

Unlocking the Power of Distributed Energy Resources

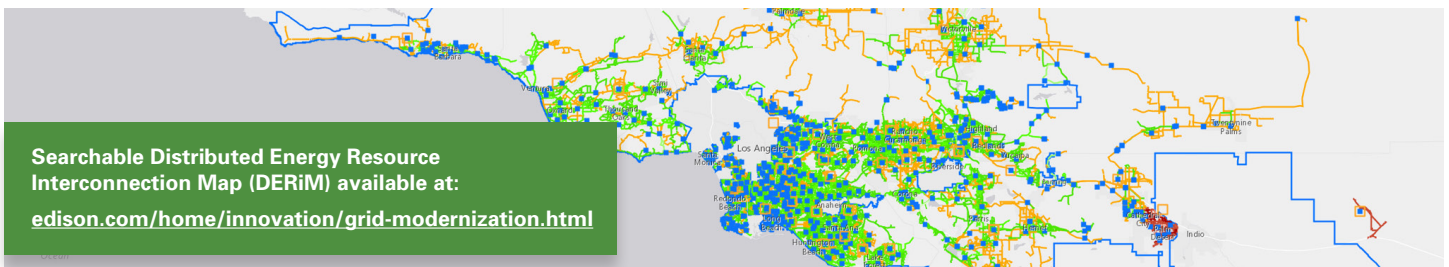
Demonstration Projects in SCE's Distribution Resources Plan



The SCE energy grid is evolving to enhance system reliability and safety, support customer use of clean energy technologies, and help California meet its clean energy goals.

SCE's Distribution Resources Plan lays out a roadmap to build the energy grid of the future. The grid will increasingly rely on clean energy technologies such as solar energy (from rooftop solar panels, for example), battery storage systems, energy efficiency, electric vehicles and smart usage programs. Each of these renewable resources is a type of distributed energy resource, or DER.

A key element of the Distribution Resources Plan is a suite of five studies to help demonstrate how DERs could augment or replace traditional sources of power on the local grid. These studies will produce findings that will be incorporated in future grid planning.



Demonstration A: Dynamic Integration Capacity Analysis

Demonstration A is a model, based on a computer simulation that looks at the number of individual DERs that could be supported on each section of a single distribution circuit before the system would need to be upgraded. It will help determine where the grid can accommodate a large volume of DERs without significant upgrades. We are examining 83 circuits in both urban and rural locations.

Status: Project was completed in December 2016.

Next steps: The results of this research have been added to our publicly available mapping tool, DERiM. SCE will complete similar studies of more than 4600 circuits by July 1, 2017 using lessons learned from Demonstration A.

Demonstration B: Optimal Location Benefit Analysis

This is a calculation tool to provide insight into where DERs could provide equal or better value than traditional capital investment projects such as new distribution circuits and substation upgrades. The completed model could enable faster and easier adoption of DERs into the grid. When completed and validated, this model will also help developers find locations where DERs would be useful and economically beneficial.

Status: Project was completed in December 2016.

Next steps: The results of this research have been added to our publicly available mapping tool, DERiM. The model will be tested and validated in the field (Demonstration C).

Demonstration C: Demonstrate DER Locational Benefits

SCE plans to acquire and install a wide representative group of DERs (such as rooftop solar and battery storage) within a specific test area. We will look at whether these DERs can defer traditional capital investment projects such as the building of new distribution circuits and could provide additional electrical services. The selected test area is within the region of SCE's Preferred Resources Pilot.

Status: The team is acquiring and deploying DERs in the test area, and looking at a range of customers' electrical consumption patterns to determine their current electrical use.

Next steps: Additional design work will be completed following California Public Utilities Commission (CPUC) approval. We anticipate completing the project and issuing a final report in the fourth quarter of 2019.

Demonstration D: High DER Penetration

This field demonstration will look at how a group of circuits can handle increased penetration of DERs (particularly rooftop solar and battery storage). Some of the DERs will be owned by SCE and others will be owned by third parties. The demonstration will serve as a test bed for emerging technologies and leverage other research projects that have been funded under the California Solar Initiative. A secondary goal is to give SCE operators better information to help them safely and reliably operate the distribution grid with large number of DERs present.

Status: The location for the demonstration will be the Camden substation area in south Santa Ana and northern Costa Mesa. Site selection for the utility-owned battery systems is in progress. Development and laboratory testing of the project control software and radio system are underway.

Next steps: Equipment and control software should be installed by mid-2017. Additional control system capabilities will be added by early 2018. Results and project updates will be submitted to the state as part of future Distribution Resource Plan filings.

Demonstration E: Microgrid

SCE plans to construct and field-test a multi-customer microgrid in a residential neighborhood in Irvine, CA. The goal of this demonstration is to better understand how to design microgrids to improve the reliability of the electric grid.

Status: A potential site has been selected and initial high-level design has been completed to assess the cost. The demonstration will proceed following CPUC approval, expected early 2017.

Next steps: Once the CPUC approval is obtained, more detailed design and laboratory testing will begin. We are currently anticipating that the field demonstration will begin in early 2019.

Please visit edison.com/home/innovation/grid-modernization.html for links to more information, including:

- **DERiM:** The Distributed Energy Resource Interconnection Map allows solar energy providers and customers to see the level of renewable energy penetration in their neighborhoods.
- **Distribution Resources Plan:** Our roadmap to the energy future was filed with the California Public Utilities Committee on July 1, 2015.
- **Preferred Resources Pilot:** A multi-year study to determine whether clean-energy resources can offset increasing customer demand for electricity in central Orange County, California.
- **White Paper:** The Emerging Clean Energy Economy is our discussion of the path to a modern electricity distribution grid and enhanced utility capabilities.

For more information on the California Solar Initiative, visit www.gosolarcalifornia.ca.gov