

Overcoming Obstacles on the Path to Zero Net Energy Schools



by
Julia Nugent

Once considered technically infeasible and cost prohibitive, a Zero Net Energy (ZNE) public school is now within reach for most school districts. The new Annie E. Fales Elementary School in Westborough, Mass. pushes this goal even further. It is projected to be one of the first Positive Net Energy schools (PNE) in New England, producing 10% more energy than required to operate the school itself. With the school now in construction and slated to open next fall, a few key lessons are worth sharing for other teams seeking ZNE success.

Select the Right Team

Zero Net Energy initiatives require early, informed expertise and dialogue across multiple disciplines. Siloed design efforts just will not work, as an energy conservation approach that is optimal for one aspect of the building may be detrimental to the requirements of another. The collaborative effort for Fales included the architect, mechanical engineer, renewable energy consultants, energy modeler, and construction manager working together to define challenges, discuss trade-offs, and come up with a holistic solution.

For Fales, more than 30% of the energy performance savings were realized before or during the schematic design phase,

through analysis and consensus decisions about the building's siting, shape, and basic mechanical and envelope systems. Fine-tuning the design in later stages moved the dial further, but the range of options to reduce energy diminish as the design progresses. In other words, the commitment to pursue a ZNE building needs to take place during schematic design at the latest.

Set Shared, Clear Goals

As leadership guru Peter Drucker once said, "The best way to predict the future is to create it." Establishing purposeful and attainable strategic ZNE goals at the outset of the project gave the Fales team a clear road map for decisions and became the basis for community dialog and consensus building. One key energy performance goal was the building's target Energy Use Intensity (EUI), the amount of energy per square foot needed to operate the building over the course of a year (measured as kBtu/sf/yr). At the Fales School, we set an ambitious EUI goal of 25; projected performance is currently tracking slightly better than the original target.

Factor Utility Savings into Project Financing

A second, however no less important, goal for Westborough was to achieve Zero Net Energy use without relying on increasing property tax revenue to pay for it. Yes, the energy savings provisions increased the construction cost of the new Fales School, which in turn increased the annual municipal bond payment by \$200,000. However, taking the older, energy hog school off-line will save the town roughly \$200,000 per year in utility costs. The new Fales School will have no



The Fales Elementary School building site / Rendering courtesy of HMFH Architects



Aerial view of the Fales Elementary School building site / Photo courtesy of Gilbane Building Company

utility bills for the life of the building, and the 10% excess energy produced will be credited toward energy consumption at other town schools. The bottom line is that the annual utility savings entirely offset the excess annual bond payment.

The shift in affordability for Zero Net Energy comes at an opportune time. As

the consequences and cost of climate change come into closer view, our clients want to contribute to the solution by pursuing low-carbon, highly sustainable school projects for their community.

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Building Energy Retrofit Resource Hub Launched

Boston – The City of Boston, recently named a top U.S. city for energy efficiency, and Eversource announced the launch of the Boston Building Energy Retrofit Hub, a new online resource that connects Boston building owners, facility managers, and tenants of large- and medium-sized buildings that are over 35,000sf or 35 units to Eversource's energy efficiency services, incentives, and technical support to complete energy-saving projects.

Buildings account for more than 70% of greenhouse gas emissions in the city, and the partnership is the latest initiative in Boston's goal to reduce emissions and become carbon neutral by 2050.

"The Boston Building Energy Retrofit Hub is an important resource as we strive to achieve carbon neutrality and mitigate the effects of climate change to ensure a healthy and sustainable future for the city of Boston," said the City of Boston chief



of environment, energy, and open space, Chris Cook. "Hands-on support and access to the latest information, trends, and specialized building technologies can be a catalyst for change. The resources and energy expertise offered through the partnership with Eversource is designed to drive greater awareness of the benefits of energy efficiency and more participation in these nationally-recognized programs."

"The city of Boston is a top performer in energy efficiency because building

owners, operators and tenants are actively collaborating and implementing new solutions to reduce energy use and cut carbon emissions," said Eversource VP of energy efficiency, Tilak Subrahmanian.

"The hub is a strong example of how we're working with customers to share expertise and streamline access to incentives and programs that make energy efficiency projects achievable. We're proud to support this collaboration and help the city and businesses achieve their energy efficiency goals."

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In 2014, Boston adopted the Building Energy Reporting and Disclosure Ordinance (BERDO) to educate building owners, tenants, and other stakeholders about their energy usage, greenhouse gas emissions, and the tools to reduce both. It also requires owners and managers of Boston's large- and medium-sized buildings to report their annual energy and water use. Buildings covered must also show concerted efforts to reduce their emissions every five years through energy actions or audits. Overall, BERDO helps property owners save money and reduce emissions to help the city meet its goal of achieving carbon neutrality by 2050, as laid out in its Climate Action Plan.