

ELECTRICITY DELIVERY AND ENERGY RELIABILITY

(Discretionary dollars in thousands)

	FY 2014	FY 2014	FY 2015	FY 2016	FY 2016 vs. FY 2015	
	Enacted	Current	Enacted	Request	\$	%
Electricity Delivery and Energy Reliability						
Clean Energy Transmission and Reliability	32,383	31,474	34,262	40,000	+5,738	+16.7%
Smart Grid Research and Development	14,592	14,125	15,439	30,000	+14,561	+94.3%
Cybersecurity for Energy Delivery Systems	43,476	42,301	45,999	52,000	+6,001	+13.0%
Energy Storage	15,192	14,706	12,000	21,000	+9,000	+75.0%
Transformer Resilience and Advanced Components	0	0	0	10,000	+10,000	N/A
National Electricity Delivery	5,997	5,997	6,000	7,500	+1,500	+25.0%
Infrastructure Security and Energy Restoration	7,996	7,996	6,000	14,000	+8,000	+133.3%
State Energy Reliability and Assurance Grants	0	0	0	63,000	+63,000	N/A
Program Direction	27,606	27,606	27,606	32,600	+4,994	+18.1%
Subtotal, Electricity Delivery and Energy Reliability	147,242	144,205	147,306	270,100	+122,794	+83.4%
Rescission of Prior Year Balances	0	0	-331	0	+331	+100.0%
Total, Electricity Delivery and Energy Reliability	147,242	144,205	146,975	270,100	+123,125	+83.8%

Appropriation Overview

Electricity Delivery and Energy Reliability (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. To accomplish this critical mission, the Office works with private industry and Federal, state, local, and tribal governments on a variety of initiatives to modernize the electric grid. Grid modernization is critical to addressing aging infrastructure, achieving public policy objectives, sustaining economic growth, supporting environmental stewardship, and mitigating risks to secure the Nation. The goal for the future grid is to provide a platform for U.S. economic prosperity and energy innovation in a global clean energy economy. It will deliver reliable, affordable, and clean electricity to consumers where, when, and how they want it.

The OE mission is reflected in the Strategic Objective 2, support a more economically competitive, environmentally responsible, secure and resilient U.S. energy infrastructure, in the DOE Strategic Plan. OE also plays a critical role in implementation of the President’s Climate Action Plan to mitigate the risks and enhance resilience against climate change.

The Request supports the Administration’s all-of-the-above strategy and emphasizes priorities that increase electric grid resilience, including managing risks, increasing system flexibility and robustness, increasing visualization and situational awareness, and deploying advanced control capabilities.

The Request also continues crosscutting programs that coordinate across the Department and seek to tap DOE’s full capability to effectively and efficiently address the United States’ energy, environmental, and national security challenges. OE is part of the Grid Modernization and Cybersecurity crosscuts.

The FY 2016 increase over the FY 2015 appropriation is primarily due to several new activities: State Energy Reliability and Assurance Grants, Advanced Distribution Management Systems and Market-Based Control Signals within the Smart Grid program, and a Virtual Energy-Sector Forensics Analysis Platform within the Cybersecurity for Energy Delivery Systems program.

Program Highlights

- **Clean Energy Transmission and Reliability**

The Clean Energy Transmission and Reliability (CETR) program (\$40,000,000) improves energy system decision-making through system measurement, modeling, and risk analysis. The program’s efforts will help lay the foundation for a modern grid and ensure that investments made to improve energy infrastructure appropriately factor risk and uncertainty as a key element. The Request supports development of value-added synchrophasor applications for transmission owners, expansion of university research in mathematics for power systems, the development and application of risk analysis, and a competitive solicitation to improve operational reliability and security of the grid.

- **Smart Grid Research and Development**

The Smart Grid program (\$30,000,000) focuses primarily on the development of technologies, tools, and techniques to modernize the distribution portion of the electric delivery system. The program conducts R&D on microgrids and resilient grids while building on grid modernization efforts to improve reliability, operational efficiency, resiliency, and outage recovery. The Request also promotes higher performing grids by integrating new assets and information streams with advanced distribution management systems and explores new market-based control paradigms that can integrate distributed generation resources more efficiently.

