ENERGY SYSTEMS INTEGRATION

ESI optimizes the design and performance of electrical, thermal, fuel, and water pathways at all scales.

NREL AND SAN DIEGO GAS & ELECTRIC COMPANY

San Diego Gas & Electric Company (SDG&E®) and NREL are collaborating to evaluate advanced metering infrastructure (AMI)-based controls for grid operations. With millions of new smart meters being deployed around the country, this collaboration will take the lead in determining how to generate insights from the AMI data, and to use these insights for real-time operations. Smart meters ensure availability of pervasive and continuous data from the grid-edge, a service that is not possible with traditional grid sensors.

R&D STRATEGY

NREL will perform a software and controller-based evaluation of the grid edge controller, devices, and sensors at the ESIF. Within the ESIF's distribution simulation environment, the AMI-based controls will be rigorously tested on NREL-developed models that are representative of SDG&E feeders. The models will be tuned to a high degree of accuracy by validating against AMI field data, providing a realistic, controlled environment.

The realistic models will also generate AMI test data for a variety of scenarios that cannot be obtained from field devices, allowing more thorough evaluation of the devices. The ESIF's high-performance computing capability will be used as needed to handle the large data generated by the AMI system.

IMPACT

Utilities have relied on conventional tools that use model-based controls for ensuring reliability and quality of service. Given the limitations from inaccurate models and the dynamic nature of the end-customer brought upon by proliferation of DERs like PV, controllable loads, and electric vehicles (EVs), there is a need to leverage pervasive grid-edge measurements like AMI data. For SDG&E's more than three million customers, efficient monitoring and control of energy use could potentially result in significant cost- and energy-savings. NREL's evaluation of AMI technology will provide SDG&E with an accurate simulation of AMI controls. The work will also result in the development of capabilities that allow utilities and researchers to leverage actual secondary AMI data to validate primary circuit models.

SDG&E today provides service to over 3.6 million consumers through 1.4 million electric meters and 900,000 natural gas meters in San Diego and southern Orange Counties. SDG&E's service area encompasses 4,100 square miles, covering two counties and 25 cities.

NREL and SDG&E are collaborating to determine how AMI data can be used for real-time operations. *Photo from iStock, 875403132*

Partner with NREL at the ESIF

User facility access to the ESIF is awarded through the review and approval of user proposals, depending on the scientific merit, suitability of the user facilities, and the appropriateness of the work to DOE objectives, and includes a signed user agreement for the facility.

For more information, please visit:
www.nrel.gov/esi/working_with.html
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The Energy Systems Integration Facility (ESIF) at the National Renewable Energy Laboratory (NREL) provides the R&D capabilities needed for private industry, academia, government, and public entities to collaborate on utility-scale solutions for integrating renewable energy and other efficiency technologies into our energy systems.

To learn more about the ESIF, visit: *www.nrel.gov/esif*.