EPRI | ELECTRIC POWER RESEARCH INSTITUTE

Energy Storage for Customer Resilience

Project Highlights

- Evaluate customer-sited energy storage performance against power outages
- Examine energy storage capabilities for resilience, demand response, and grid services
- Execute test plans based on use cases informed by utility-customer programs
- Evaluate economic applications, documenting via Product Specification Database

Background, Objectives, and New Learnings

Industry forecasts point to the continued and accelerated deployment of energy storage as an advanced customer resilience solution. There is a growing demand for utilities to understand how this technology can be optimally utilized to support revenue-enhancing services, leveraging comprehensive value streams. Testing and validation is required to determine product potential to participate in demand response (DR) programs and/or grid services. In order to better serve their customers, utilities have the opportunity to leverage customer-sited energy storage systems in a variety of ways. This research project aims to provide utilities with practical experience and validation of energy storage features, functions, and performance to better support resilience and grid services.

This research intends to draw actionable conclusions from comparative data sets to inform utility-customer programs decisions. This collaborative research project will build from the preceding "Customer Energy Storage Field Testing" supplemental project, leveraging the existing functional and performance testing infrastructure, and five operational residential energy storage systems. The new "Customer Resilience + Energy Storage Evaluation" research will add new utility-approved use cases, based on new and existing utility-customer programs, and apply to new products being connected in service territories across the country.

The objective of this project is to understand functional and performance characteristics of customer-sited energy storage products in a timely and continuous manner. This project aims to test a series of customer-sited energy storage products in parallel with the same methodology and conditions at the SolarTAC/GridNXT facility near Denver, Colorado. The research seeks to understand key differences between different available systems, including functionality and its ability to integrate within a variety of utility-customer programs.

New findings are expected regarding characterization of technical readiness, performance, and uptime of customer-sited, particularly residential, battery storage products. Uptime refers to the percentage of time the product is functioning and responding as intended.

Benefits

Results are expected to yield lessons learned to offer insight toward optimized pathways to leverage customer energy storage resilience resources to improve customer satisfaction, improve grid quality, increase service revenue and reduce grid operational costs. Direct benefits to the public may include higher quality information and improved decision-making for energy storage design and use. Electricity customers may be able to improve site reliability, achieve economic returns, and improve environmental responsibility of electricity use. Further integration of energy storage into power system planning and operations may result in lower costs of operation, improved reliability, and increased integration of renewable energy sources by regional electric power systems.

Project Approach and Summary

This project aims to test and evaluate multiple market leading customer storage products. This project begins by consulting

with project advisors to select market leading products for testing. Existing test plans will be expanded, based on utility-customer grid services and DR programs, to evaluate the following device characteristics.

- Product Functions: Test and evaluate product features and functions. For instance, is it DR program ready? What grid services are available (for example, fast frequency response, Volt-Watt, Volt-VAR, capacity) and in what markets/programs can they be applied and valued?
- System Performance: How do storage products installed in the field perform in comparison to manufacturer specifications, owner expectations, and seasonal conditions over time? (For example, how do these units respond to customer outages, EV charging, whole vs. partial load support, duration and effectiveness supporting medical baseline devices?)
- Safety, Integration and Technology Readiness: Are products able to be safely and reliably deployed with robust operations? Evaluate battery chemistry, BMS/PCS/EMS to inform utility approved vendor considerations. What are actual deployment experiences, as well as standards and requirements that apply for installation, safety, operation, monitoring, and integration?

In addition to continuing to test on the existing operational systems, new product iterations will be procured, installed, commissioned and tested over time to ensure utility interconnection and programs have confidence and understanding of what these new system evolutions can do to serve both the customer and grid. EPRI will solicit feedback on plan and methods prior to commencement of testing, providing timely data to project participants and to facilitate collaborative analysis.

Deliverables

Participants will receive the following deliverables.

- Technology Transfer: Webcasts provided on a monthly to bi-monthly schedule to provide progress updates, solicit input from participants, and discuss collaborative analysis findings. A one-day site visit at the SolarTAC site is also planned.
- EPRI Collaboration Site: Share project information, including data collected, system procurements and testing progress, and collaborative analysis of energy storage systems.
- Technical Update Report: Summary report of the testing experiences, lessons learned, and analyses on collected data.

The non-proprietary results of this work will be incorporated into EPRI's R&D programs and made available to the public, for purchase, or otherwise.

Price of Project

$75,000 per funder

This project requires a minimum of four funders to kick-off for testing of three systems (in addition to the existing five operational systems). Additional funders are expected to enable additional systems and/or testing scope.

This project qualifies for tailored collaboration (TC) or self-directed funding (SDF). Funding may be distributed across three calendar years (2021–2023).

Project Status and Schedule

The project is expected to commence in Q2 of 2021. The project duration is expected to be 36 months from commencement. Ongoing data monitoring of existing systems and/or additional systems as available may be offered subsequent to this project period.

Who Should Join?

Utilities experiencing a growing number of customer outages, expected growth of interconnection queues, and a desire to understand how to incorporate flexible customer resources into utility programs. R&D managers, engineers, and customer programs. Any other participants seeking to understand the functional and performance characteristics of available customer sited energy storage systems.

Contact Information

For more information, contact the EPRI Customer Assistance Center at 800.313.3774 (askepri@epri.com).

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