San Antonio, TX

Transforming the Resilience of Critical Infrastructure Systems and Communities

Resilience Week Objective: A Symposium dedicated to advancing the interdisciplinary dialog on policy and technologies that accelerate critical infrastructure and community resilience to unexpected and malicious threats.

Session 07: *Department of Energy – Office of Electricity (DOE-OE)* *Special Session Panels*

Session Chairs

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Panel Session 1: Advanced Sensors and Data Analytics for Enhanced Electric Grid Resilience

To address security and resilience of the nation's critical energy infrastructure, the U.S. Department of Energy Office of Electricity has four priorities identified for its Advanced Grid Research and Development efforts. Among the four is to revolutionize sensing technology utilization, which pursues integration of high-fidelity, low-cost sensing technology for predictive and correlation modeling for electricity. Addressing this priority, the recently released DOE document, Sensor Technologies and Data Analytics, outlines a five-year program plan to meet the needs of monitoring and managing electric grid assets and operations—from transmission to distribution to end-use load. The report also describes monitoring needs for interdependencies of the electric grid and other critical infrastructures, in an environment with increasing threats of malignant attacks and extreme weather. First-year implementation of this multi-year program plan has begun, with projects selected competitively from solicitations to the Grid Modernization Laboratory Consortium and the private sector, respectively. All of these projects are being carried out under a team structure involving research institutions (national laboratories, companies, and/or universities) and industries (vendors, utilities).

This panel will feature invited presentations from these recently awarded projects on implementing the DOE's Sensor Technology and Data Analytics program plan. Presentation topics will cover several key technical areas: enhanced power system resilience, incipient failure detection, monitoring for critical infrastructure interdependencies, and detecting and forecasting behind-the-meter resources. Big data analysis of synchrophasor data that crosscuts some of the technical areas will also be featured. Recent progress and planned activities of each project will be presented.

Panel Session 2: North American Electric Resiliency Model

Improving our Nation's power grid resilience is presently limited by the lack of models and quantitative tools that fully integrate and analyze the interdependencies among energy infrastructure. Investing in the tools, models, and expertise across infrastructure sectors ensures increased preparedness for natural and adversarial events. To address this deficiency an ambitious effort initiated by the U.S. Department of Energy (DOE), Office of Electricity (OE) — the North American Energy Resiliency Model (NAERM) — will enhance this capability to ensure reliable and resilient , energy delivery across multiple energy sectors while considering a range of large-scale, emerging threats (natural and man-made). DOE will undergo this effort in support of its critical infrastructure protection responsibilities for the energy sector under Presidential Policy Directive-21 that defines resilience as "the ability to prepare for and adapt to changing conditions and withstand and recover rapidly from disruptions. Resilience includes the ability to withstand and recover from deliberate attacks, accidents, or naturally occurring threats of incidents". The panel session will feature 4 speakers from National Labs that are involve with this initiative. The speakers will provide insight into different aspects of this initiative that is currently underway, and a vision for the future.

Panel Session 3: Institutional Decision-Making for Resilience

Scope: A key concern in the utility industry is how to factor resilience into planning processes leading to effective infrastructure investment decisions. Currently, commonly-accepted definitions, metrics, methodology and institutional practices are in place to guide efficiency and reliability improvements, but not for resilience. This session will examine the institutional framework needed to support resilience decision-making and provide the latest advancements in approaches that can guide regulators and utilities in their efforts to address electric grid resilience.

Panel Session 4: Microgrids for Enhanced Resilience

Microgrids have the potential to contribute vitally to transforming our nation's electric grid from generation to end use, as they offer unique physical and operating characteristics for enhanced reliability and resilience. The U.S. Department of Energy Office of Electricity (OE) has been focusing microgrid R&D on providing energy surety to all critical facilities and improving overall grid reliability and resilience. Targeting microgrids for enhanced resilience, R&D is aimed to develop advanced capabilities to provide continuing power to critical loads during a grid outage, support grid stability during abnormal and emergency conditions, and support system recovery and restoration, while providing customer value such as power quality and local load reliability. These capabilities are in various stages of development, from simulation to emulation to in-field validation.

This panel will feature invited presentations on the OE-supported microgrid R&D efforts for enhanced resilience. The presentations will include resilience strategy and tools, planning and design tools, and operations and control technologies, all being developed for individual and networked microgrids ranging in applications from remote communities to urban settings to critical defense facilities. Collectively, the panel will provide a representation of OE's key microgrid R&D effort for enhanced resilience, including major progress to date and ongoing and planned activities.