



U.S. DEPARTMENT OF
ENERGY

2020 Microgrid R&D Program Peer Review



**Advanced Grid
Research**

OFFICE OF ELECTRICITY
US DEPARTMENT OF ENERGY

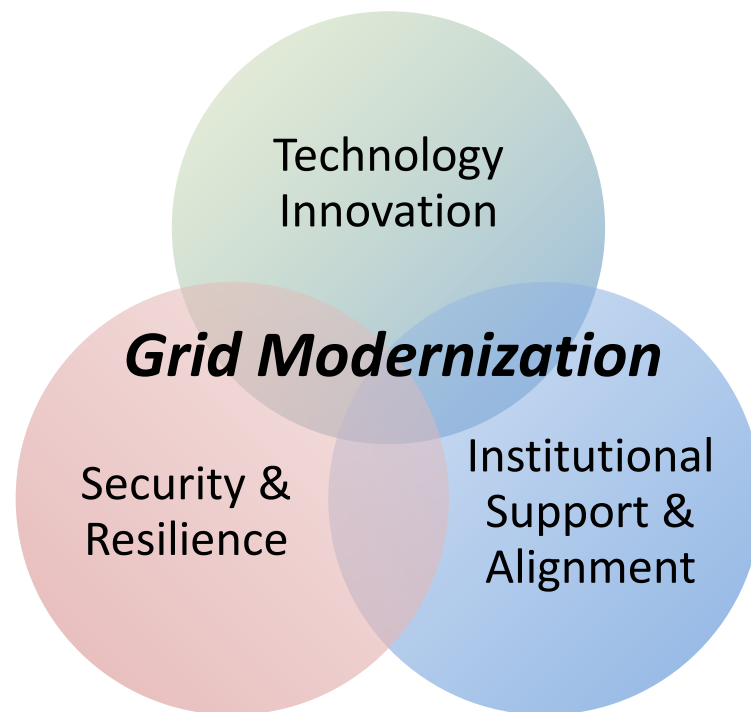
Program Manager: Dan Ton

June 2020

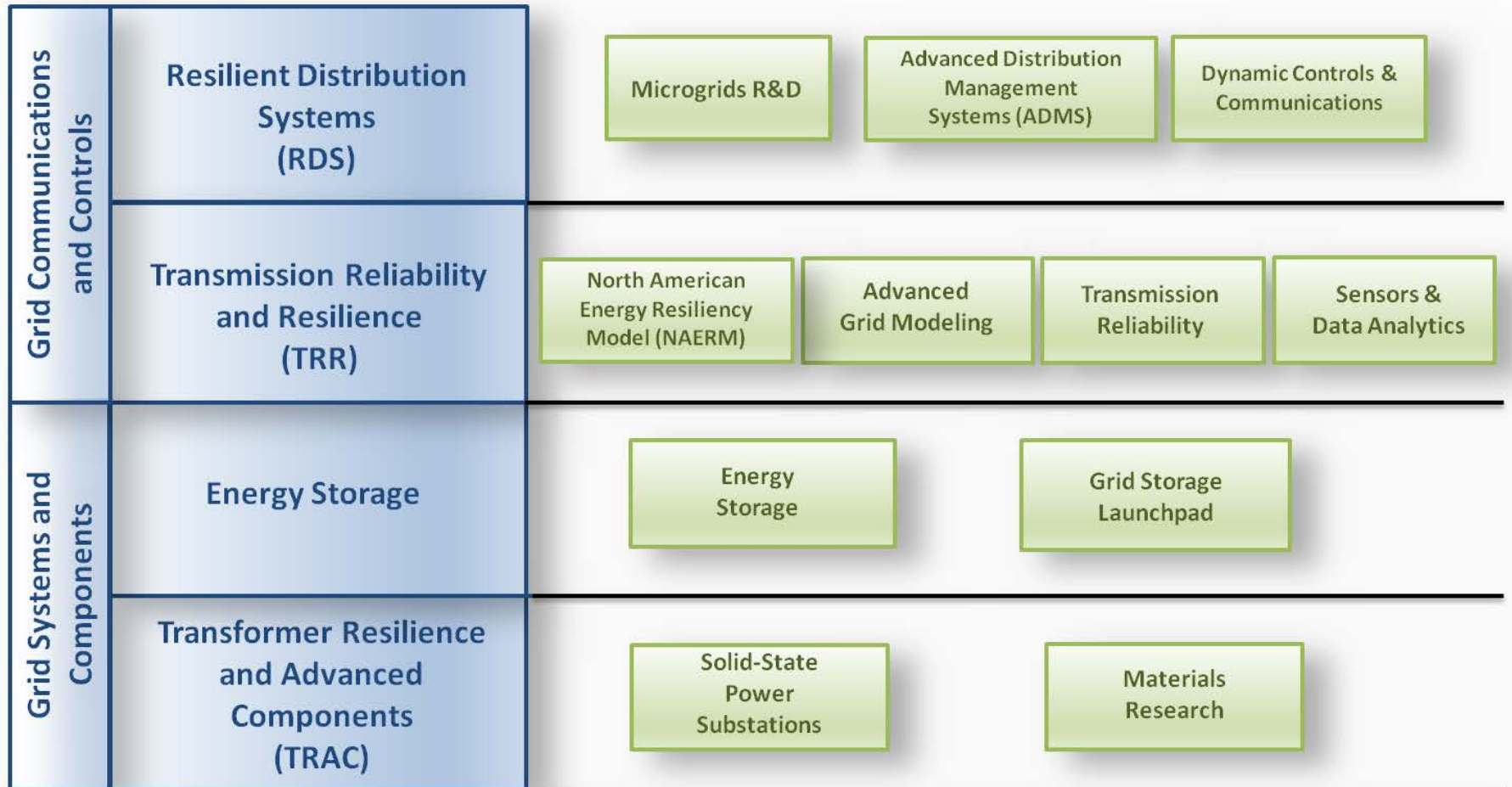
DOE Office of Electricity

The Office of Electricity (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 serves as the Energy Sector Specific lead for the Federal emergency response when activated by DHS/FEMA.



