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Education

Renovating a Mid-Century School for Net Zero Energy Performance

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Buckley Elementary School rendering



zero public school renovation. It has proven an ambitious but attainable goal that's good for the environment, good for the town's bottom line, and impactful for the children.

How Designing for Net Zero Energy is Different

Architect/designer TSKP Studio and engineers CMTA/Bemis agreed: A common-sense approach to designing and engineering a net zero energy facility begins by first making the building as energy efficient as it can be, and then designing renewable energy solutions sized to satisfy the remaining demand.

Four critical decisions determine the energy efficiency of a building during the design process: its massing (the form of the building), solar orientation, envelope, and building systems.

Massing and orientation were already determined by the existing building: an efficient double-loaded corridor with a utility crawl space dug into a hillside. The long exterior walls, oriented north and south, maximize the output of a roof-mounted photovoltaic array. The 360kW array, says CMTA/Bemis, will generate enough energy annually to offset all of the building's energy demands.

TSKP Studio and CMTA/Bemis designed and modeled an envelope and fenestration strategy with an EUI (energy use intensity) target in the low 20s, taking advantage of the school's existing features. This is achieved by a combination of good insulation and good installation. The pressurization test provides field verification about the installation, testing for air leaks which compromise the envelope's performance. For comparison, similar facilities have EUIs between 50-70, which meet higher performance energy standards requirements.

For the building's systems, the goal was eliminating fossil fuels and relying on electric power. New rooftop photovoltaics then offset the electric usage. Efficient electrical pumps deliver hot and cold water from a central geothermal energy system to small mechanical units in the crawl spaces and closets. Geothermal wells – 60 of them – are sited beneath a field on school property.

A DOAS unit (dedicated outside air supply) supplements the wells to provide ventilation. Fresh outside air will come through the DOAS to individual spaces throughout the building so that each space receives fresh air based on occupancy and carbon dioxide levels.

How Building for Net Zero Energy is Not So Different



A Final Inspirational, Educational Touch

As a testament to the building's net zero energy features, many of which are not visible, a colorful LCD "energy dashboard" in the main entrance displays real-time energy savings, showing K-4 students, teachers, and visitors just how clean and green their rejuvenated school is.

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