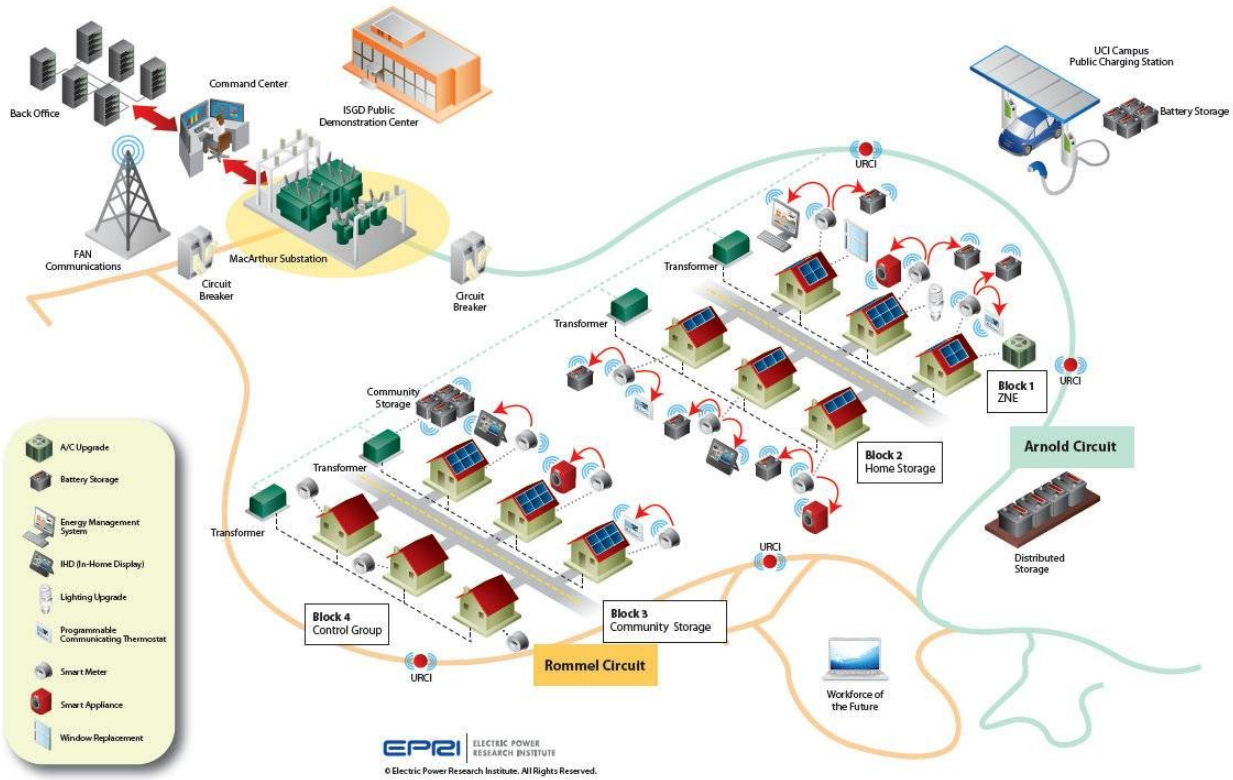
Southern California Edison's Smart Grid Demonstration Project

Irvine Smart Grid Demonstration (ISGD)



Southern California Edison (SCE) Project Overview

The objective of Southern California Edison's Irvine Smart Grid Demonstration (ISGD) is to verify, quantify, and validate the feasibility of integrating Smart Grid technologies. This project will deploy various technologies that represent the future of an integrated electric distribution system which is expected to be more reliable, secure, economic, efficient, safe, and environmentally-friendly than those in general use today. The project will showcase advanced technologies necessary to support a smarter, more robust electricity infrastructure that will be critical as the country begins to rely on greater amounts of renewable generation, to use electricity as a fuel for vehicles, and recruit consumers to become active participants in the energy supply chain. To accomplish these objectives, the Irvine Smart Grid Demonstration encompasses four key areas addressing a broad set of requirements: 1) energy smart customer devices, 2) year 2020 distribution system, 3) secure energy network, 4) workforce of the future.

