



Photos by Dennis Schroeder, NREL 07361

Transforming **ENERGY** through the Solar Energy Innovation Network

The United States electric grid is rapidly developing as more advanced energy technologies—

such as photovoltaic (PV) systems, battery storage, and electric vehicles (EVs)—become more commonplace. Stakeholders are facing new challenges and opportunities as these distributed energy resources (DERs) drive grid modernization. The Solar Energy Innovation Network is a collaborative research effort that inspires teams of diverse stakeholders to develop

and demonstrate new ways for solar energy and other DERs to improve the affordability, reliability, and resiliency of the nation's electric grid.

How it Works

By pairing participating teams from across the U.S. with analytical support from a broad set of technical experts, the innovation network is driving the development of novel applications of solar energy and other DERs. The rigorous demonstration and validation of these applications in real-world laboratories will accelerate their widespread adoption. The program is divided into two rounds,



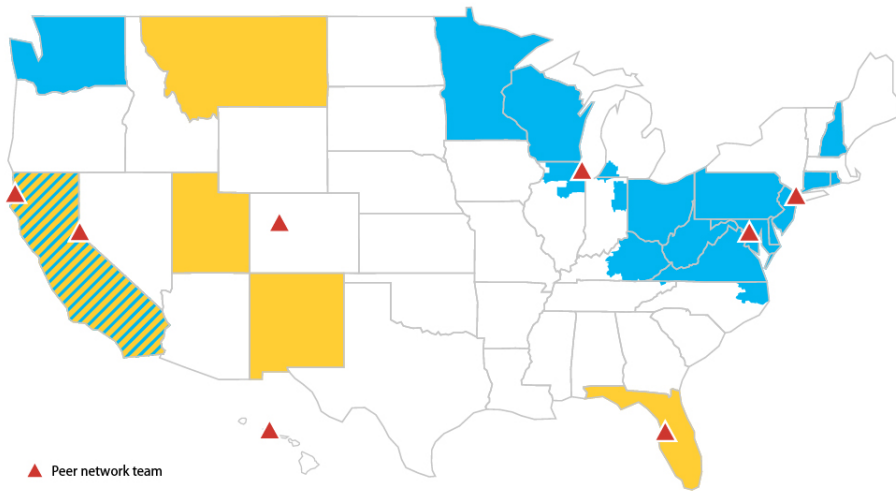
At the first working session, stakeholder teams shared ideas and further refined their approaches to local challenges and goals, while working with NREL and the Rocky Mountain Institute to apply each organization's technical expertise toward those challenges and goals.

Photos by Dennis Schroeder, NREL 50328

one of which is ongoing and the other is planned for the fall of 2018. Each round of the innovation network will be composed of two cohorts, each of which are organized around shared areas of interest.

Visit www.nrel.gov/solar/solar-energy-innovation-network.html to learn more about the innovation network.





▲ Peer network team

Options Analysis
Improving reliability and affordability of solar energy through options analysis and systems design

Grid Flex
Improving grid flexibility and resiliency through advanced siting and operations of solar + DER

Who's Involved

Each of the nine teams participating in the first round brings together a range of stakeholders—including utilities, state and local governments, nonprofits, companies, and system operators—to ensure that the solutions they develop benefit from diverse perspectives and community buy-in. These teams are then organized into two cohorts, based on shared goals and challenges.

Improving Reliability and Affordability of Renewable Energy through Options Analysis and Systems Design (or “Options Analysis”) Cohort

This cohort will focus on identifying the grid impacts and costs anticipated with various penetration levels of solar and other DERs. This includes: developing data sets and geo-spatial mapping tools that assess impacts on reliability of various levels of variable generation at municipal or utility service territory scale; identifying and validating new

solar siting methods that minimize grid impacts and reduce distribution system costs; and exploring alternative rate designs and compensation mechanisms, among other things.

Improving Grid Flexibility and Resiliency through Advanced Siting and Operations of Solar + DER (or “Grid Flex”) Cohort

This cohort will focus on quantifying the value of combining solar and other DERs, such as storage, for grid flexibility, reliability, and resiliency. Activities include: assessing opportunities to improve PV's value through siting, load management, storage, and better integration with transportation electrification; evaluating options for rate structures and other compensation mechanisms to effectively value solar + DER systems' various value streams; and exploring program and policy options to maximize the value of solar + DER, including locational value and wholesale market participation.

The project teams selected for the Options Analysis Cohort are:

- Orlando: Renewable and Resilient – led by the City of Orlando
- Analysis of Distributed Solar Potential in San Diego – led by the City of San Diego
- Montana Solar-Powered Community Transportation Initiative – led by the Montana Renewable Energy Association
- Renewable Electricity Impacts and Solutions in Utah – led by Utah Clean Energy
- Resilient Renewable Energy Roadmap for Rural Electric Cooperatives – led by Kit Carson Electric Cooperative

Topics of focus for this cohort include:

- Impact of electrification and demand-side management measures on utility system load profiles
- Pre-requisites for effective roadmapping and assessment of impacts and options for high penetrations of variable renewable energy

The project teams selected for the Grid Flex Cohort are:

- Solar PV for Advanced System Resilience and Restoration – led by PJM Interconnection and NARUC
- Multistate Initiative to Develop Solar in Locations that Provide Benefits to the Grid – led by Clean Energy States Alliance (CESA)
- Technological and Market Deployment Synergies between EVs and Solar DG Using EV Charging to Add Value to Distributed Solar – led by Great Plains Institute
- Exploring Advanced Rate Structures to Expedite Solar + DER Deployment – led by the Center for Climate Protection

Topics of focus for this cohort include:

- Locational value of PV, including evaluating dimensions of value, emerging approaches, and key challenges
- Review of advanced rate design concepts, such as varying pricing by location or mandatory residential demand charges
- Capturing the full value of solar + DER through markets and tariffs