

Multi-Family Existing Building Renovation - Vera Cruz Village

Building Type & Use: Affordable multifamily housing

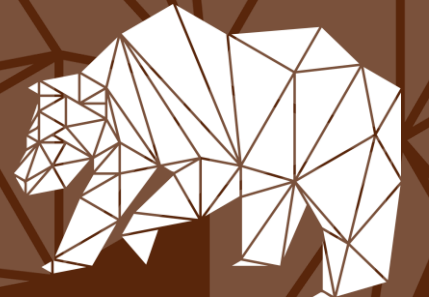
Location: Richgrove, CA

Occupancy/Client: Low-income farmwork residents

Highlights: Gas to all-electric, zero operational carbon emissions, thermal energy system, passive design



This case study is part of a series illustrating how building energy modeling is applied on real projects — showing the tools, decisions, and outcomes that define high-performance design in practice. CalBEM, a collaborative initiative sponsored by Southern California Edison, brings together California's building energy modeling (BEM) community to advance solutions for high-performance buildings.



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Project Overview

This project renovated affordable multifamily housing for low-income farmworkers in Richgrove, California, as part of an RMI grant exploring building retrofits, energy decarbonization, and solar integration.

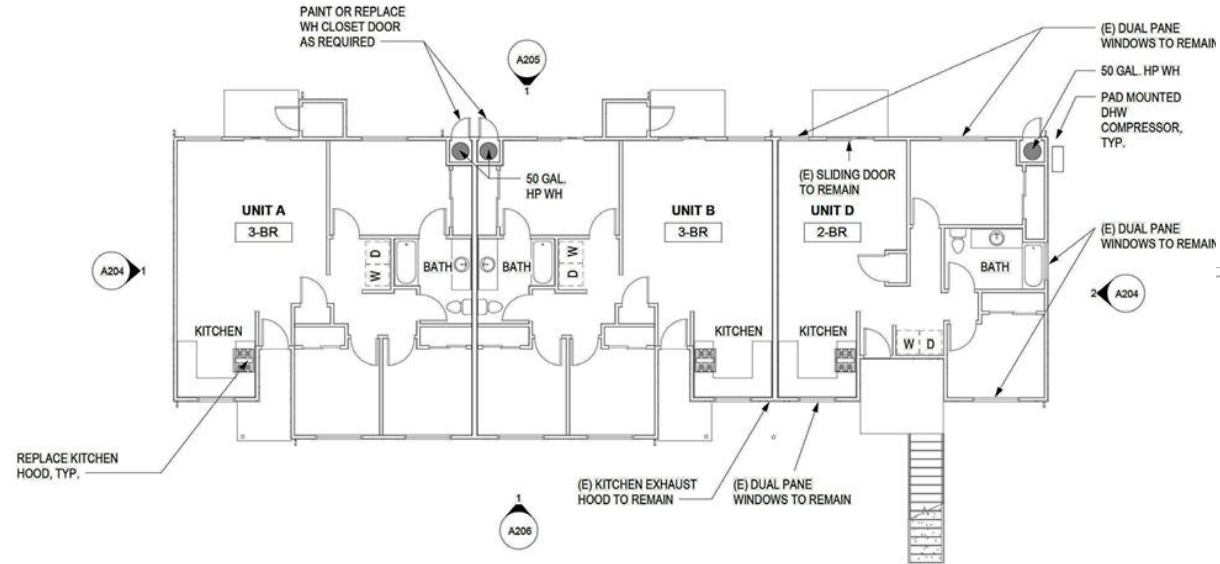
Building Overview

Building Type: Affordable Housing (Renovation)
Location: Richgrove, CA
Floor Area: 46,734 sq.ft.
Occupancy Date: 2022

