

Freeport, Maine Passive High School

The First Passive House-Certified, Net-Zero High School in the U.S.



Maine Coast High School: Inspiring spaces and a permanent home: front exterior view and multipurpose room are shown. Photos courtesy of Kevin Morris Photography.

By Barbara Whitchurch

On March 30, 2018, Efficiency Maine (efficiencymaine.com) designated the Maine Coast Waldorf School (mainecoastwaldorf.org) as a certified Maine Advanced Building. Designed by the architectural firm Briburn of Portland, Maine, the building far exceeds many of this certification's requirements.

In addition, the school recently received certification from the **Passive House Institute of the United States**, the highest voluntary energy efficiency standard in the world, making it the first Passive House-certified high school in the United States.

An article by Katy Kelleher ("Designing for Change," July, 2018, *Maine Home + Design Magazine*) quotes Christopher Briley and Harry Hepburn, Briburn's founding principals, " 'We're super jazzed about how the school came out,' Briley says. 'It's the best feeling ever, to walk into that school and see kids and teachers using it. It's their everyday building.' Rather than the standard rectangular brick building, these high school students get to learn beside airy windows and under solar panels. According to Hepburn, who was the lead architect and LEED AP Professional, 'They didn't want something that would feel institutional. It was a lot of fun to play with shape, color, and material, while making sure it was up to our standards.'"

The Specifications

The two-story, 10,600-square-foot building accommodates 70 students and incorporates the following features that led to the certifications:

- The walls are highly insulated with dense-packed cellulose. The east, west and south walls are 8" thick, overlaid with 4" of rigid foil-faced polyiso foam board, yielding an R-value of 51.6. The north wall is 8" thick, overlaid with a 9" Larsen truss system, both filled with dense-packed cellulose yielding an R-value of 61.4.
- The main roof is constructed of 16" TGIs, yielding an R-value of 55; the roof over the Great Room has 24" TGIs, yielding an R-value of 82; and the flat roof over the entrance section yields an R-value of 70. There is also 4" of insulation around and under the slab.

- Sophisticated building membranes and tapes from **Siga** and **Huber Zip System** control the ingress of moisture from the outside and prevent interior moisture from migrating into exterior walls in the winter.
- **Intus** triple-glazed windows and **Reynaer** exterior doors, from Lithuania and Belgium, respectively, yield high R-values and excellent air sealing as well.
- Southern orientation of the building allows for maximum solar gain.
- Window openings are strategically located to capitalize on solar heat gain in the winter; deep southern overhangs help prevent overheating during warmer months.
- Interior LED lighting is tied to occupancy sensors.
- **Mitsubishi** ductless mini-split heat pumps provide efficient heating and cooling. Internal heat gains from people, lighting, and equipment provide significant heating in the winter; heat pumps make up the difference — if needed).
- Three RenewAire Energy Recovery Ventilators (ERVs) use exhausting air to precondition incoming fresh air to minimize energy loss.
- A 33kW roof-mounted solar electric system, designed and installed by **Maine Solar Solutions**, is modeled to produce at least as much electricity as the building is projected to use. The solar system is operated under a Power Purchasing Agreement (PPA), in which Maine Solar Solutions owns the array and has a long-term contract with the school to purchase the electricity it produces for a low-cost, fixed rate.

Warren Construction Group was the general contractor/installer for the project. According to Peter Warren, “(We were) proud to be part of a committed team brought together to plan and create one of the most environmentally conscious schools built in recent history. The school now has the benefit of tight, efficient, high-quality space that is really fantastic to be in. The Waldorf community will be well served for years to come.”

A Bit of History

The school was founded in 1984 as Merriconeag Waldorf School, serving students in early childhood through eighth grade. In 2007, Waldorf opened a high school in New Gloucester, but the board and faculty have always held a vision of a beautiful, energy-efficient building on the adjoining property. As the high school enrollment climbed toward a record 70 students, the time was at hand to make a move.

“The new high school location in Freeport really strengthens our overall school,” Admissions Director, Lynn Baird, said in a news release. “Not only are we more accessible, but we now have endless opportunities for connection, interaction and collaboration among teachers and students across grades K through 12.” These opportunities include tutoring, “big brother/sister” programs, and all-school games days.

The building project also included an expansion of the school’s Community Hall for new faculty offices, a commercial kitchen/café, and an additional music/performing arts space. To create these sustainably designed additions, Maine Coast Waldorf School partnered with Kaplan Thompson Architects of Portland.

Passive House buildings are also known for their comfort. The temperature is uniform throughout; fresh air is continuously circulated; the southern exposure affords great light. So, it is with the Maine Coast Waldorf High School. Windows afford beautiful views and plenty of light, enhancing the feeling of being connected to nature — and hopefully encouraging a feeling of stewardship for the land.

Passive House design/construction is supported by certified builders, designers, consultants and raters, each with a respective designation: CPHB, CPHD, CPHC, and CPHR. More information is available from Efficiency Maine, Vermont Passive House (vtph.org), and Efficiency Vermont (efficiencyvermont.com).

Barbara Whitchurch is a freelance writer and a board member of Vermont Passive House.

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