DOE OE: Federal Support for Grid Modernization

Department of Energy (DOE), Office of Electricity Delivery & Energy Reliability (OE)

- The OE is tasked with improving grid resiliency and reliability during natural disasters or hostile attacks.
- The duty of overseeing the grid is vital as the U.S. invests in smart grid technologies to enable better resource management and efficiency. The aging infrastructure that currently makes up the grid is in need of transformational updates to keep pace with new technologies.
- The OE has the duty of planning the next generation of grid technology and investment, including a new mix of power supply from distributed sources, and new smart grid capabilities to better respond to changes in electricity demand.
- The OE will continue to review permitting processes and map the installation of next-generation technologies to improve resiliency and reliability.

The U.S. Department of Energy's Role via Office of Electricity's Electricity Delivery and Energy Reliability Program

There are two main areas of focus for the DOE's Office of Electricity Delivery and Energy Reliability (OE): grid modernization and resiliency in electric infrastructure.

Upgrades to the electric grid have taken on a new focus in the decade and a half since the **National Transmission Grid Study** that illustrated deep concerns for the future reliability of the grid without critical investment and upgrades. In addition to this 2002 study, the 2017 DOE Staff report to the Secretary **further illustrated** concerns of grid resilience with an aging infrastructure and deferred maintenance. Much of the concern stems from power plant closures, primarily coal-fired plants, due to market pressures from lower cost natural gas and renewables.

The OE has four programmatic functions to ensure our modernized grid is resilient and secure:

ADVANCED GRID RESOURCES AND DEVELOPMENT

As more distributed generation resources come online, primarily through residential solar and new wind farms, the grid will need to address the challenges of inconsistent energy flows. These challenges affect reliability as **energy production rapidly shifts** during the periods of sunrise and sunset. A smart grid will enable the integration of these new energy sources, unlocking efficiencies and **"enhanced interconnectivity."** Capable of operating independently from the grid as a whole, microgrid infrastructure will allow for timely power restoration even when the larger grid is offline. Microgrids also offer **prominent benefits** such as integrated distributed energy sources locally, leading to greater efficiency as part of a smart grid.

TRANSMISSION PERMITTING AND TECHNICAL ASSISTANCE

One of the key elements to deploy new energy resources is an efficient and timely permitting process. As new energy sources come online, there is a vital need to ensure that projects are not unnecessarily delayed. While the **Integrated Inter-Agency Pre-application (IIP) process** is a step in the right direction, a more thorough review of permitting roadblocks remains a high priority.

INFRASTRUCTURE SECURITY AND ENERGY RESTORATION (ISER)

ISER is tasked with securing the electric grid against threats and coordinating with federal and local partners for disaster response. This includes working with the Department of Homeland Security to adhere to the **National Infrastructure Protection Plan.** Modernization efforts will **enable faster response times to disasters** and affected communities to get back online faster.

CYBERSECURITY AND EMERGING THREATS RESEARCH AND DEVELOPMENT (CET R&D)

The security of America's energy infrastructure is paramount and **ensuring proactive management** of inbound threats is vital to modernization efforts. Without cybersecurity, efficiency achieved through modernization could be undone. The CET R&D program is tasked with anticipating attacks to ensure the grid remains secure, reliable, and resilient.

Why Grid Reliability?

In the U.S., there's never a question as to whether or not the lights will turn on when the switch is flipped. Thanks to a diverse network of energy resources that power the grid, most Americans do not regularly deal with rolling blackouts or unexplained outages.

While the current system of transmission and distribution is adequate, integrating more distributed energy sources from renewables will be an important step in the shift towards clean energy, but will add complexity to the systems. Investing in demand response functionality to allow the grid to rapidly adapt to local changes in wind or solar production is critical.

Why Grid Resiliency?

Grid resiliency is the ability to withstand and reduce the magnitude and/or duration of disruptive events, which includes the capability to anticipate, absorb, adapt to, and/or rapidly recover from such an event. However, there is substantial ongoing discussion about what grid resiliency means in practice. The current grid is at a nexus of distributed generation, new insights from devices connected to the Internet of Things (IoT) and an ever-aging core infrastructure.