



Community Energy Storage Project in Stapleton Neighborhood

Project overview

As the demand for solar energy at our customers' home and businesses increases, Xcel Energy is examining how battery storage can help integrate higher concentrations of photovoltaic (PV) solar energy on our system. As part of an energy storage demonstration project, Xcel Energy is installing six customer batteries and six larger grid batteries in Denver's Stapleton neighborhood. The batteries will operate to manage solar integration and also support other areas of the grid.

This pilot project is one of two approved in March 2016 by the Colorado Public Utilities Commission (PUC) under the company's Innovative Clean Technology (ICT) Program.

Xcel Energy is particularly interested in learning about how battery storage can help:

- Increase the ability to accommodate more solar energy on our system
- Manage grid issues such as voltage regulation and peak demand
- Reduce energy costs

For the two-year pilot program, we are installing six larger batteries also known as grid batteries—in the right-of-ways or in easements in Stapleton's North Central Park and Eastbridge neighborhoods. We chose the Stapleton area for this pilot project because it has among the highest concentrations of rooftop solar installations in the Denver area. We also plan to install six battery systems at our customers' homes. These systems will be used in similar ways to manage the grid. We are currently screening homeowners in the Stapleton neighborhood with solar installations who have applied to participate in this project, and expect to have them selected by March 2017. The customer batteries are being provided by San Francisco, Calif.-based Sunverge Energy, and participants will be able to keep the batteries after the pilot for the life of the battery—approximately another eight years.

Xcel Energy's Innovative Clean Technology program

Our Colorado ICT program enables the testing of emerging energy technologies that promise lower greenhouse gas emissions and other environmental benefits. Since the Colorado PUC approved the program in 2009, a limited number of projects have been funded. The ICT provides us with the ability to test new technologies and evaluate their cost, reliability and environmental performance on a small, demonstration scale before determining whether to deploy them more widely for customers.

Past ICT projects include the Colorado Integrated Solar Project in Palisade, Colo., and the community energy storage project at SolarTAC in Aurora, Colo.

For additional information on our Innovative Clean Technology program, please visit xcelenergy.com.

Battery locations

We have proposed locations for the six grid batteries, which will be provided by Waitsfield, Vt.-based Northern Reliability Inc. (NRI). We are specifically installing two sets of 18 kW batteries, two sets of 36 kW batteries and two sets of 52 kW batteries. The proposed locations



Representative photo simulation of the battery storage unit installations near 33rd Avenue and Alton Court. Please note that the final configuration and design may be subject to change due to engineering or other factors.

For the two-year pilot program, we are installing six larger batteries also known as grid-sited batteries—in the right-of-ways or in easements in Stapleton's North Central Park and Eastbridge neighborhoods

and photo simulations of how the batteries will look can be found at our project website at xcelenergy.com/energy_portfolio/innovation/stapleton. Factors that were considered when evaluating these locations included access for maintenance, safety and visual impacts.

Project schedule

We expect to begin installing the customer battery storage units in April 2017. After comprehensive testing, we expect them to be in-service in May 2017.

We expect to begin installing the grid batteries in October 2017, and have them in-service in November 2017.

Please note that the project schedule is subject to change. Please visit the Stapleton Battery Storage Project website at xcelenergy.com/energy_portfolio/innovation/stapleton for ongoing updates.

Benefits of battery storage

Supporting variable solar energy sources

Many of our customers in the Stapleton neighborhood have rooftop solar systems. With continued adoption, the distribution feeder in this area could reach a point where additional mitigation or equipment upgrades are required. Battery storage systems can be operated to reduce high solar penetration issues such as high voltage or flicker. By reducing these impacts, we may be able to accommodate higher amounts of solar energy.

Backup power

A battery can provide backup power in the event of a power grid outage. Customer batteries can be wired by a certified installer to a back-up electrical panel that supports electrical items the customer selects, such as lights, a refrigerator, and select wall outlets. If the power grid goes down, these critical items in their home would receive power directly from the battery.

When a customer pairs a battery with rooftop solar and a power outage occurs during the day, the rooftop solar system is able to continue operating during a power outage—providing back-up power for a longer period of time than the battery could on its own. Without a battery, solar systems must shut down during outages to follow approved safety and reliability standards and protocols.

Renewable integration

Solar power is a variable energy resource. The generation of power from these resources may vary from moment to moment.

Energy coming onto the grid from PV solar can cause quick spikes and drops as it enters the system on the feeder. And at certain times of the day, we can have higher amounts of solar energy as a percentage of the overall load. During this pilot, we will examine how batteries manage these fluctuations so we can learn more about how to successfully integrate more solar onto our grid.

Project safety

The safety of the public and our employees is at the forefront of all we do. We always take a proactive approach to safety and will implement industry-leading safety measures throughout this pilot project.



A photo of how Sunverge Energy's customer-sited battery will look when installed in a customer's garage.

Contact us

For more information about this pilot project, please visit xcelenergy.com/energy_portfolio/innovation/stapleton or email us at EnergyStorage@xcelenergy.com.