



NREL + PANASONIC

DEVELOPING A ZERO-ENERGY, TRANSIT-ORIENTED CAMPUS IN DENVER, COLORADO

NREL is collaborating with Panasonic Enterprise Solutions Company, Xcel Energy, land developer L.C. Fulenwider, and the City and County of Denver through its Denver International Airport to enable the least cost and most scalable net-zero energy infrastructure development in the United States. The transit-oriented development will feature Xcel Energy's first microgrid in Colorado on a zero-energy campus. NREL will develop the foundational software that will enable comprehensive energy district design and planning among cities, land developers, and energy companies. The software will integrate building energy load modeling with distribution system modeling for the first time in a tool that utilizes URBANopt and OpenDSS.

R&D STRATEGY

NREL will combine its building energy system model, URBANopt, with grid modeling software, OpenDSS, to model the interaction of the district with the grid. NREL will then develop a variety of load and power flow scenarios using a range of technology options, including varying solar photovoltaic penetrations, energy efficiency scenarios, distributed energy storage capacities, and district heating and cooling, possibly using geothermal energy. These will lead to distribution system models that Xcel Energy will verify for feasibility and Panasonic will perform a cost-benefit analysis upon. NREL's two-dimensional and three-dimensional visualization techniques will be employed to analyze and illustrate the results of the power systems simulations for each URBANopt scenario.



Panasonic Enterprise Solutions plans for the Peña Station Next district to include offices, homes, hotels, retail, dining, and parks.
Illustration from LC Fulenwider, Inc.



PROJECT OBJECTIVES

Along with the creation of the actual Peña Station NEXT district, this project will result in several tools that others can use to replicate this project across the country, including the enhanced version of URBANopt, as well as a developer's handbook, created by Panasonic. Other objectives include:

- Demonstrate the combined use of multiple distributed energy resources (DERs).
- Decrease the net integration costs of DERs by addressing the hardware, software, and business aspects of district planning and development.
- Create economic and engineering methodology that enables a possible new regulated tariff for a net-zero energy district.
- Create a proven, demonstrated model for smart city design, applicable across the country and for all utility business models.



Photo by Dennis Schroeder, NREL 40870

Partner with NREL at the ESIF

User facility access to the ESIF is awarded through the review and approval of user proposals, depending on the scientific merit, suitability of the user facilities, and the appropriateness of the work to DOE objectives, and includes a signed user agreement for the facility.

For more information, please visit:

www.nrel.gov/esi/working_with.html

or contact:

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Three dimensional renderings help lay the groundwork for the Peña Station Next district. *Illustration from LC Fulenwider, Inc.*

The Energy Systems Integration Facility (ESIF) at the National Renewable Energy Laboratory (NREL) provides the R&D capabilities needed for private industry, academia, government, and public entities to collaborate on utility-scale solutions for integrating renewable energy and other efficiency technologies into our energy systems.

To learn more about the ESIF, visit: www.nrel.gov/esif.

National Renewable Energy Laboratory

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Office of Energy Efficiency and Renewable Energy

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