GREEN BUILDING

EPA United States Environmental Protection Agency New England

NEW ENGLAND REGIONAL LABORATORY

U. S. Environmental Protection Agency

Energy Efficiency

The building and its components have been designed to minimize energy consumption. We worked with our local utility and participated in its energy conservation program, Massachusetts Electric Design 2000plus. Based on these efforts, the laboratory is at least 35 percent more energy efficient than a typical laboratory. The energy efficient systems in the building include: six modular gas-fired boilers, two water-cooled chillers, daylight dimmers, occupancy sensors, tubular skylights, energy-efficient lights, high-efficiency motors and variable flow pumping systems, variable air volume heating and cooling systems with night and low occupancy system setbacks, insulated windows, highly rated insulation, and automated building management and monitoring systems.

Water Efficiency

Water in the building is reduced with the use of waterless urinals, which conserve an average of 40,000 gal. per year/per urinal. Restrooms are equipped with electronic sensors on the plumbing fixtures. Outside, native trees and shrubs requiring little water have been planted, and water diverted from roof drains replenishes on-site wetlands. The lab uses a well on the property to supply a portion of its non-potable water for minor irrigation.

Solar Power

Photovoltaic (solar energy producing cells) awnings shade the office windows on the outside and reduce glare and heat gain, thus reducing the amount of cooling needed. In addition, the awnings supply approximately 2,000 watt-hours daily to the building's electrical system. Special skylights in the corridors with reflective tubing systems bring daylight deep into the building, reducing the need for artificial light.

Green Power

EPA New England powers its laboratory with 100 percent green electric power. EPA purchases wind power to match the electrical consumption of its North Chelmsford lab, estimated at close to 2 million kilowatt hours per year. While this will not generate cost savings, it will help us achieve environmental benefits by reducing greenhouse gases that would have been emitted from conventional power sources.

Natural Landscaping

The regional laboratory landscaping design and maintenance program follows water conservation and environmental protection principles. The laboratory's landscaping is a natural system with mostly native grasses, wild flowers, and shrubs. The landscaping is adapted to the local climate, with little additional water, minimal cutting, and no synthetic fertilizer or pesticides.

Waste Handling

Sanitary wastewater from the lab is being sent to the Lowell Regional Wastewater Utility. All wastewater generated in laboratory portions of the building are piped to a state-of-the-art acid neutralization system. This system uses a two-stage neutralization process and a 500-gallon holding tank, which is activated if the wastewater is not completely neutralized during the two-stage process. The building has an extensive recycling program. Food waste and some landscaping debris are composted on site. Paper, cardboard, plastics, glass, cans and batteries also are recycled.

Indoor Air Quality

A healthy indoor environment is a critical safety concern in a laboratory setting. The largest sources of indoor air contaminants are interior building materials, office furniture and equipment. Before any material was used in this building, it was examined for possible effects on indoor air quality in addition to its general environmental impact. Materials with contaminants above EPA-designated levels were not used. Measures taken to ensure indoor air quality at the lab included low volatile organic compound (VOC) products; strict control of formaldehyde; construction materials; off-gassing materials before installation; cleaning of all duct work; replacing of filters before occupancy; and the use of environmentally preferable cleaning materials. Prior to occupancy, an independent indoor air quality consultant tested the building to ensure that it was within EPA-specified requirements. An Indoor Air Quality Control Plan is being implemented.

Environmentally Preferable Materials

The building design incorporated the resources naturally available on the site to avoid generating unnecessary debris and to minimize site demolition. All soil and gravel on the site was stockpiled and graded for later use as fill or loam. Blasted rock outcroppings were crushed with portable on-site processing equipment and totaled approximately 17,500 tons. The crushed stone was used as base material for concrete paving; sub-base for bituminous concrete pavement; backfill for footings, structures and pipe bedding; and for under-drain filter aggregate. Reuse of materials avoided disposal costs and was sufficient to complete the landscaping and fill work with only a minimal amount of fine grading material (sand) brought in for finish grading. Materials used in construction contained the highest recycled content available. Using them eliminated pollution from extraction of new materials, transportation and manufacturing. Additionally, it reduced the need to dispose of the recovered materials and encouraged recycling in the industry. The following recycled materials were used in construction: fly-ash containing concrete (use of this type of concrete diverted 126 tons of fly-ash from becoming part of the waste stream), steel, gypsum wallboard, ceiling tiles, insulation and hydromulch.

