The Woods Hole Research Center is a scientific, policy, and educational institution whose mission is to combat global warming and other forms of environmental degradation. We have a particular interest in the health and function of world forests because of their controlling influence on climate. With a pressing need for expanded facilities to house a growing staff, the Center employed the firm of William McDonough+Partners to design a 19,300 s.f. building that would be a model for 21st century construction in its use of energy, water, and environmentally-friendly building materials. Completed in February of 2003, the Gilman Ordway Campus provides comfort and pleasure to building inhabitants without causing harm to the immediate environment and the larger world.

HIGH PERFORMANCE BUILDING

Our primary goal is to develop a "High Performance" building producing more energy than it consumes, and operating without the combustion of fossil fuel, the primary contributor to global warming. We estimate that our building will require 19% of the energy required to maintain a similarly sized structure built to the state building code, or 90,000kWh annually (16,000 BTU/ft^2/yr) versus 470,000 kWh annually (83,000 BTU/ft^2/yr). Meeting this goal requires a commitment to three crucial conservation strategies.

- The building "envelope" must be tight
- Lighting, office, and mechanical systems must be highly efficient
- Natural daylight and ventilation should be optimized

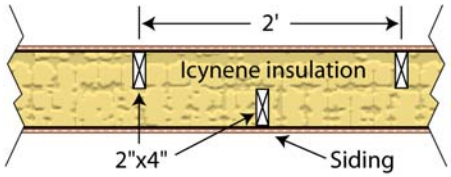
Once these strategies have been implemented, it becomes possible to use renewable energy technologies to achieve a High Performance building.

STEPS TO A HIGH PERFORMANCE BUILDING

EFFICIENT BUILDING ENVELOPE

Icynene spray foam insulation was used in the roof and exterior walls, providing an effective R-20 insulation that is both a thermal and a vapor barrier.

Offset-stud framing complements the Icynene application, eliminating the thermal bridge created by attaching interior and exterior walls to common studs.



Double- and triple-glazed windows (argon-insulated, low Emissivity) were installed throughout.

Natural daylighting and ventilation is supplied to all interior spaces.

EFFICIENT MECHANICAL SYSTEMS

Energy Recovery Units

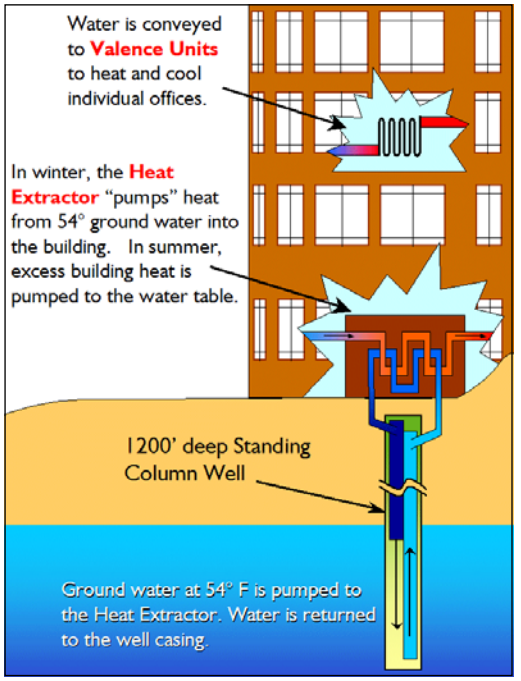
Three "Enthalpy Wheels" recapture energy from the ventilation system by preheating incoming air with outgoing exhaust air.

Office Lighting & Equipment

We replaced incandescent lighting with fluorescents, desktop computers with laptops using 10% of the energy, and laser printers with inkjets. We eliminated redundant equipment and adopted EnergyStar appliances.

Ground Source Heat Pump

Building temperature is maintained by using the temperature of ground water to heat (or cool) the building.



RENEWABLE ENERGY

Aggressive conservation strategies are prerequisites for the practicable implementation of renewable energy in the operation of a building.

Photovoltaic Panels

Funded by a grant from the Massachusetts Renewable Energy Trust, our photovoltaic array is composed of 88 – 25 s.f. panels and is expected to yield 41 percent of the building's power needs (37,000 kWh annually), including the power to operate the ground source heat pumps.

We have installed an array of 88 ASE Photovoltaic panels at the Gilman Ordway Campus.

Wind energy

Onsite measurements tell us that a 100kW wind turbine will provide 60,000 to 127,000 kWh annually, or 67% to 141% percent of the building's power needs.

Northern Power Systems' NorthWind 100 turbine

OTHER "GREEN" ATTRIBUTES OF THE ORDWAY CAMPUS

Certified and Recycled Wood: All interior finish woodwork is Forest Stewardship Council (FSC) Certified sustainably harvested maple (interior flooring) or recycled ash (used for all doorframes and window casements). Exterior wood finishes are FSC Certified, including cedar shingles and siding, and the Brazilian *ipé* wood used for our spacious porch, deck and entrance stairway.

Low-Emitting Materials: Paints and coatings meet low VOC standards. Carpets have been eliminated throughout the building.

Increase Ventilation Effectiveness: Fresh air is delivered to all areas of the building

Controllability of Systems: Offices contain operable windows and user-controlled temperature and lighting.

Light Pollution Reduction: Exterior lighting has been minimized consistent with safety. Automatic shutoffs for exterior lighting

Innovative Wastewater Technologies: Denitrifying septic (Ruck™) system. Our soils scientists will monitor performance of the system and hope to experiment with alternative denitrifying strategies.

Recycled content in furniture: We have sought high recycled content and sustainably managed wood in our furniture products.

The Woods Hole Research Center

P.O. Box 296
Woods Hole, MA 02543-0296
Phone (508) 540-9900
Fax (508) 540-9700
http://www.whrc.org

BUILDING

FOR THE FUTURE

The Woods Hole Research Center's

Gilman Ordway Campus