Advanced Grid R&D within OE



Microgrid R&D Program Areas

**Remote, Off-Grid
Microgrids**

**Grid-Connected
Microgrids**

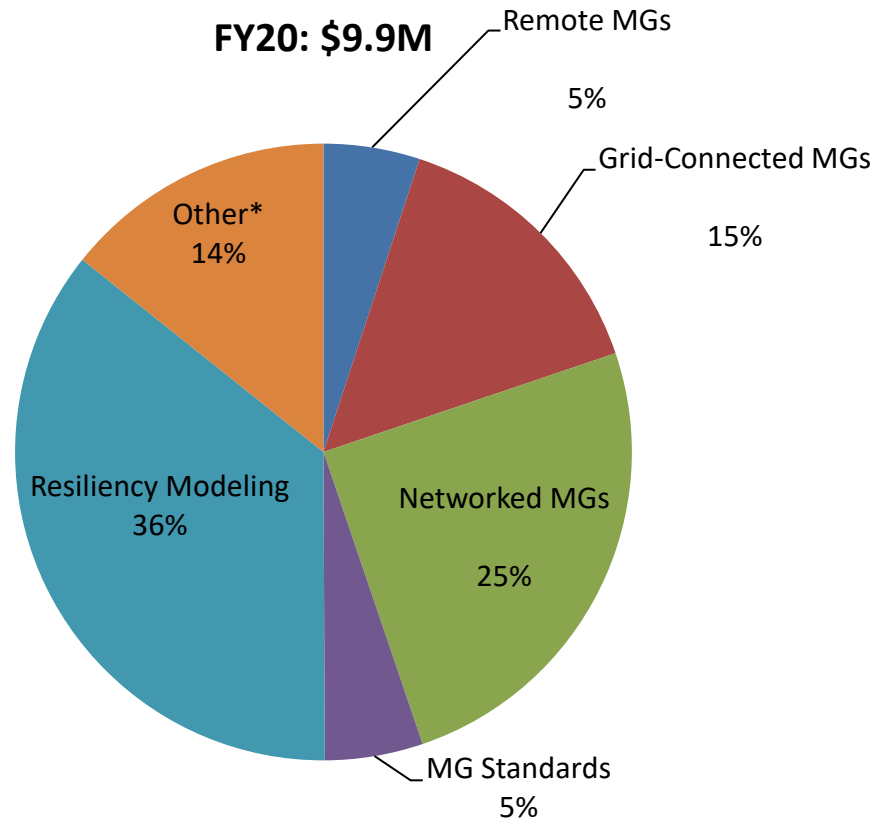
**Networked
Microgrids**

**Resiliency
Modeling
(Inc. DCEI Applications)**

**Standards and
Testing**



FY 20 Funding by Program Area



* Other: Corporate + NARUC-NASEO MG State WG



Remote, Off-grid Microgrids

Meet community-specific goals.

