Updated: October 5, 2020

Net-zero energy schools offer CT a glimpse of future green development

RENDERING | CONTRIBUTED

The new Mansfield Elementary School will become one of the first two net-zero energy public schools in New England.

By Joe Cooper

Spurred by increasing and high utility costs and public support for sustainability, two northeastern Connecticut towns are pursuing the first net-zero energy public school developments in New England.

Key principles of net-zero energy buildings

More Information >

The towns of Manchester and Mansfield are wrapping up design plans for new and renovated net-zero energy elementary schools that will be equipped to generate as much energy as they consume by using roof-mounted solar panels and other technology that lowers energy consumption for lighting, heating and cooling, computers and other equipment.

With 14 months of construction slated to begin on both schools next spring, area designers and environmental consultants say the $50-million Mansfield Elementary School and $24-million remodeled Buckley Elementary School in Manchester will establish new standards for sustainable design in public and commercial developments across the state and region.

Ryszard Szczypek, Partner, TSKP Studio

“There’s a rising consciousness of net-zero and what it means,” said Ryszard Szczypek, a partner at Hartford architecture firm TSKP Studio, which is spearheading the designs of both net-zero energy schools. “Five years from now, net-zero is going to be the standard language in every [request for proposals]” for public projects.

Net-zero developments still represent a small percentage of public and commercial building construction, but are growing in popularity as the cost of buying renewable energy sources has decreased by more than 80% over the last decade, according to industry experts.

Affordable renewables have made the cost of zero-energy developments on par with, or up 10% more than, a regular build. Long-term energy savings and reimbursements from state governments on public buildings more than offset the added costs, proponents say.

Taxpayers in the Northeast, meanwhile, are looking to combat some of the highest utility rates in the country by funding zero-energy public buildings that also have a smaller impact on global warming.

More green developments would also move Connecticut closer to its goal of reducing carbon emissions in the state by 80% from 2010 to 2050, environmental officials say.

Nationally, there are nearly 700 zero-energy public and commercial developments that are expected to be completed this year, according to the New Buildings Institute (NBI), a not-for-profit organization that promotes and verifies net-zero buildings. That's up sharply from 60 net-zero developments in 2012, and 332 in 2016, NBI data shows.

Schools are the top non-residential net-zero building, representing over a third of all projects tracked by NBI.

"Everybody is on the bandwagon in one way or another," Szczypek said. "When you're adding on some features to improve your energy performance, it's kind of a no-brainer to add those [renewable] features."

Gaining momentum

Tony Hans, Vice President and National Director of Sustainable Projects, CMTA Inc.

The majority of growth in net-zero energy buildings is in the urban and rural education markets because school systems use them as a learning tool for students and they lower overall operating costs, according to Tony Hans, vice president and national director of sustainable projects for engineering consultancy CMTA Inc.

Hans says his Kentucky-based firm, which is working on the Manchester and Mansfield projects, over the last dozen years has been involved in designing more than 4.6 million square feet of net-zero energy buildings in the U.S.

That includes the first net-zero building in Louisville, Ky., where CMTA designed a $3.5-million, 25,000-square-foot corporate office that included glare reduction and daylight management features and LED lighting systems connected to live dashboard displays that tally daily energy generation.

Most of CMTA's net-zero work has been in the mid-Atlantic region, but the ultra green model is starting to gain attention in New England and on the west coast, he said.

CMTA is currently eyeing other potential net-zero developments in and around Connecticut, but Hans declined to discuss those projects.

"There's been eight states where CMTA has done the first zero-energy building or school in the state," he said. "So often, once that first one is done, and people can go visit, it drives other groups competitively to do the same thing."

CT projects

Both of the Connecticut net-zero elementary schools will use roof-mounted photovoltaic panels to generate renewable energy, and incorporate geothermal wells on-site that generate and store energy to reduce HVAC demand.

Geothermal wells are often designed to use the earth's subsurface temperature and a heat exchanger that adds or removes heat from a building.

Project officials say they are also using aggressive conservation measures — including strategic IT design and window placements to maximize daylight — to offset the generation needs of the buildings.

In Manchester, local officials are still finalizing plans for incorporating a net-zero design at the aging Buckley Elementary School. That renovation project is part of a larger $92-million school overhaul plan that voters backed in 2019.

TSKP, which is also contracted to complete a net-zero energy project at Mancheter's Bowers Elementary School, said the Buckley redevelopment is on pace to break ground sometime in February with an expected completion by summer 2022.

Fifteen miles east in Mansfield, TSKP has designed a 79,000-square-foot school that will include 1,450 photovoltaic cells on its roof and 60 geothermal wells on the property. The 500-foot-deep wells will regulate building temperatures all year, substantially reducing the HVAC burden.

T. Whitcomb Iglehart, Partner, TSKP Studio

After moving costs and acquiring furniture and equipment, the project is expected to cost $50 million. Construction starting this winter is also expected to conclude the following year.

"The challenge for us is to get to net-zero in a way that demonstrates you're not sacrificing good design to achieve it," said T. Whitcomb Iglehart, partner at TSKP Studio. "We need to move the industry to achieve energy efficiency levels that 10 years ago we thought were impossible."

Key principles of net-zero energy buildings

• Buildings must achieve an annual operational net-zero carbon emissions balance based on

metered data.

• Buildings must perform as efficiently as possible, and not waste energy.

• Any extra energy needed for a building should come from renewable sources, preferably on-site.

Source: World Green Building Council

Most Popular

Net-zero energy schools offer CT a glimpse of future green development

After helping send a powerful NY senator to prison, CT entrepreneur tackles climate change

Meet Greater Hartford's Top 25 Health Care Power Players