

Mosaic Gardens New Construction, Low-Income Multifamily ZNE

OVERVIEW

WHAT IS THE PURPOSE OF THIS PROJECT?

The largest percentage of new residential construction in California is now multi-family buildings. Much of this new housing stock is targeting a long-overlooked segment: low income tenants. State and Federal programs are offering incentives to developers to encourage high efficiency building construction in this sector.

This project provided SCE with a real-time in-situ opportunity to demonstrate how innovative ZNE measures can be effectively adopted in this segment. An additional goal of the project was to conduct post-occupancy field testing to evaluate opportunities to provide demand response at a later date. This summary will only focus on the demand response aspect of the project.

The project took place at Mosaic Gardens, located in Pomona, California. This site is a multi-family residential development consisting of forty-six apartment units that vary in size from one to three bedrooms. This facility serves tenants that are low income, with half the units designated for displaced residents.



Image 1: Mosaic Gardens Building

TECHNOLOGY

WHAT DEMAND RESPONSE TECHNOLOGIES WERE INSTALLED FOR THIS PROJECT?

An opportunity for DR research presented itself to demonstrate a new type of HVAC control platform for the building. A mesh network system utilizing wireless state-of-the-art smart communicating thermostats was installed in each apartment. A wireless gateway was provided in the main facility area to route the communications signals that provide both comfort and additional control and monitoring of the individual all-electric heat pumps.

The communication between the gateway and each of the thermostats is part of a secure “peer-to-peer” wireless mesh network. Tenants do not need to have their own internet because the thermostat portal is served by a common internet connection in the building. Individual dashboards for building tenants have advanced features and allow customization to reduce energy use.

While this project did not advance to the stage at which demand response participation, the demand response technologies have been installed and did provide some initial findings and will also be used for research at a later date. Below you will find additional information on the demand response technologies installed:

Electric Ducted Mini-Split Heat Pumps

Single ductless heating and cooling units with the highest possible SEER rating available



Smart Communicating Thermostats

Wireless control of the heat pumps, that provide remote access to controls, record run time, temperature and energy histories for accurate real time identification of issues



Wireless Gateway

A wireless gateway helps the thermostats communicate. It provides additional control and monitoring of individual heat pumps.



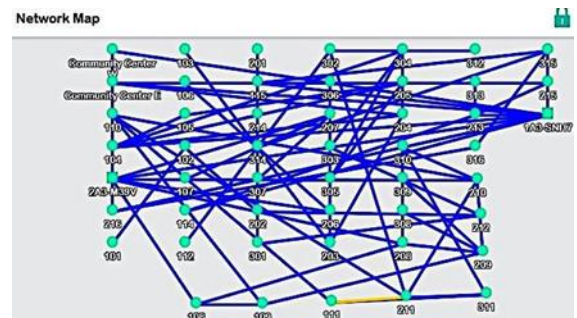
Portal

Networks all smart thermostats to a central location for reliable communication, access, and monitoring by management.



Wireless Mesh Network

The thermostats utilize mesh network communication to reduce the amount of hardware required for successful data collection and transmission to the dashboard website.



INITIAL FINDINGS

WHAT WERE THE INITIAL FINDINGS FROM THIS PROJECT?

Customer Value:

- The wireless thermostats installed through this project are operating well and providing tangible value. Tenants are enjoying consistent and comfortable space heat and cooling in addition to energy savings.

Communication and Connectivity:

- During the setup and monitoring of the portal it was discovered that a few thermostats were not reliably communicating. A thermostat gateway repeater was installed to improve connectivity.
- Connectivity through the ISP to the internet and reliability problems with the existing CAT5 cabling from the connection hub to the ISP switch were encountered and cabling terminations needed to be redone.

Functionality

- The project encountered delays with the data monitoring system and getting the portal online to track energy usage through a centralized portal kiosk. The wireless thermostats have the capability of providing residents with information on their usage patterns to help them make economic decisions about their energy usage and participation in demand response incentive programs.

Foundation for Future Demand Response

- These new wireless smart communicating thermostats will enable future participation in demand response events using their built in OpenADR capability.

M&V

WHAT DATA WAS COLLECTED AND FOR WHAT PURPOSES?

The new wireless thermostats are collecting data for current and future research purposes. At a later date these thermostats could be programmed to test demand response capabilities by controlling heat pump electrical draw following ADR signals. For now, these thermostats are collecting valuable data to inform future multi-family ZNE design.

RESULTS

WHAT WAS CONCLUDED FROM THIS PROJECT?

The advanced mesh network system provides multiple benefits in being able to remotely monitor a large number of heat pump systems, delivers automated alarms warning of spaces out of temperature range, and assists management and technicians to respond quickly to any maintenance issues. This project did not advance to the stage at which demand response participation was an option. Nonetheless, the thermostats have been installed and may be used for research at a later date. They can be programmed to load shifting mode to reduce electricity demand in response to an OpenADR signal.

RECOMMENDATIONS

WERE THERE ANY RECOMMENDATIONS FOR ADDITIONAL DEMAND RESPONSE RESEARCH?

- SCE could field test the smart thermostats installed through this project to reduce electricity demand in response to an OpenADR signal.
- SCE could leverage the metering data that EPRI is collecting on each circuit throughout the building to estimate demand response potential. SCE could assess whether the battery storage installed in the building (not yet operational) could be a useful demand response resource by studying operational profiles.

The full findings are based on the report "DR15.21: Mosaic Gardens New Construction, Low-Income Multifamily ZNE", which is available at www.dret-ca.com.