In Alaska, the goal is to achieve a reduction in total imported fuel usage by 50%, while lowering system life-cycle cost and improving reliability and resiliency.

Project being Presented

Wednesday	Title
SNL	Alaska St Mary's: A Case Study in Advanced Power Electronics



Grid-Connected Microgrids

Develop commercial scale (< 10 MW) microgrid systems that:

- Reduce outage time of critical loads by > 98% at a cost comparable to non-integrated baseline solutions (uninterruptible power supply + diesel generator)
- Reduce emissions by > 20%
- Improve system energy efficiencies by > 20%
- Meet individual community-defined objectives for electricity system resiliency

Projects being Presented

Wednesday	Topic
LBNL	Risk-controlled Expansion Planning with Distributed Resources (REPAIR)
ORNL	Advanced Protection Schemes for Microgrids
SNL	Advanced Protection System for Microgrids



Networked Microgrids

Achieve the following, as compared to a baseline of individually designed and operated microgrids:

- During extreme event outages, improve customer-level reliability and resilience by:
 - ✓ Extending duration of electrical service to critical loads by at least 25%;
 - ✓ Maintaining electrical service for all critical loads during a single generator contingency in any microgrid; and
 - ✓ Lowering capital expense by at least 15%.
- During normal distribution grid operations:
 - ✓ Reduce the utility cost of serving the microgrids by at least 10%.

Project being Presented

Wednesday	Topic
LANL/NREL/SNL	Resilient Operations of Networked Microgrids (RONM)



Resiliency Modeling

Accomplish 20% reduction in systemic impact (calculated from outage duration and frequency and avoided lost load value) under extreme weather scenarios

