

Energy Storage Analysis Framework for Utility Service Territory Deployment



Background, Objectives, and New Learnings

Energy storage is expected to be a core enabler of the modern electric system. As a result, utilities are considering energy storage for both transmission (Tx) and distribution (Dx) system applications ranging from targeted system-wide deployment levels as part of regional goals or mandates to customized applications such as a non-wires alternatives (NWA). Utility planners require comprehensive and systematic analysis approaches to identify and evaluate the efficacy of various storage applications.

EPRI has previously developed an energy storage analysis framework for site specific energy storage valuation. This research aims to build upon that work by applying a decision-making process to identify energy storage applications and locations across a utility's service area to maximize benefits.

Energy storage can be used for a number of grid service applications, and in some cases, multiple services can be leveraged simultaneously to achieve greater impact and value. Experience has shown that the approach used to evaluate the efficacy of an energy storage application is highly dependent on the primary service the energy storage device is expected to provide. Understanding that value is critical to utilities to make informed decisions as they seek to interconnect new storage projects to their systems. In particular, this project's focus is on those primary applications related to Tx or Dx planning, like network-related applications, as opposed to storage as a resource primarily used for capacity and, energy or ancillary services, though those may be secondary use cases to examine.

Project Highlights:

- Screen potential energy storage applications and locations in planning across a utility service territory or area given targeted deployment levels
- Tailor custom analyses to evaluate integration impacts and understand value attributes
- Determine the feasibility of potential energy storage applications planning across a transmission or distribution system service

Working with participants, this project aims to provide a systematic approach for utilities to evaluate targeted system-wide energy storage Tx or Dx deployment opportunities. Understanding system needs and how energy storage will be used allows for more targeted analysis to capture storage valuation. The expected approach would first determine the primary applications of energy storage deployments across a utility service territory (Tx or Dx). Based on the primary service application, the appropriate analysis methods will be identified to evaluate the impact of the storage deployment(s) across the system. Finally, this project will demonstrate the analysis methods to determine the overall impact and value of identified storage projects.

Benefits

The potential benefits of this project include:

- Enable utilities to better understand and assess potential network related applications of energy storage across an entire system
- Analytical methods that help Tx and Dx planners determine how to value energy storage applications specific to a given deployment plan
- Help utilities identify and understand the modeling requirements, and potential gaps, to complete a robust analysis of energy storage impacts across a system

Project Approach

EPRI intends to apply a systematic assessment approach with project participants to assess energy storage opportunities.

Step 1: Study Needs Evaluation

In this step, EPRI intends to work with the utility storage interconnection team to complete an assessment of the potential storage locations available to the utility. This step would include detailed discussions with other utility organizations involved in storage assessments, resource planning, operations, and market assessment.

Together, the team will work through the potential sites evaluating their feasibility and potential value to host storage deployments. The application of the storage device can vary from site to site and for specific use-cases. The use-case will determine the type of analysis that needs to be completed in Step 2 to determine how and where to interconnect energy storage to determine the value of deployments extrapolated across the service territory. In cases where storage does not provide a net positive benefit, EPRI can help identify the coordination required between stakeholders to integrate energy storage within the system to derive value.

Step 2: Integration Assessment

Based on the analytic models and methods identified from Step 1, EPRI will develop a scope of work and budget to complete a robust integration assessment and valuation across the service territory and conduct the detailed analysis. Example analyses could include:

- Steady state, dynamic, and/or reliability analysis
- Blackstart and restoration capability Operational cost/benefit assessments for different storage locations using production cost models
- Cost benefit assessments against traditional wired solution

Deliverables

- System wide assessment of potential storage locations available to a utility.
- Customized documentation of analytical approaches needed to conduct impact assessment for identified use cases.
- Integration assessment and valuation across the service territory based on customized scope.
- Final report including lessons learned and case study summaries of all analyses conducted under this supplemental project.

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

- Minimum \$160,000 (additional funding may be required depending on the scope of Step 2)

This project qualifies for Tailored Collaboration (TC) or Self-Directed Funding (SDF). Funding can be distributed across three calendar years.

Project Status and Schedule

The project will commence with the first host member agreement. All collaborative results are planned to be completed within 36 months of commencement.

Who Should Join?

Utilities with state mandated energy storage deployment targets where an understanding of high-value applications and sites for energy storage are needed. Utilities that are interested in understanding planning processes for the use of energy storage.

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