Driving Grid Resilience

Office of Electricity - Advanced Grid R&D

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Transmission Reliability

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The Office of Electricity (OE) provides national leadership to ensure that the Nation’s energy delivery system is secure, resilient and reliable. OE works to develop new technologies to improve the infrastructure that brings electricity into our homes, offices, and factories, and the federal and state electricity policies and programs that shape electricity system planning and market operations.

OUR MISSION
OE drives electric grid modernization and resiliency in the energy infrastructure. OE leads the Department of Energy’s efforts to ensure a resilient, reliable, and flexible electricity system. OE accomplishes this mission through research, partnerships, facilitation, and modeling and analytics.
OE’s Advanced Grid R&D Portfolio

**Electric Power Grid**

**RTO/ISOs**
Coordinates, controls and monitors transmission grid and wholesale market.

**Electric Utilities**
Monitor and operate Transmission and Distribution networks.

**Energy Storage**

**Wide Area Sensors**
Measurement and Monitoring

**Transformers, Protection, Power Control Devices**

**Distribution Automation and Management**

**Microgrids**

**States/Territories**

**Communities**

**Electricity Producers**

**Electricity Consumers**

**Distributed Energy Resources**

**Advanced Grid Research**

DEPARTMENT OF ENERGY
# Integrated Technical Thrusts

<table>
<thead>
<tr>
<th></th>
<th></th>
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<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Create grid planning tools that integrate transmission and distribution system dynamics over a variety of time and spatial scales</td>
<td>• Design &amp; test technologies that enhance/enable the capability to control and coordinate millions of assets for grid operations through EMS/DMS</td>
<td>• Explore integrating advanced sensors, communications, visualization and analytics to enable 100% observability</td>
<td>• Evaluate and develop new devices and components for improved reliability/resilience</td>
<td>• Develop resilient and advanced security (cyber and physical) solutions and real-time incident response capabilities for emerging technologies and systems</td>
<td>• Enable regulators &amp; utility/grid operators to make more informed decisions &amp; reduce risks on key issues that influence the future electric grid/power sector</td>
</tr>
</tbody>
</table>
### Advanced Grid R&D Programs At-A-Glance

<table>
<thead>
<tr>
<th>Grid Controls and Communications</th>
<th>Transmission Reliability and Resilience</th>
<th>Synchrophasors</th>
<th>Advanced Grid Modeling</th>
</tr>
</thead>
<tbody>
<tr>
<td>Grid Systems and Components</td>
<td>Resilient Distribution Systems</td>
<td>Advanced Distribution Systems</td>
<td>Advanced Microgrids</td>
</tr>
<tr>
<td>Grid Systems and Components</td>
<td>Transformer Resilience and Advanced Components</td>
<td>Advanced Power Grid Components</td>
<td></td>
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<tr>
<td>Grid Systems and Components</td>
<td>Energy Storage Systems</td>
<td>Energy Storage</td>
<td></td>
</tr>
</tbody>
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**Advanced Grid Modeling**
- Synchrophasors
- Advanced Grid Modeling
- Dynamic Controls and Communications
- High-Fidelity & Low-Cost Sensors
- Advanced Power Grid Components
- Energy Storage
Five Priorities for OE Going Forward

2. Operational Strategy for Cyber and Physical Threats
3. Megawatt-Scale Grid Storage
4. Revolutionize Sensing Technology Utilization
5. Puerto Rico and US Virgin Islands Resiliency Efforts
Advanced Synchrophasor Program

North American SynchroPhasor Initiative

• Realize promise of synchrophasor technology
• Facilitate intelligent deployment of synchrophasors

Advanced Application Development

• Automatic switchable network for reliable early warning for informed remedial reaction
• Reliability monitoring and NERC compliance tools
• Oscillation behavior

Reliability and Models

• Research, develop, and implement electricity infrastructure and market simulations

Equipment Standards

• Data quality
• Device calibration (NIST)