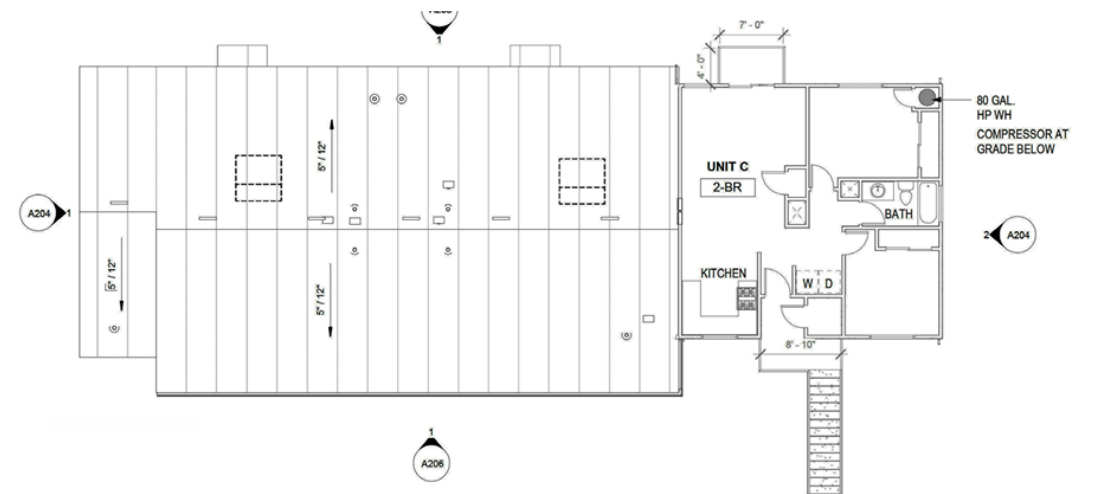
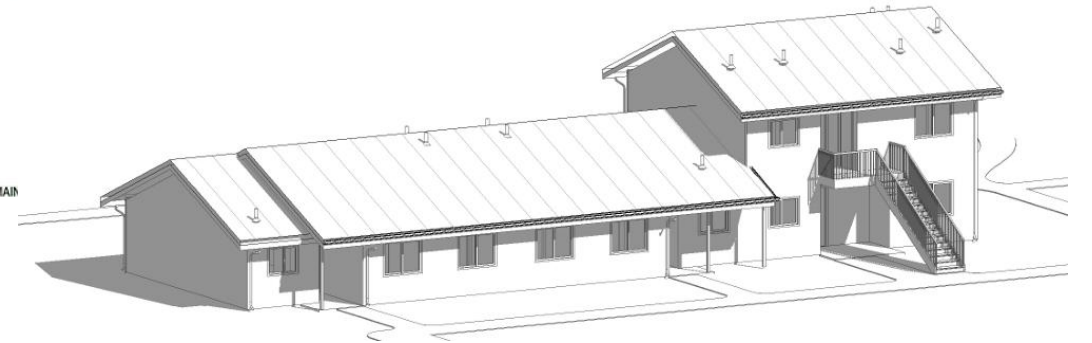
Main Goals:

- Reduce energy consumption in existing affordable multifamily housing
- Convert buildings from natural gas to all-electric systems
- Achieve zero operational carbon emissions as the electric grid decarbonizes
- Enable rapid, scalable retrofit strategies with minimal occupant disruption
- Support California's long-term climate and decarbonization goals

