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For example, 50 miles north of Sacramento in Browns Valley, California, Pacific Gas and Electric Co. (PG&E) recently deployed its first lithium-ion energy storage facility, which features 22 Tesla Powerpacks for a combined facility size of 500 kW/2000 kWh. Each about the size of a refrigerator, the Powerpacks, which feature a modular design adapted from Tesla"s electric vehicle technology, will help PG&E address peak demand on the substation and improve power quality and reliability.

Funded through the Electric Program Investment Charge (EPIC) program, PG&E worked with Cupertino Electric, a San Jose, California-based electrical engineering and construction firm, to design and install the system and kick off the project, titled EPIC 1.02 - Energy Storage for Distribution Operations.

The EPIC program enables California investor-owned utilities to develop smart grid technology demonstration and deployment projects, and evaluate how they support safety, reliability and affordability objectives for the benefit of their customers.

By building the new facility and testing key functionalities through the EPIC program, PG&E is exploring how best to meet the regulations set forth by California"s energy storage mandate. The utility is working with San Diego Gas & Electric (SDG&E) and Southern California Edison (SCE) to accomplish the targeted interconnection of 1.3 GW of energy storage resources by 2024, with much of these facilities either directly or indirectly enabling increased renewable generation on the grid.

In addition to being PG&E"s first lithium-ion storage facility, Browns Valley also represents the first time a Tesla energy storage system has been fully integrated into a utility SCADA system. While the facility performs peak-shaving autonomously on a typical day, PG&E can also manually schedule or directly dispatch the energy storage system at any time.

Lessons LearnedThrough project deployment, PG&E discovered best practices that it plans to use on future battery energy storage facilities. For example, with a utility project such as this, significant effort goes into the planning, design and construction of the energy storage facility. This level of effort is relatively fixed and does not scale linearly with project size. As such, from an efficiency perspective, it makes sense to build facilities larger when addressing the challenges of obtaining land, designing and procuring major equipment, and mobilizing labor.

For example, it doesn"t require a significant amount of additional effort to add more megawatt-hours of Powerpacks, just as SCE has done at the recently installed Mira Loma energy storage facility. SCE"s 20-MW/80-MWh facility is 40 times the size of PG&E"s first lithium-ion energy storage facility, and the facility was deployed in just over six months, proving that it"s possible to build larger-scale energy storage

facilities quickly.

PG&E ultimately considers the lithium-ion batteries as substation assets, and as such, it manages them like other complex substation equipment such as static VAR compensators.

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