideas on how existing procedures and practices can be modified or replaced to improve grid operations. A total of up to \$1 million of prize money will be awarded to up to 25 selectees.
- **Puerto Rico Energy Resilience:** As part of its commitment to support Puerto Rico for long-term resiliency improvement, DOE convened experts interested in supporting the long-term recovery of Puerto Rico. \$10.1 million in FY18 supplemental funding enabled OE to support the rebuilding of the grid in Puerto Rico. OE released the [Energy Resilience Solutions for the Puerto Rico Grid](#) report which contains resilience recommendations for the Government of Puerto Rico to consider for incorporation into its recovery plans.
- **Expansion of the RAPID Toolkit:** The Regulatory and Permitting Information Desktop ([RAPID](#)) Toolkit, which gives agencies, developers, and industry stakeholders an easy-to-use source of online information about federal and state regulatory processes and requirements for bulk transmission projects, was expanded to cover all 50 states. This online tool helps states and the energy industry modernize the nation's electric grid by easing access to critical information needed in planning new transmission infrastructure projects.
- **Conference on Security Investments for Energy Infrastructure:** DOE and the Federal Energy Regulatory Commission (FERC) co-hosted a technical [conference](#) on Security Investments for Energy Infrastructure to discuss security practices to protect energy infrastructure. The purpose of the conference was to discuss current cyber and physical security practices used to protect energy infrastructure and explore how federal and state authorities can provide incentives and cost recovery for security investments in energy infrastructure.
- **Investment in Grid Resilience:** OE [announced](#) awards of up to \$7.5 million to support R&D of the next generation of large power transformers that can be shared and replaced more easily in the event of a failure, are smarter with embedded sensors and analytics, and are more secure to cyber-physical threats. Transformers are fundamental to the grid, as all grid-sourced electricity flows through these devices.

For more information about OE's priorities, activities, and accomplishments, visit the OE [website](#).