Project Floor Plans

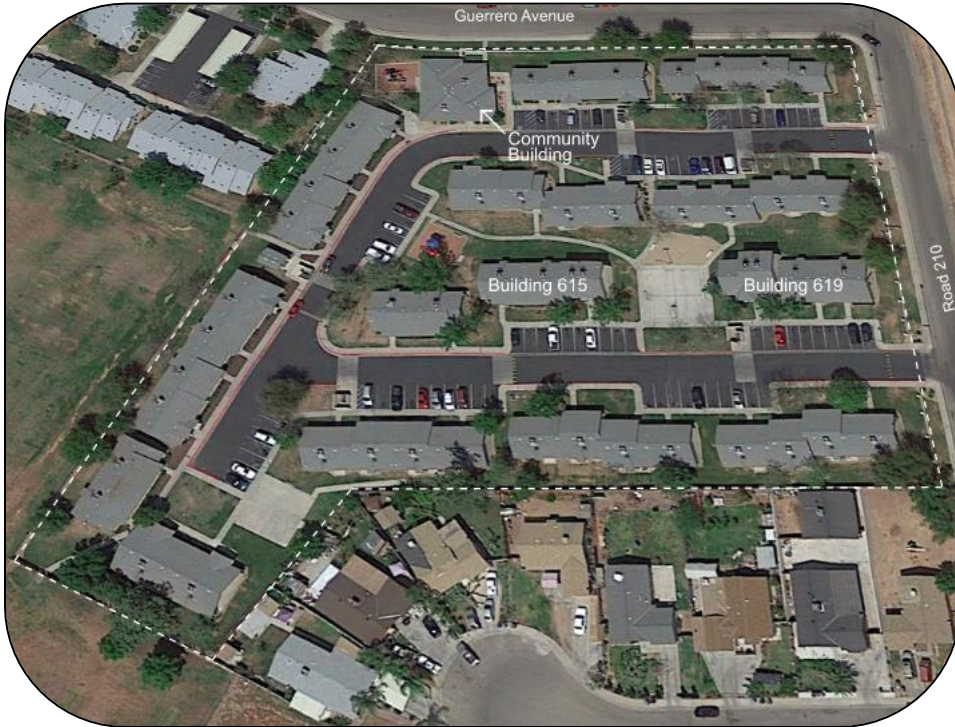


FIRST FLOOR PLAN



SECOND FLOOR PLAN

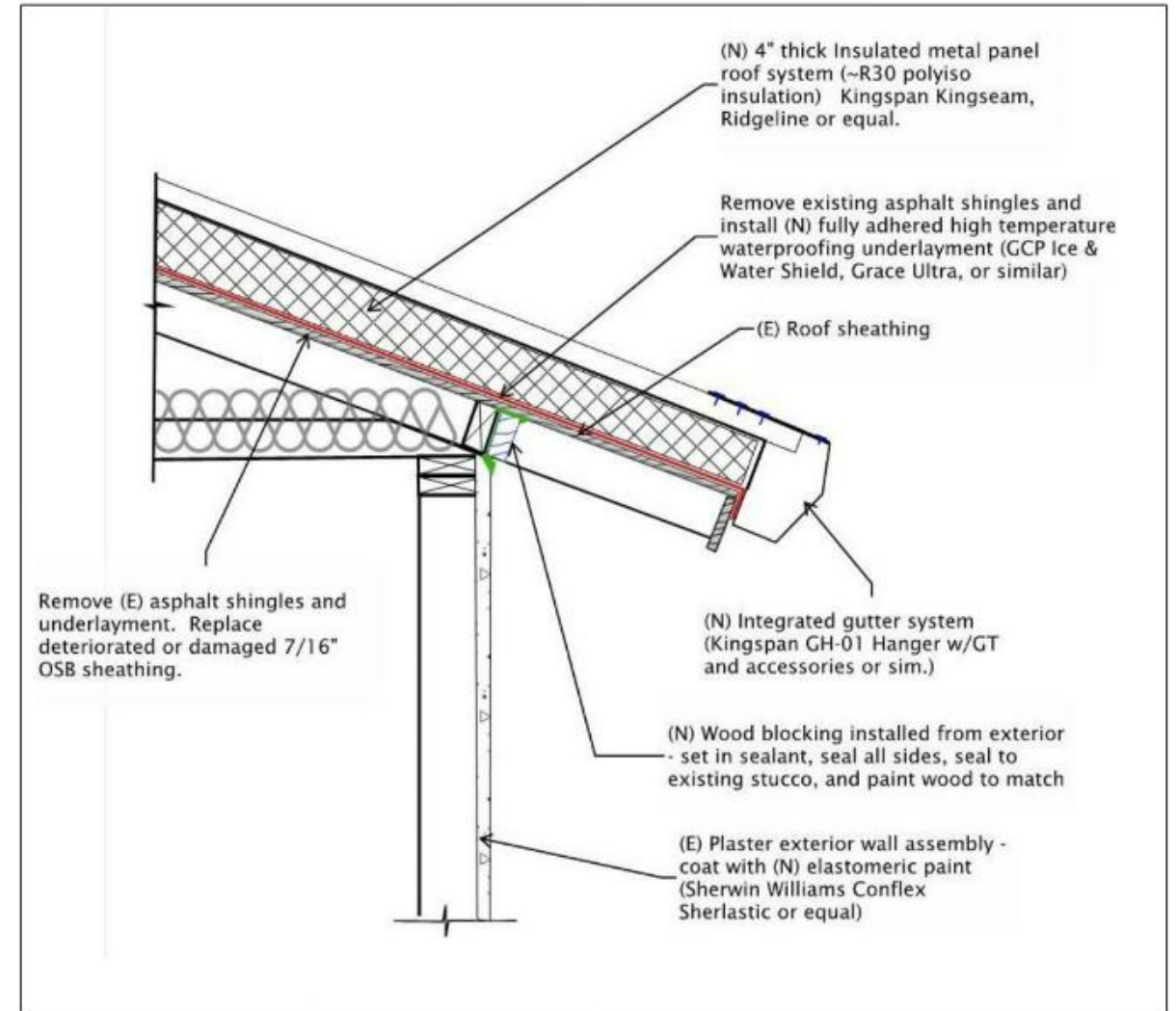
Retrofit Site



