



Using a precision approach to forecasting DER adoption.

Overview

Distributed energy resources (DERs) such as solar photovoltaics (PV), battery storage, and electric vehicles (EV) are experiencing a cost decline, leading to exponential growth in adoption. The swift evolution of this market presents challenges for many utilities, as they grapple with understanding the probable impacts on their businesses, the electric grid, and their role in the future. Technologies such as battery storage are particularly difficult for a utility to assess, as their economics depend on complex interactions among the customer load shape, electric rate structure, whether they are paired with storage, and what credits and revenue streams they might be able to capture.

Opportunity

Rapid growth of DERs, which can have a considerable impact on the distribution system, is driving many utilities to forecast the likely impacts at a spatially granular level (e.g., circuit by circuit).

This proactive approach helps ensure grid readiness to accept higher market shares of DERs, facilitates good decision making and investment planning for utilities, and helps service territories meet growing climate change mitigation objectives. Since utilities may not be equipped to understand the likely adoption and impacts of these technologies, they often seek third party experts, like Resource Innovations (RI), to assist with the forecasting process.

Solution

For the past six years, RI has supported a California utility by providing detailed forecasts of DERs.

PROGRAM SNAPSHOT

Program offerings:

Comprehensive technology diffusion model, analyzing DER economics, adoption, and impacts of DERs

Benefits:

- Proactive approach helps ensure grid readiness
- Facilitates good decision making and investment planning for utilities
- Helps service territories meet growing climate change mitigation objectives

Solution (Cont.)

RI utilizes its proprietary SPIDER (Spatial Penetration and Integration of Distributed Energy Resources) model to assess the economic feasibility, probable adoption rates, and anticipated impacts on the distribution system for rooftop solar PV, battery storage, and EVs.

The SPIDER model is a spatially granular dynamic market simulation tool that provides a detailed analysis of DERs adoption. It incorporates System Dynamics, technology diffusion theory, and both linear and nonlinear optimization to comprehensively study the potential evolution of these markets. The model undergoes ZIP code level calibration through a process known as "back casting," where simulated adoption is compared with actual historical adoption, ensuring accuracy in forecasts. This meticulous bottom-up calibration approach, distinct from the top-down methods employed by other firms, ensures forecasts are rooted in real-world data, enhancing accuracy.

The economic evaluation of each technology follows a similarly rigorous approach, with consideration given to all cost and revenue elements, each of which may vary over time. Special emphasis is placed on battery storage, which undergoes analysis in SPIDER using a linear program. This program simulates optimal hourly battery dispatch, aligning with electric rates, customer load, and compensation mechanisms.

Results

Developed in collaboration with the California utility and through participation in California's Distribution Forecasting Working Group, RI's methodology is state-of-the-art. The methods employed have been deemed "best practice" by a wide range of stakeholders who participated in CA's Distribution Forecast Working Group.

RI's forecasts feed the detailed distribution system planning process employed by the California utility and have facilitated good investment planning that is supported by rigorous analysis.

ABOUT RESOURCE INNOVATIONS

Resource Innovations (RI) is an energy transformation firm. Women-led, purpose built, and focused on impact, we're constantly expanding our portfolio of solutions to guide utilities through increasingly complex, connected challenges. For communities across North America, we're leading the charge to power change.

Contact

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