

Project Profile

A Zero Energy-Capable Building



Photo Credit: Gino DeGrandis

Overview

Site Details

- Location: Falmouth, MA
- Building type(s): Laboratory, Commercial office, Other
- 62% new construction, 38% renovation of a historic building
- 19,200 ft²
- Completed June 2003

GILMAN ORDWAY BUILDING AT THE WOODS HOLE RESEARCH CENTER

The Woods Hole Research Center is a science and policy institution working to advance scientific discovery and to seek science-based solutions for the world's environmental and economic challenges through research and education on forests, soils, air, and water.

In contemplating their consolidation in a new headquarters, trustees and staff agreed that this building should reflect the Center's core ideals, support their research and education mission, and promote the health of not only the building occupants, but the larger world as well.

Working within a challenging and constrained site, the design preserves the cultural landscape represented by an existing 19th-century summer home, respectfully and adaptively reusing the original house with the addition of contemporary office, laboratory, and common spaces.

Energy

The integration of passive-solar and energy-conservation strategies, optimal performance, and on-site renewable power generation make the building 83% more efficient than a minimally ASHRAE-compliant building.

A grid-connected, net-metered photovoltaic array and a solar-thermal hot water system supply renewable electricity and water. Hydronic distribution provides silent radiant heating and cooling, and valance convectors offer individual zone control and much greater efficiency than conventional fan coil

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The integration of passive-solar and energy-conservation strategies, optimal performance, and on-site renewable power generation (solar and wind) make the building 83% more efficient than a minimally ASHRAE-compliant building.

units. An on-site wind turbine provides roughly 50 percent of the building's energy needs. In the first three months of 2012, the turbine generated 37,693 kilowatt-hours (kWh), saving \$5,653 and averting 46,212 pounds of CO². (Source: buildingdashboard.net)

Careful detailing of the building envelope stands foremost among the strategies used to achieve the project's ambitious energy goals. Icynene spray foam insulates all exterior walls and roof assemblies, providing an extremely effective air barrier and optimized R-values.

Efficiency Strategies

Wall Insulation. Use spray-applied insulation in cavities with many obstacles or irregularities. Use advanced framing techniques.

Solar Cooling Loads. Orient the building properly.

Daylighting for Energy Efficiency. Use large exterior windows and high ceilings to increase daylighting. Use skylights for daylighting.

Water Heaters. Use solar water heaters.

Photovoltaics. Use a photovoltaic (PV) system to generate electricity on-site

Wind. An on-site wind turbine meets ~50% of the building's energy needs.

High-performance Windows and Doors. Optimize energy performance of glazing systems.

Heating Systems. Use hot water heat distribution.

Ventilation Systems. Use enthalpic heat-recovery ventilation.

Lighting Controls. Use occupancy sensors.

HVAC Controls and Zoning. Provide sufficient sensors and control logic. Zone the building for modular HVAC control.

For an in-depth case study, visit:

buildings.newbuildings.org/overview.cfm?projectid=257

New Buildings Institute

New Buildings Institute (NBI) is a nonprofit organization working collaboratively with commercial building professionals and the energy industry to improve energy performance of commercial buildings.