SOUTHERN CALIFORNIA EDISON®
Energy for What's Ahead℠

MICROGRIDS:

Grid Modernization Planning

Southern California Edison supports customers in achieving their energy goals and clean energy solutions, and is engaged in research to understand whether microgrids could be a cost-effective alternative to other technologies. Microgrid components that incorporate clean energy solutions like solar power and energy storage can improve air quality and reduce GHG emissions. SCE is engaged in research and demonstration projects to better understand whether combining these components into microgrids could improve grid resiliency, address specific power intermittency issues and help customers increase efficiency or reduce costs.

WHAT IS A MICROGRID?

A microgrid is a system that has its own source or sources of power (renewable, traditional or a combination of both) and has the ability to serve the energy needs of a defined and limited number of customers. Microgrids have a traditional grid connection and can function either connected to or islanded (untied) from the grid. When they are islanded, they can operate autonomously to support specific power needs in unique situations.

CAN A MICROGRID REPLACE THE GRID?

Microgrids depend on the support of the traditional grid because there are times when microgrid resources are not available to serve customers' energy needs.

Clean-energy microgrids are not currently a viable long-term alternative to the grid. Developing all of the needed generation and energy storage to function completely islanded for prolonged periods is an expensive and logistically difficult process. For example, for a solar energy-based microgrid to supplant traditional power 24 hours a day, it would need to be large enough to produce both enough energy for customers to use all day and enough excess energy to keep the lights on once the sun has gone down, and it would need to be tied to an energy storage facility big enough to store the excess production. This is expensive, and, using today's technologies, would require an enormous amount of space, both for solar arrays and for energy storage[1].

MICROGRIDS IN SCE SERVICE AREA

There are two models for microgrids in our service territory:

- **Single-meter microgrids** serve one customer exclusively, and, since the elements of the microgrid are within the customer's operations, SCE has no ownership stake or visibility. Some industrial and commercial customers within our service territory use these systems to provide greater reliability and to shift their energy use in order to take advantage of lower off-peak rates.
- **Community microgrids** serve groups of customers within a limited geographical area and the energy company manages the elements of the microgrid, including one or more sources of generation and potentially storage.

1 For instance, our Mira Loma energy storage project provides 80MWh of storage, which could power 5,000 homes for 12 hours - but it takes up more than 100,000 square feet - almost double the footprint of a football field. In urban and suburban areas such as the LA basin, siting, permitting and building on that scale may not be feasible.

UNDERSTANDING THE BENEFITS AND CHALLENGES OF MICROGRIDS

Microgrids potentially could serve remote communities and provide resiliency to support disaster and emergency operations. In addition, the enhanced control systems that enable a microgrid to operate when islanded from the system could potentially allow grid operators to have improved visibility into the energy production and demand on these circuits when they are not islanded.

The decision to build a microgrid could raise a number of challenging issues, including determining which public services and private businesses can participate. Furthermore, microgrid components such as enhanced control systems, renewable generation and energy storage might provide greater overall customer benefits if located separately where needed on the distribution system. For instance, energy storage could be more helpful when it is placed on a different (overloaded) circuit, or adjacent to substations or peaker plants.

DEMONSTRATION PROJECTS

Fort Irwin Microgrid
(Single-meter customer microgrid)

The Department of Defense has an established objective to enhance energy resiliency at its bases. As part of this effort, in October 2016, Fort Irwin, an Army base in San Bernardino County, requested that SCE "develop and install a micro-grid system to provide a reliable source of energy during prolonged power outages."[2] The microgrid will serve the fort's headquarters, training facilities, communications and data recording operations and health and safety facilities. The microgrid infrastructure (communications, switches, conductors, controllers, etc.) will be installed on the fort's side of the meter and will be paid for by the Army. The generation for the microgrid will be a combination of fossil fuel and renewables. Unlike most single-meter microgrids, SCE will control the operation of the microgrid when in island mode. Although it is anticipated that the microgrid will be islanded for approximately 35 hours per year, it should be able to support the electrical needs of the base during grid outages lasting up to 30 days. The project is expected to be in service by 2020.

Poole Hydro Microgrid
(Community microgrid)

As part of our Distribution Resources Plan[3], SCE will be building a microgrid near Poole hydro plant in the Eastern Sierra. This research project (DRP Demonstration E) should help us to better understand how to deploy microgrids and their component parts in remote communities. The area is served by a single transmission line. It includes the Marine Corps Mountain Warfare Training Center, and the population of the area fluctuates based on the activities at the training center. The microgrid will use hydroelectric energy supplied by the SCE Poole plant and is proposed to include existing private (customer-owned) solar and the addition of new energy storage systems. A new control system will control and monitor the component parts. It could provide additional reliability to the existing distribution system power, as well as other benefits, such as improvements in quality and voltage stability. The demonstration project is expected to be constructed by the end of 2018 and will be studied through 2019.

2 June 15, 2017 SCE's Proposed Microgrid Demonstration project with the U.S. Department of Defense (Advice Letter 3510-E), Attachment C. Quoted in: PUBLIC UTILITIES COMMISSION OF THE STATE OF CALIFORNIA, Agenda ID 15744 ENERGY DIVISION, RESOLUTION E-4840

3 Available at http://www.edison.com/home/innovation/grid-modernization.html