



SOLUTION AT A GLANCE: KAISER PERMANENTE: SANTA ROSA MEDICAL OFFICE BUILDING IS A ZERO-ENERGY FIRST

SECTOR

Commercial

BARRIER

Getting access to data and information, Identifying or evaluating energy-saving technologies, Metering/measuring energy use

TOOL TYPE

Case Study

BUILDING TYPE

Healthcare, Clinic or other outpatient health care, Hospital, Medical office

BUILDING SIZE

50,000-100,000 square feet

TECHNOLOGY

Envelope/Enclosure, HVAC, Lighting, Renewable Energy, Solar PV, Zero energy/ZE ready

OVERVIEW

Kaiser Permanente set an ambitious goal to be carbon neutral in 2020 (and achieved it) and carbon positive in 2025. One of the ways the company intends to achieve that goal is by constructing zero-energy buildings. A zero-energy building (ZEB) produces enough renewable energy to meet its own annual energy consumption requirements. Kaiser Permanente's 87,300-square-foot Santa Rosa medical office building in California is the first to achieve net-zero status and the first demonstrated net-zero healthcare building in the U.S. Completed in mid-2018, the building has 95 exam rooms, eight procedure rooms, a healthy living and technology center, an on-site café, 497 parking spaces, and over a dozen electric-vehicle chargers. Architects designed the Santa Rosa facility as an environmentally friendly, all-electric, net-zero energy building. The design team implemented a variety of sustainability features to enable the clinic to generate its own energy and use as little power as possible. The chart below describes some of the building's efficiency features:

Energy Efficiency

Measures	
Heat Pumps	Heat pumps provide cooling and heating for each thermodynamic zone, as well as domestic hot water; this eliminates the need for gas-fired boilers.
Building Envelope	The building's envelope is made from energy-efficient, durable, and highly insulated interlocking clad

	ding panels.
Windows	Windows are electrochromic, tinting as needed to reduce solar heat gain and lower the building's cooling requirements.
Independent Office Controls	Office temperature control systems utilize Therma-fuser supply grilles that open and close automatically to maintain desired comfort settings.

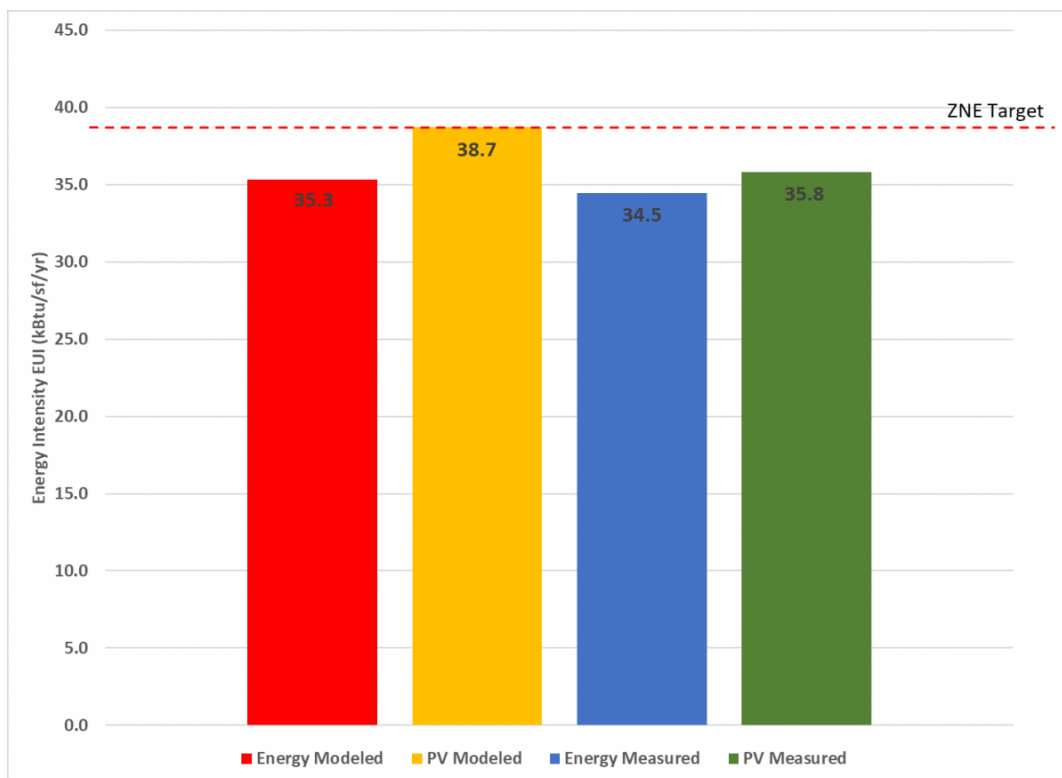
Other design features include:

- Locally sourced natural materials;
- Materials with a large recycled content;
- Water conservation measures via landscaping with drought-tolerant native plants watered by weather-based drip irrigation; and
- Building envelope and orientation optimized to maximize natural daylight while reducing heating and cooling energy.

Achieving net-zero building status required a two-part design combining energy efficiency and on-site renewable energy. With the energy efficiency measures put in place, the next step was designing and installing a solar photovoltaic (PV) system. The Santa Rosa facility features a 617 kW PV array in the parking lot as the main power source. After a 12-month waiting period the solar system was tested to verify net-zero status.

The chart below shows the results of the measurement and verification (M&V) process Kaiser used to verify the building as net-zero:

Solar Performance & Energy Results (Sept. 2018 – July 2019)	
<i>Solar EV Energy Production (modeled)</i>	38.7 kbtu/sf/yr
Solar PV Energy Production (measured)	35.8 kbtu/sf/yr
<i>Building Energy Consumption (modeled EUI)</i>	35.3 kbtu/sf/yr
Building Energy Consumption (measured EUI)	34.5 kbtu/sf/yr
Consumption – Production = 34.5 – 35.8 = -1.3 kBTU/ft2-yr	



Courtesy of Integral Group

Because the building is all-electric and burns no fossil fuels, industry standards consider it both net-zero energy and net-zero carbon. Measurement and verification of building performance found that actual energy consumption was about 2% less than modeled while the solar PV system produced about 7% less energy annually than predicted. However, this performance gap is considered very low by industry standards, proving the design concepts for the building and the PV system worked better than expected. The design team will use these positive results to help inform future zero energy building designs for Kaiser Permanente.

As Kaiser Permanente's first measured and verified net-zero energy/carbon medical building, the Santa Rosa facility has set the stage for others to follow. Though the facility is currently trending towards LEED Platinum, the design team is also considering the International Living Future Institute's Zero Energy certification and LEED Zero certification.

*Integral Group was the MEP Engineer and Energy Consultant for the project