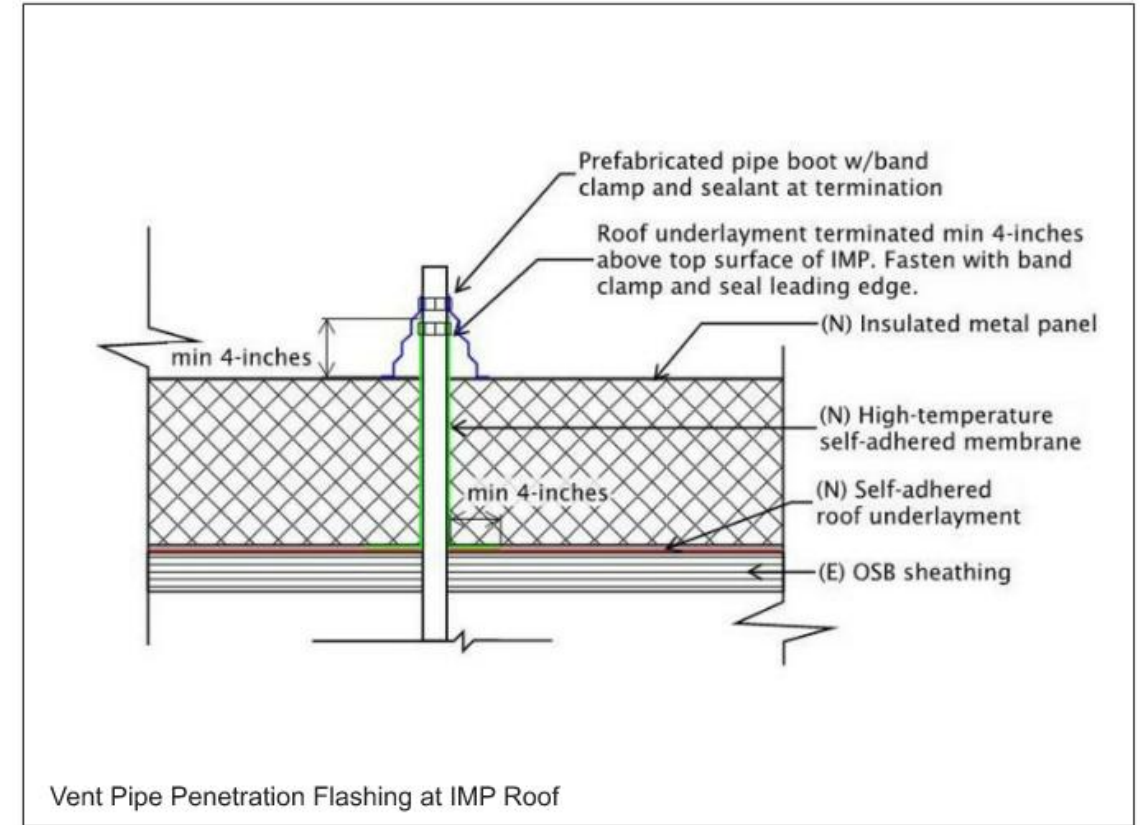
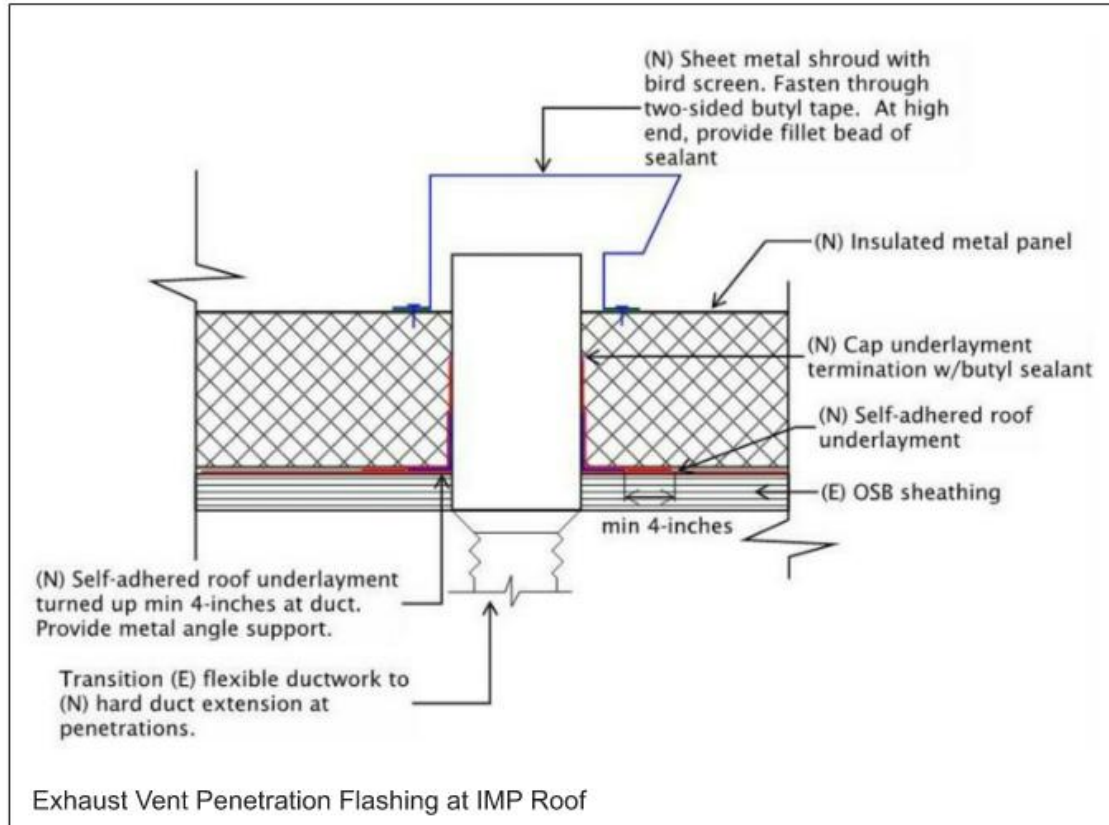
Innovation of Whole-Building Insulated Panels



Based on a program of retrofitting multifamily housing in the Netherlands called **Energiesprong**, which encourages whole-building solutions such as applying manufactured insulated panels to the exterior walls and roofs of buildings.