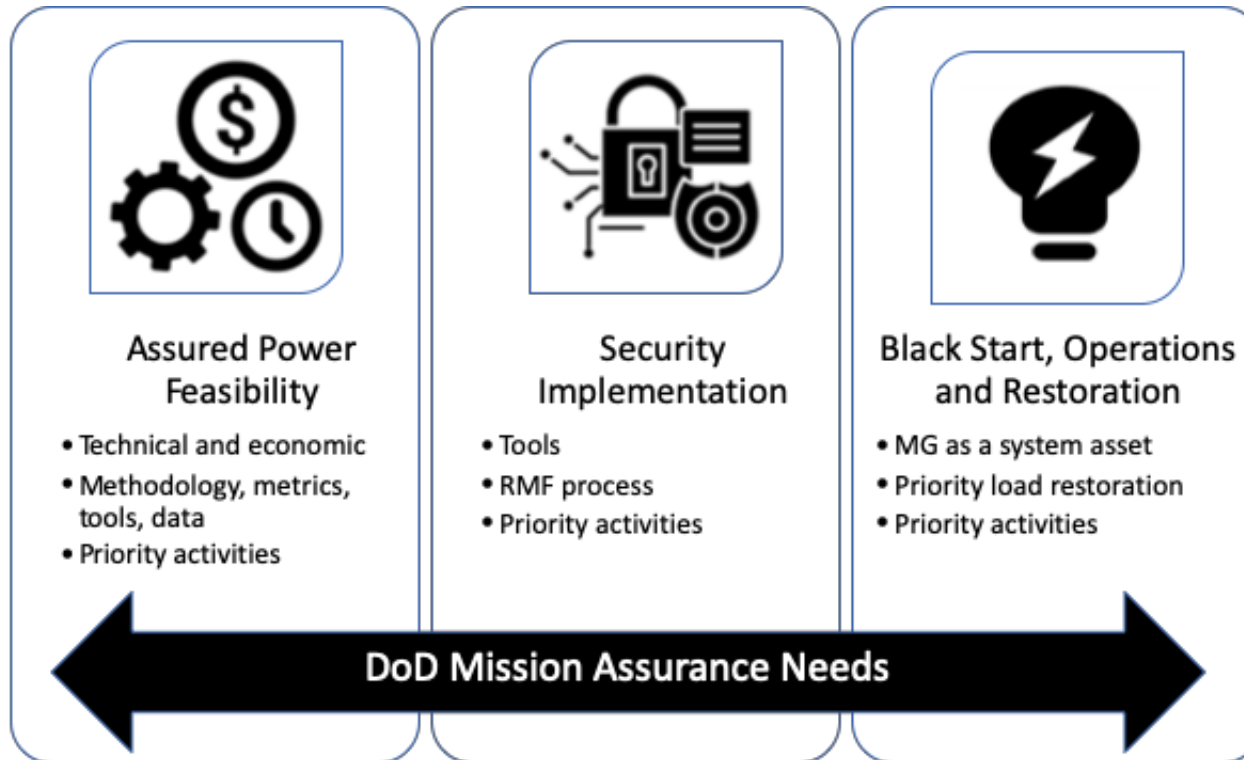
Projects being Presented

Wednesday	Topic
SNL	Critical Infrastructure Resilience Technical Assistance
Thursday	Topic
PNNL	Resilient Electric Distribution Grid R&D
Virginia Tech	Enhancing the Resiliency of a Cyber-Microgrid System; Microgrid Building Blocks
University of California, Irvine	Self-Healing Microgrids
ANL	NERC SPIDERWG Support – Studies of System Planning Impacts from Distributed Energy Resources Using TDCosim



Resiliency Modeling for Defense Critical Electric Infrastructure (DCEI) Applications

Produce rapid, repeatable methodology, by employing existing and proven tools from DOE, DoD, and DHS to perform a threat-informed technology assessment for providing assured power at critical defense facilities



The project review is closed to general public to conform to classification guidance.



International Collaboration

Under U.S.-India Joint Clean Energy Research and Development Center (JCERDC), a collaboration (10 academic and 18 private partners from India and U.S.) to develop and demonstrate DSO functions for optimal utilization and management of DER by interfacing DER control and microgrid control system as well as analysis of prototype feeders with high penetration of energy storage.

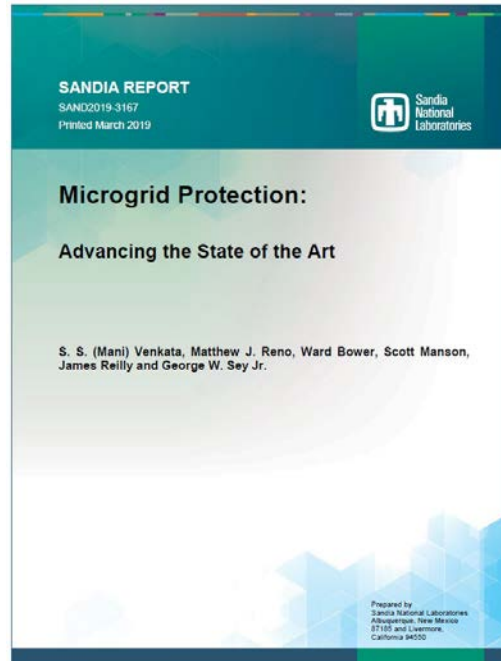
Project being Presented

Tuesday	Topic
Washington State University	<i>UI-ASSIST</i> : U.S.-India Collaborative for Smart Distribution System with Storage

Microgrid Standards

FY19

- Established respective Working Groups for the approved PARs
 - IEEE P2030.11: Distributed Energy Resources Management Systems (DERMS) Functional Specification
 - IEEE P2030.12: Guide for the Design of Microgrid Protection Systems
- Published *Microgrid Protection: Advancing the State of the Art*
 - Laid out technical basis for guidelines for MG protection



FY20-FY21

- Continuing support in developing two new standards toward completion
 - IEEE P2030.11: Aug 2021
 - IEEE P2030.12: Dec 2022
- Continuing to promote the acceptance and adoption of approved MG standards
 - IEEE Std 2030.7
 - IEEE Std 2030.8

Broad Partnerships



Peer Review Meeting: General Items

- 40 minutes for each project
 - 30 minutes for uninterrupted presentation
 - 10 minutes for Q/A , addressing Qs in the order of:
peer reviewers → DOE personnel → general audience
- Peer reviewers' evaluation results to be used by the DOE to plan for FY21 tasks
- Peer review presentations and project summaries to be made available after the meeting

Thank You

Questions?

Contact:

Dan Ton

Microgrid R&D Program Manager, OE

Dan.Ton@hq.doe.gov