

Mosaic Gardens at Pomona

An affordably priced and grid-interactive efficient apartment complex



Mosaic Gardens at Pomona/Source: Electric Power Resource Institute

Mosaic Gardens

Mosaic Gardens at Pomona is a 46-unit apartment complex in Pomona, California for low-income and formerly homeless individuals and families. It is designed to be a grid interactive efficient building (GEB). This project demonstrates one way that cutting-edge technologies can be deployed in buildings with relatively low rents.

The site has technology that allows it minimize energy use and behave flexibly to meet grid needs without compromising building energy management. Mosaic Gardens at Pomona features energy technologies that

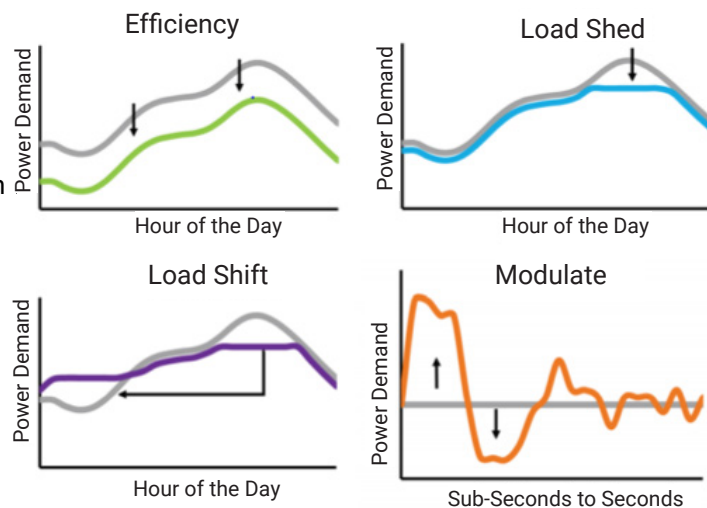
can meet comfort needs while also mitigating stress on the grid: energy efficiency, rooftop solar PV, and grid-tied battery storage. In addition, grid-connected thermostats are responsive to time-sensitive grid needs. This project was possible because of the Low Income Housing Tax Credit. Virtual Net Metering allows monetary benefits of solar to be passed on to tenants.

A post-occupancy field test will evaluate the operation of the energy technologies. The analysis will improve understanding of the challenges to zero net energy building implementation in low-income multifamily settings. A final report is expected in 2020, after one year of occupancy. The California Energy Commission supports apartment-level and community-wide data collection and analysis for the report.

Extending GEB Benefits to Low-Income Households

Mosaic Gardens at Pomona units are available to low-income and formerly homeless individuals and families. Half the units are reserved for referrals from the Los Angeles County Department of Human Services, while the other units are available to Section 8 Voucher holders and families earning 60% or less of area median income. The building's construction Developing a GEB for a low-income community is important: the national average energy burden – the percentage of income spent on energy bills – for low-income households is 3 times higher than for non-low-income households. Price points and other barriers prevent low-income communities from reducing their energy consumption. This important demonstration project shows that cutting-edge energy savings strategies can successfully be deployed in low-income contexts when leveraging existing policies and programs.

Building Load Profile Changes Possible When implementing GEB



Source: U.S. Department of Energy (DOE)

Tenant Involvement through Virtual Net Energy Metering

Virtual Net Energy Metering (VNM) provides an opportunity for renters to access the monetary benefits of GEBs. VNM is an arrangement between a multitenant building owner and a utility to allocate the kilowatt hours generated by rooftop solar among the building owner and tenant utility accounts. The allocation is pre-determined. It ensures even distribution of generation across multiple accounts to reduce utility bills for both the owner and tenants. The concept was approved in California in 2012 for all multitenant buildings after a pilot program investigated opportunities to provide the benefits of solar to low-income tenants.¹

Energy Reduction and Management Features

Energy Efficiency

Efficiency measures reduce the amount of energy a building needs to operate and thus reduces demand for grid services. It can also enable designers and builders to use smaller-sized equipment for heating, cooling, onsite generation, and storage systems. Mosaic Gardens has high-efficiency mechanical systems, high-performance windows and envelope, and spray foam roof insulation. These measures are highlighted on the building website as sustainability features.

Solar Power

Mosaic Gardens has 34 kilowatts (kW) of solar photovoltaic panels (PV) on its roof. This on-site solar generation reduces demand for grid-supplied power. When linked with onsite battery storage (see below), it can support demand flexibility through load shifting to reduce peak demand and help optimize the use of renewable generation. In some jurisdictions, including California, electricity generated from solar arrays can be sold back to the grid, an arrangement known as net metering.

Grid-tied Storage System

Combining on-site solar with an on-site battery system helps optimize usage of variable renewable power for grid benefit. Grid-tied storage allows solar-generated power to be used on-site, dispatched to the grid, or stored for later use depending on building and grid needs or cost signals. At times of excess solar power generation, battery storage allows solar power that would otherwise be curtailed to be stored for later use. This can provide utility bill savings to building occupants and owners by reducing peak charges and, where allowable, selling power to the grid. In addition, in certain scenarios, a battery system can provide critical power during an outage.

Demand Response Thermostats

Mosaic Gardens uses smart thermostats to receive demand response signals from the utility. They do so with Open Automated Demand Response (OpenADR), an open source communication standard that does not require interaction with the thermostat manufacturer. Smart thermostat demand response programs typically allow the utility to adjust temperature settings by 2 to 4°F to reduce peak demand. Some utilities have programs that periodically cycle off heating and cooling systems during peak periods to minimize power draw from these systems.

Conclusion

Mosaic Gardens shows one way that low-income multifamily buildings can be configured as a GEB with multiple distributed energy resources—energy efficiency, PVs, batteries, and grid-interactive equipment. Through policies and program design, benefits of GEB technologies can be coordinated to mutually benefit owners, tenants, and the utility. These strategies mean that residents of all incomes can benefit from access to innovative building energy technologies.

¹ California Public Utilities Commission, "Virtual Net Metering," <https://www.cpuc.ca.gov/General.aspx?id=5408>

Acknowledgements

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Sources

- [American Council for an Energy Efficient Economy "Energy Impacts of Smart Home Technologies"](#)
- [California Public Utilities Commission "Virtual Net Metering"](#)
- [Electric Power Research Institute "Advanced Energy Communities: Enabling Clean Energy in Disadvantaged Communities using Integrated PV+Storage – Willowbrook"](#)
- [LINC Housing "Mosaic Gardens at Pomona"](#)
- [LINC Housing "Mosaic Gardens at Pomona – 22 New Apartments"](#)
- [National Association of State Energy Officials "Grid-interactive Efficient Buildings: State Briefing Paper"](#)
- [Southern California Edison "Demand Response Emerging Markets and Technologies Program Semi-Annual Report: Q3 – Q4 2018"](#)
- [U.S. Department of Energy "Grid-interactive Efficient Buildings: Overview"](#)
- [U.S. Department of Energy "Low Income Community Energy Solutions: Why It Is Important"](#)