Building Envelope – Roof Retrofit





Building Envelope – Window Retrofit & Airtightness

Aerosol Sealing is a method of air-sealing that had been originally developed for duct-sealing and used in recent years for whole-house air-sealing in new construction.

The building is pressurized while dispersing an aerosol sealant “fog” to the building interior. As air escapes from the building through the leaks in the exterior envelope, sealant particles are carried to these air leakage spots where they adhere to the surfaces, effectively sealing off the leak points.

This was used for all buildings that had a ventilated attic.

All the windows were replaced with double-glazed vinyl units that are compliant with the California Title-24 energy code.





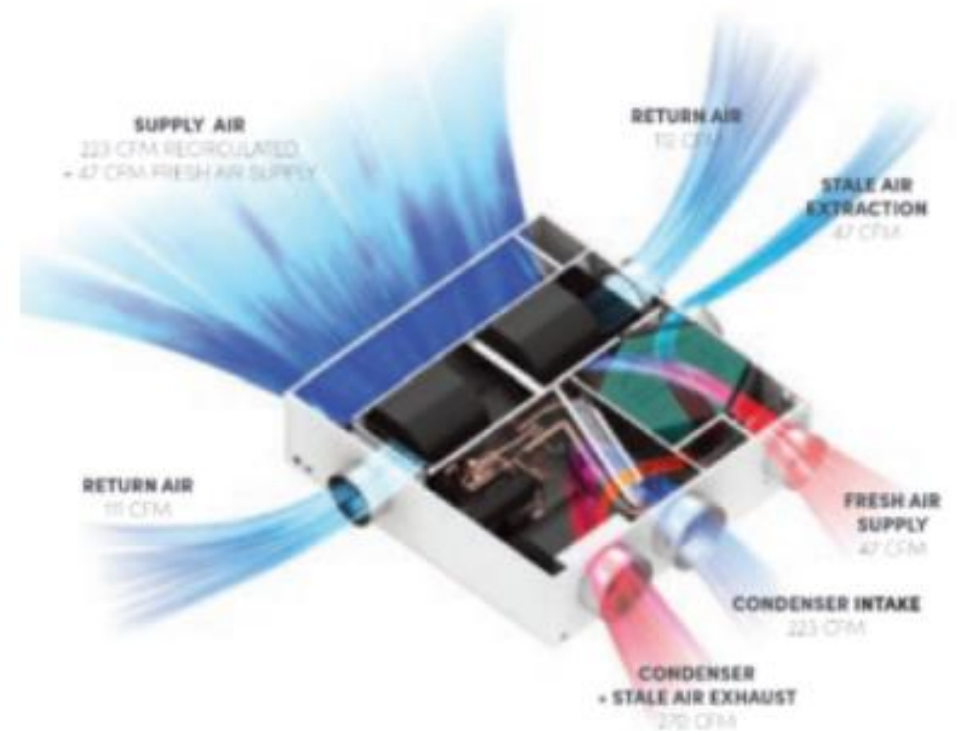
Building HVAC and Fresh Air

Before

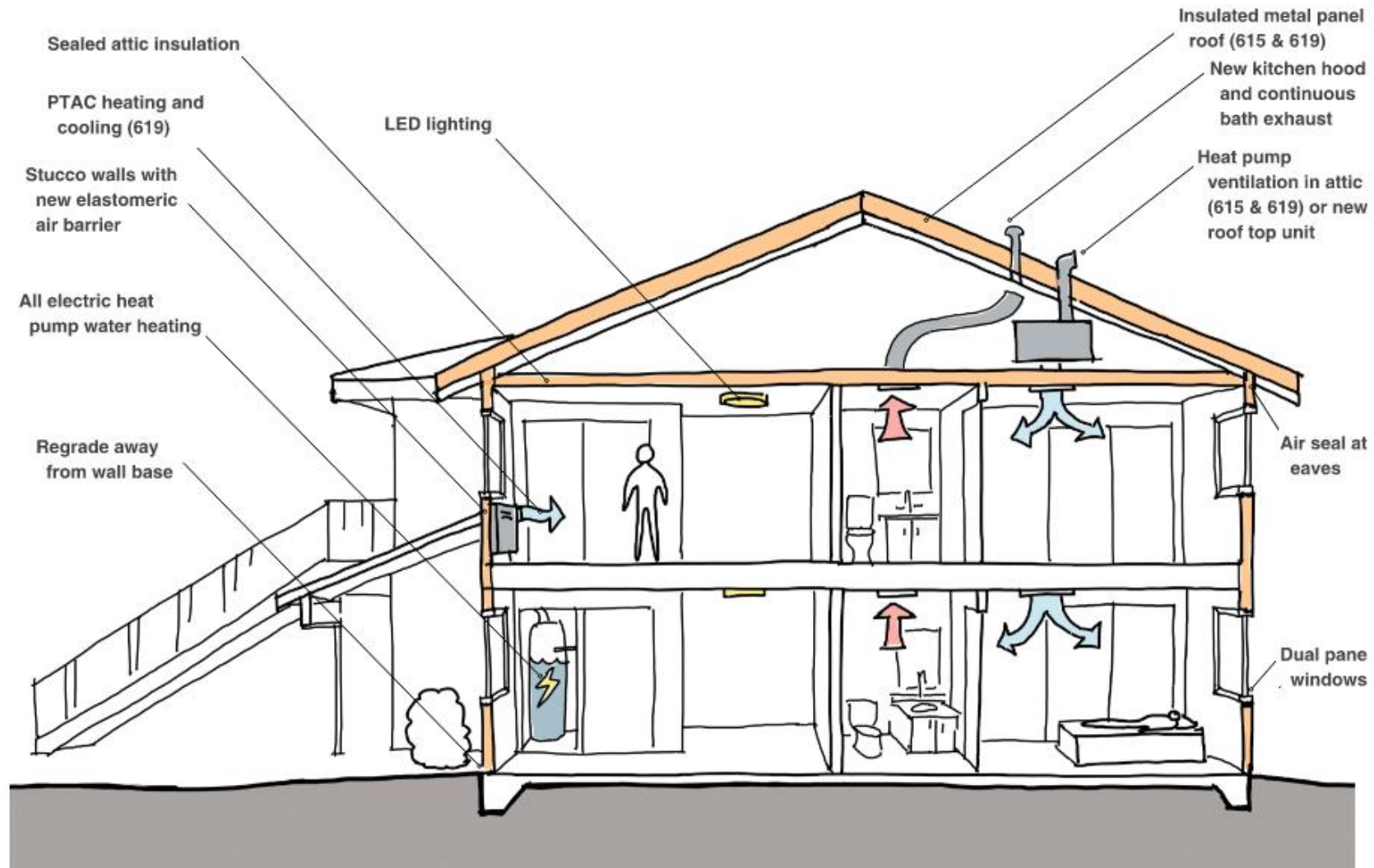
- Packaged units equipped with gas-fired furnaces for heating and DX cooling equipment.
- Large ductwork with bends contributing to higher pressure drops
- Gas-fired water heaters

After

- All electric heat pumps with different configurations
- More efficient ductwork with 45-degree bends to minimize pressure drop
- Heat pumps integrated with energy recovery ventilator
- Smart thermostats
- Heat pump water heaters