- **Cybersecurity for Energy Delivery Systems**

The Cybersecurity for Energy Delivery Systems program (\$52,000,000) reflects the critical need to accelerate and expand efforts to strengthen the energy infrastructure against current and future cyber threats. Working closely with the Energy Sector and government partners, the Request supports research on cutting edge cybersecurity solutions, information sharing to enhance situational awareness, implementing tools to help industry improve their cybersecurity posture, and building an effective, timely, and coordinated cyber incident management capability in the energy sector. The Request establishes a virtual collaborative environment for conducting real-time advanced digital forensics analysis, which can be used to analyze untested and untrusted code, programs, and websites without allowing the software to harm the host device.

- **Energy Storage**

The Energy Storage program (\$21,000,000) develops and demonstrates new and advanced energy storage technologies that will enable the stability, resiliency, and surety of the future electric utility grid as it transforms into a resilient grid, as well as support increased levels of renewables. The Request addresses challenges in cost competitive energy storage technology, validated reliability and safety, an equitable regulatory environment, and industry acceptance.

- **Transformer Resilience and Advanced Components**

Transformer Resilience and Advanced Components (\$10,000,000) addresses the unique challenges facing transformers and other critical components for transporting energy from where it is generated to where it is used. The program will advance the understanding of impacts of geomagnetic disturbances and electromagnetic pulses on large power transformers and grid components. In addition, the Request supports advanced component work including power electronics R&D.

- **National Electricity Delivery**

The National Electricity Delivery program (\$7,500,000) supports policies, planning and practices related to electricity delivery to assist the electric power industry, state regulators and policymakers, and Federal agencies respond to major new challenges and opportunities. The program provides, upon request, technical and policy expertise to states, regions, and tribes to encourage the development and deployment of reliable and affordable electricity infrastructure. It also authorizes the import and export of electricity, issues permits for cross-border transmission lines, and coordinates Federal transmission permitting on Federal lands. The Request provides an increase to strengthen the modeling and analytical tools available to state regulators and policymakers to assist in developing long-term integrated system reliability plans.

Key FY 2014 Accomplishments

In support of the U.S. Energy Infrastructure Agency Priority Goal:

- ✓ Cutting edge cybersecurity solutions transitioned to the energy sector in 2014 include substation control system components and field devices designed to allow only expected cyber-activity, strengthening protections against unauthorized access, communications and executable processes.
- ✓ OE supported responses to 24 energy emergency events, physical security events, wild fires, winter storms, fuel shortages, national security events, storms, and typhoons.
- ✓ In support of an MOU between DOE and New Jersey, OE completed a resiliency assessment and feasibility study for constructing and operating a microgrid to support NJ TRANSIT. Based on the OE design, the microgrid is being built by NJ TRANSIT, under a competitive grant from the Federal Transit Administration, to fortify its multimodal transportation network.
- ✓ OE released the Lantern Live mobile app to provide helpful information regarding electrical outages and locating gas stations during emergencies.
- ✓ OE work in redox battery and cell optimization led to a bench-top battery with 4 times the power and a 50 percent greater current density, compared to the 2013 state of the art.

- **Infrastructure Security and Energy Restoration**

The Infrastructure Security and Energy Restoration program (\$14,000,000) leads the Department's efforts as the Energy Sector-Specific Agency on national efforts, in cooperation with public and private sector stakeholders to enhance the reliability, survivability, and resiliency of the U.S. energy infrastructure. The Request includes a series of regional energy assurance training workshops to assess state and local government response to energy events.

- **State Energy Reliability and Assurance Grants**

The State Energy Reliability and Assurance Grants program (\$63,000,000) is a new initiative in FY 2016 that would provide grants to states, localities, and tribal governments in support of electricity transmission, storage, and distribution reliability and energy assurance. States are excellent test beds for the evolution of the electric power system and, with Federal support, can provide innovative ways to address new trends through more coordinated and efficient processes that allow the electric sector to reliably provide services that meet environmental, resilience, efficiency, and energy assurance goals. The Department is uniquely positioned to facilitate the coordination of these planning processes within states and across state lines.