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Maclay Architects designed Coast Maine Botanical Gardens achieves Net-Zero Energy

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The Coastal Maine Botanical Gardens Bosarge Family Education Center, a LEED Platinum certified facility, has achieved confirmation of Net-Zero Energy status after a year of operation. The Education Center is recognized as one of only a handful of Net-Zero, non-residential buildings in New England, and is the second commercial LEED Platinum building in Maine.

The structure was a collaborative effort of integrated design and construction that included Portland-based Thornton Tomasetti/Fore Solutions, which served as the project's green building consultant. Their work also includes Maine's only other LEED Platinum commercial building, the Augusta Hannaford supermarket.

The design was led by a collaboration between Maclay and Scott Simons Architects. Maclay Archts. has completed 10 Net-Zero or Net-Zero ready projects ranging from 3,000 to 75,000 s/f.

In addition, Allied Engineering collaborated with Energy Balance to design and engineer the mechanical and electrical systems, which include a massive array of on-site solar photovoltaic electricity generation capable of generating 55,184 kilowatt hours.

H.P. Cummings was the construction manager on the project. Becker Structural Engineers provided structural design services for the project. Bensonwood builders of high performance houses and commercial structures, produced and installed the super-insulated, tightly-sealed building shell. To reduce waste and minimize disruption to the build site, Bensonwood fabricated the panelized construction assemblies off-site at their NH facilities, and assembled them rapidly on-site at the Gardens. Bensonwood's off-site fabrication techniques enabled the building to be rapidly assembled on-site during the winter months while ensuring the highest building performance standards.

Funding for the project came from the Bosarge Family Foundation, which was so impressed by the plans for the Education Center that it donated \$2 million, including a \$1.5 million matching challenge, which the Gardens not only met but exceeded. The total cost for the Center and its all-native landscape is \$4.2 million.

According to the U.S. Department of Energy, a Net-Zero building is a structure with zero net energy consumption and zero carbon emissions annually. After a year of operation, an analysis of the property's performance has confirmed that the Center is producing almost 30% more energy than it is using, and the excess energy produced is being used to supplement other power needs at the gardens. Only a few select commercial projects nationwide achieve this distinction annually and the center is the first non-residential development in Maine to achieve Net-Zero Energy status.

The new center highlights the remarkable growth of Coastal Maine Botanical Gardens, which opened in 2007, on 128 acres of forest and tidal frontage. The Gardens attracted about 40,000 visitors the first year. Since then it has expanded to 248 acres, becoming the largest botanical garden in New England and one of Maine's top tourist attractions.

This fast-growing popularity caused Coastal Maine Botanical Gardens to quickly outgrow its visitor center, prompting the decision to build the education center. At the facility's opening in the summer of 2011, the 8,000 s/f education center was hailed as the "greenest building in Maine." This building stands at the next frontier of building design, going beyond LEED standards to achieve much greater energy savings and reductions in greenhouse gas emissions.

Coastal Maine Botanical Gardens has been praised widely, receiving accolades from the Maine Chapter of the U.S. Green Building Council's Katie Charette, who said "Healthy, high performance buildings like the Borsage Family Education Center are key to creating a sustainable built environment in Maine."

The building enclosure is at least a foot thick. Designed and specified by Maclay Architects, this innovative enclosure design achieves an impressive efficiency rating of R-40 in the walls and R-60 in the roof. Special triple-glazed windows, among the most efficient windows that can be bought in the U.S, allow for passive solar gain in the winter, while keeping out the heat in the summer. In addition, a recent energy audit of air leakage concluded that air infiltration at the facility is by far the lowest in the state. All these factors combined allow for a building with incredibly low energy consumption, before renewables are even factored into the mix.

To produce the energy required to achieve Net-Zero status, 135 photovoltaic panels are mounted on the south-facing roof, and an additional 102-panel array is located in an open field nearby. Altogether this solar installation generated 55,184 kWh last year. Payback for the solar system is estimated at 10 years.

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