EPRI Smart Grid Demonstration Project Overview

EPRI Smart Grid Demonstration Host-Site projects are part of a five-year collaborative initiative with 19 utility members focused on integrating distributed energy resources (DER) like demand response, storage, distributed generation, and distributed renewable generation to advance widespread, efficient, and cost effective deployment of utility and customer-side technologies in the distribution and to enhance overall power system operations. Host-site projects apply EPRI's IntelliGrid methodology to define requirements for technologies, communication, information, and control infrastructures that support integration of DER. Operations experience, integration issues, and lessons learned will reveal

the full range of standards and interoperability requirements needed to support the industry. Gaps revealed will identify critical areas of future smart grid research. Public updates are available on www.smartgrid.epri.com.

Project Criteria: 6 Critical Elements

SCE's Smart Grid project aligns with the six critical elements that EPRI has identified as key criteria to achieve the goals of our five-year Smart Grid initiative.

Integration of multiple distributed resource types

To further expose issues that need to be addressed and enable widespread integration of DER.

The project integrates multiple resource types (for example, demand response, local storage, and renewable sources) at both the system and customer levels. This includes energy storage behind the meter and at the circuit level, solar generation, and Advance Volt/volt-ampere-reactive (VAR) control.

Application of critical integration technologies and standards

To identify gaps associated with standards, harden critical integration technologies and advance adoption.

The project includes the design and demonstration of a unified telecommunications infrastructure to link regional transmission and distribution operations across inter-utility, intra-utility, to field networks and to energy smart devices in the home. System/data interoperability and cyber security will be primary elements. SCE anticipates using the following system standards in the project:

- ANSI C.12.xx
- HomePlug & Zigbee (802.15.4)
- Smart Energy Profile (SEP) 1.0 or 2.0
- ZigBee J1772
- IEC 61850 Family
- DNP3
- C37.118
- Comtrade
- Cellular based (1xRTT, GPRS, EVDO, CDMA, etc.)
- Internet based IP, TCP, HTTP)
- IEC 60870 (ICCP)
- WiMax

Incorporation of Dynamic Rates or other approaches to link wholesale conditions to customers

To evaluate integration issues and incentives associated with customer response and linking supply with demand.

The project will perform a communications test consisting of event signals on devices in the home that may be tied to dynamic rates, such as programmable communicating thermostats (PCTs) and smart appliances.

Integration into system planning and operations

Demonstrate integration tools and techniques to achieve full integration into system operations and planning.

In view of the scale, technological integration, and ubiquity of data associated with this project, SCE and its co-participants in this project will review its impact on current processes and standards for system planning, as well as the construction, operation, and maintenance of the grid, substations, circuits, and equipment. The objectives are to assess the policies, organizational design standards, job skills, workforce development needs, and future industry practices as a result of all the sub-projects. Assessment findings will be used to:

1. Propose new design standards with the goal of identifying the most effective structure for the organization going forward
2. Compare the current organizational structure with the one determined as most effective and create a detailed plan for how to attain that structure
3. Specify how individual roles and responsibilities in the future organization will differ from current ones

Compatibility with initiative goals and approach

Enable high-penetration of DER and advance interoperability and integration for the electric power industry.

The project is compatible with EPRI's underlying initiative approach and goals to enable high penetration of distributed energy resources (for example, renewable resources, local storage, and demand response) through full integration and supporting interoperability.

Leverage of additional funding sources

Secure required participation, commitment, and funding for a successful project.

This project will leverage funding from Southern California Edison, the U.S. Department of Energy (DOE), CEC Grant, and Partner cost share: GE, UCI, and Boeing.

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