

ZNE Schools

A ZNE building produces as much energy as it consumes over the course of a year

K-12 schools and community colleges represent key opportunities to advance zero net energy (ZNE) policies and practices. Schools can serve as examples of the feasibility and benefits of ZNE buildings and as hubs to educate the broader community about ZNE buildings.

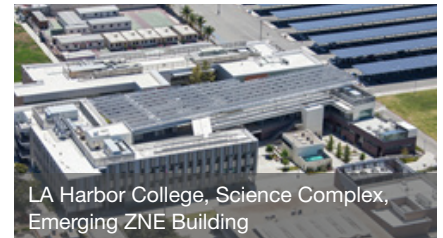
Educational facilities have been some of the earliest models of sustainable, high performance buildings and many school districts participate in certifications such as LEED or the Collaborative for High Performance Schools (CHPS) to improve building energy performance. ZNE is the next step in this evolution of high performance schools, healthier learning environments and a commitment to mitigating climate impacts.

Some of the benefits of schools pursuing ZNE include:

- **Lower Operating Costs:** K-12 schools spend \$8 billion on energy, more than is spent on computers and textbooks combined. Schools built to ZNE performance have lower operating costs and over time, save money on energy bills that can be spent on educating students. ZNE also reduces exposure of school budgets to the volatility of shifting energy prices.

- **Increased Student Performance:**

Occupants of ZNE schools benefit from heightened student performance, increased average attendance, better occupant health and improved teacher satisfaction and retention.

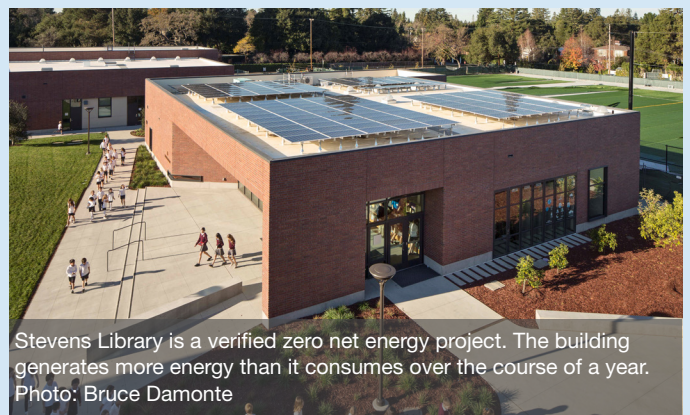


- **Innovation:** ZNE schools are living laboratories, stimulating learning and innovation. Occupant engagement in ZNE schools can provide additional energy savings and serve as a teaching tool for students, STEM programs and the larger community.

- **Resiliency:** ZNE schools are also more resilient in severe weather events. They can create safe havens for the community during emergencies since the building energy generation systems can be islanded and remain functional continuing to provide light and space conditioning during an outage, they also use daylighting and natural ventilation.

PROJECT PROFILE: Stevens Library, Sacred Heart Elementary | Atherton, CA

The Stevens Library at Sacred Heart Elementary School is the first verified zero net energy school building in California and an innovative model for zero net energy schools everywhere. Built in 2012, the 6,800-square-foot library is certified LEED® Platinum by the USGBC and as a Net Zero Energy Building by the International Living Future Institute. The building features natural ventilation and daylighting augmented by high performance lighting, high efficiency mechanical systems and a 42.5-kW, low-profile photovoltaic system. The project includes an energy monitoring system dashboard for public education and was designed and constructed at 20% below standard industry prices. The Stevens Library has a total energy use intensity (EUI) of 16.9, a renewable production intensity of 29.1, and a net EUI of -12.2, helping offset the larger campus energy use.



FAQs for ZNE Schools

Is ZNE the right option for my school?

Schools are a natural building type to achieve ZNE. They have regular and controlled occupancy sometimes with less summer use and extended vacation periods. Many schools are low rise and have large, unshaded roof and parking areas that are ideal for deployment of solar panels.

How do ZNE buildings compare with costs of other green buildings?

Depending on the type of building, uses, and type of construction, ZNE school buildings are in the cost range of typical construction. According to a K-12 ZNE feasibility study, ZNE school buildings not only are cost comparable to a code minimum building, but also have a greater return on investment.

What are financing options for a ZNE retrofit for my school?

Programs and policies like Savings by Design and Proposition 39 can assist school districts with costs associated with ZNE design, planning and construction. In addition, solar financing

programs and incentives may be helpful for financing renewable systems. Some school districts have begun work in tandem with their operation and maintenance departments to leverage Proposition 39 funding with other bond funding for ZNE upgrades. Additional resources may be available to support ZNE including grants, technology demonstrations, utility support, public-private partnerships, as well as local, state or federal government funding.

What design strategies are key to the success of ZNE in schools?

Most successful project designs include: passive strategies such as orienting the building for best solar access, shading to reduce heat load in the summer; daylighting; energy-efficient lighting and appliances; high performance insulation and building envelope design; attention to plug load management; lighting that responds to dimming and occupancy, and natural ventilation. Renewable strategies such as photovoltaic arrays can be used to offset any remaining energy after designing for maximum efficiency.

What Can Decisionmakers Do to Advance ZNE Schools & Public Buildings?

1 Set a ZNE commitment with performance goals for your district, campus, or building. A ZNE planning charrette can help set targets and ensure key stakeholder buy-in. Commitments to deep energy efficiency in new construction and modernization practices as well as ZNE performance goals are important policies to put in place now.

2 Inform long-range planning by benchmarking current energy consumption of school buildings, using this data to make decisions about future opportunities, and engaging in practices like Strategic Energy Management (SEM) to comprehensively manage energy production.

3 Share inspiration and lessons learned from case studies of other ZNE buildings to educate decision makers, capital projects and planning staff, facility managers and operators about ZNE benefits, cost and performance goals.

4 Incorporate energy performance criteria into design, construction and planning contracts (including RFQ's, RFP's and other contract-related documents) and take advantage of ZNE technical assistance and incentive programs.

Resources:

- Zero Energy Schools – Beyond Platinum: media.cefpi.org/efp/EFP45-3Hutton.pdf
- ZNE Prop 39 School Retrofit Pilot Program: energydesignresources.com/programs/zne-schools.aspx
- New Buildings Institute ZNE School Case Studies: newbuildings.org/hubs/zero-net-energy/
- USGBC Center for Green Schools: centerforgreenschools.org/
- Savings by Design Incentives: savingsbydesign.com/savings-design-program-overview
- DOE Better Buildings Accelerator – Zero Energy Schools: betterbuildingsinitiative.energy.gov/accelerators/zero-energy-schools
- Technical Feasibility Study for Zero Energy K-12 Schools: buildingdata.energy.gov/cbrd/resource/1981