Building Energy Efficiency Strategies



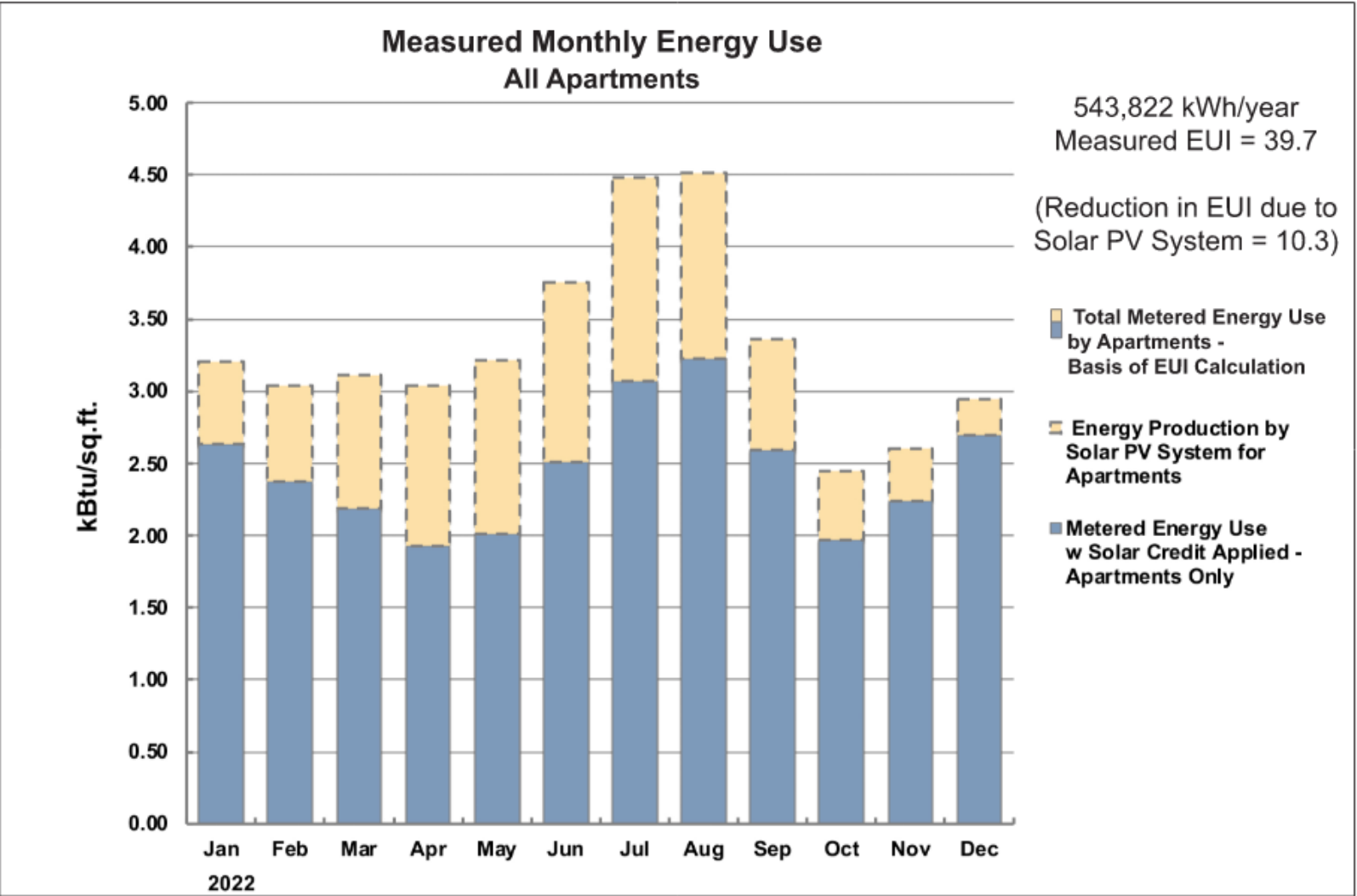
On-Site Renewable Energy



The renewable energy supply consisted of five structural canopies above some of the existing parking areas and the installation on the canopy roofs of 384 solar PV panels totaling 138 kW



Annual Energy Generation



Key Take Aways

Innovative Technologies Warrant Broader Adoption

Whole-building insulated panels and aerosol sealing proved viable in a California climate context supporting the case for wider application.

Replicable Renovation Model

This project demonstrates a scalable retrofit pathway for the state's aging affordable housing stock, supporting both resident comfort and long-term grid decarbonization.

