

In the Field

Delving into Solar in The Midwest

Alliant Energy, EPRI Study Panel Performance, Orientation, Trackers, and Energy Storage

By Chris Warren

“Location, location, location” isn’t just a mantra for the real estate business. Geography has a huge impact on solar generation, which explains in part why California, Arizona, and other sunny states have significant solar photovoltaic (PV) capacity.

But as PV prices continue to decline, less sunny regions are taking a closer look at solar. Alliant Energy recently installed a 300-kilowatt solar facility at its Madison, Wisconsin headquarters to help the utility company and its customers better understand how solar performs in the U.S. Midwest. Wisconsin’s solar capacity ranks 30th nationally, with 22 megawatts, according to the Solar Energy Industries Association.

“Solar is new in this area,” said David de Leon, director of generation construction projects at Alliant Energy. “We want to be able to share information with our customers because their interest in solar is growing and they want choices.”

Solar and Batteries

Alliant Energy’s three-year Solar Demonstration Project will gather operational data for 10 crystalline silicon and thin-film solar panel technologies. EPRI provided guidance on installing and selecting technologies and is assisting with data collection.

Alliant Energy and EPRI also are evaluating panel orientation. Some panels are mounted on trackers, some are in a flat position, and others are oriented toward the west, northwest, and southwest.

The solar facility is connected to a battery system with 30 kilowatt-hours of usable energy storage capacity. “We want to learn how to use solar and batteries to reduce peak demand and shift energy use to off-peak periods when costs are lower,” said de Leon. Alliant Energy will not feed any solar generation to the grid because its headquarters building can use all of it.

Knowledge for Alliant Energy, Its Customers, and the Industry

Alliant Energy’s project is one of EPRI’s Integrated Grid Pilot Projects, which are intended to increase understanding of the performance of distributed energy resources and their integration into the distribution grid.

EPRI’s Integrated Grid Benefit-Cost Framework outlines four steps for a comprehensive assessment of the implications of adding distributed energy resources (see EPRI’s Benefit Cost Framework below). Alliant Energy is focused on the first step: identifying core assumptions. This involves understanding technologies and the characteristics of a particular region.

An Overview of EPRI’s Benefit-Cost Framework:

Core assumptions: Because no two power systems are exactly alike, the starting point for utilities, consumers, regulators, and other stakeholders is to account for their unique market conditions and study objectives. Identifying the questions that must be answered helps to define potential scenarios to study and the assumptions behind them.

Distribution impacts: Distributed energy resources connect at the distribution level. Understanding how they impact parameters such as voltage, safety, and reliability is key to determining the costs and benefits.

Bulk power impacts: Two-way electricity flows between the distribution and transmission systems can affect the capacity and flexibility required to serve demand. Assessing those impacts is vital.

Benefit-cost analysis: Quantifying the actual costs and benefits of integrating distributed energy resources in real dollars is the framework's final step. These costs and benefits don't accrue equally to society, utilities, and consumers.

"We want to know how to tap the full potential of new technologies, whether they're smart inverters, batteries, or solar panels," said Kathy Trudell, an EPRI principal technical leader working on integrated grid pilot projects. "Until we have a thorough understanding of their capabilities, we won't know how to deploy and configure them in the most effective way."

Trudell says that the findings will inform EPRI's understanding of the performance and maintenance of solar coupled with batteries in Midwest weather conditions.

The project also provides a way for Alliant Energy to meet increasing customer interest in solar. It has placed interpretive signs for customers, employees, and the public along public paths near the solar facility, and it will post performance data on a new website. "We want to help our customers decide whether solar is a good choice for them," said de Leon.

Key EPRI Technical Experts

Kathy Trudell