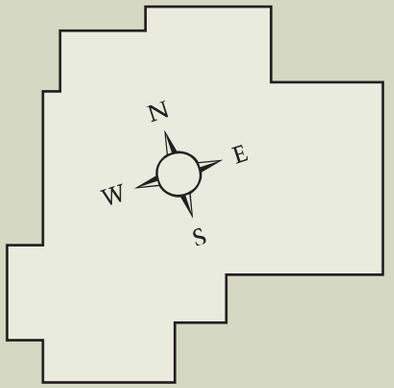
Green Building Features of the U.S. EPA New England Regional Laboratory

Energy efficient insulated windows

Water runoff from the roof replenishes on-site wetlands

Northside offices reduce required cooling

Southside loading dock maximizes snow and ice melt



Photovoltaic window shades produce energy

Original boulders provide a natural wall

Natural landscaping uses native plants and minimal lawn

Higher set windows allow more natural light deeper into the building

Green Building Operations of the U.S. EPA New England Regional Laboratory

Reducing Our Environmental Footprint

The EPA New England Regional Laboratory has implemented an Environmental Management System (EMS) for its facility, operations and employees. It focuses on compliance, pollution prevention and public outreach. The system provides a set of management practices and processes that enables the laboratory to manage and reduce its environmental impacts and to operate with greater efficiency and control.

The benefits of an EMS include:

- Improved environmental performance in such areas as energy and water conservation
- Increased ability to identify pollution prevention opportunities
- Enhanced operational control and efficiency
- Reduced costs
- Improved compliance with environmental protection laws

Adopting and implementing an Environmental Management System reduces the regional laboratory's environmental footprint. Environmental improvements at the laboratory include:

- Thirty-three tons of mixed paper has been recycled from 2003 to 2007
- Energy consumption dropped by nearly 31% between 2004 and 2007 by implementing procedures to reduce electricity use and increase efficiencies in HVAC system
- Installation of 70 LCD computer monitors saves approximately 21,400 kWh each year
- Waterless urinals save approximately 25,000 gallons of water each year
- Regional vehicle fleet average fuel mileage has continued to increase each year and two of the 13 laboratory vehicles are hybrid vehicles
- Use of clean burning 4-stroke outboard boat engines in the region's fleet reduces emissions
- Water consumption declined by 49% between 2004 and 2007
- All paper for copiers and printers is 100% post consumer recycled content paper and paper use has been reduced by double-sided printing and electronic file transmissions

The regional laboratory's Environmental Management System ensures that environmental accountability is incorporated in daily activities and long-term strategies.

For more information about Environmental Management Systems, please visit the EPA on the web at: **www.epa.gov/ems/index.html** and **www.epa.gov/ne/ems/**

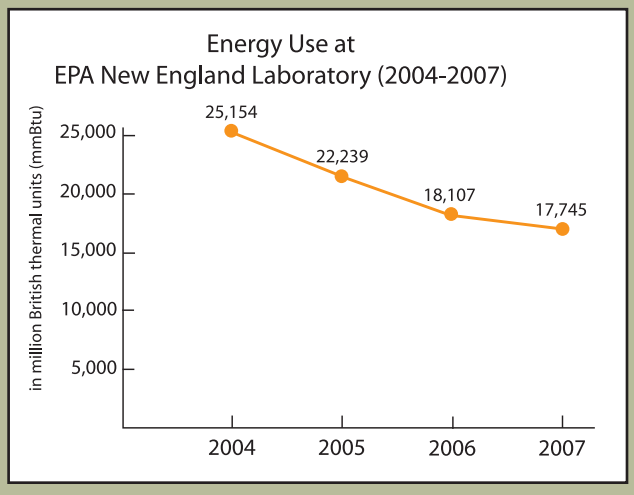
EPA New England Regional Laboratory EMS Policy:

It is the New England Regional Laboratory (NERL) policy to integrate environmental stewardship into all of our operations within our defined fenceline. We will manage our organization and our programs in a manner that protects the environment, the safety of our employees, and public health.

Green Building Operations of the U.S. EPA New England Regional Laboratory

Improving Energy Use

The EPA New England Regional Laboratory is a LEED Gold Rated building. It has been recognized for its energy efficient design, active and passive solar power, use of recycled materials in construction, natural landscaping and consistently keeping its energy consumption and costs at a minimum. Since 2004, there has been a reduction of 7,778 million British thermal units (mmBtu) in annual usage, a decrease in energy use of over 30%. The resulting cost saving in 2007 alone was $206,895. The regional laboratory also has reduced water consumption since 2004 by 1,132,550 gallons, a reduction of just over 49%.



The laboratory has implemented a variety of building modifications and operational changes to achieve energy reductions, including installation of 23 fan-powered air terminals which have enhanced the heat distribution in perimeter offices, while increasing comfort and improving temperature control and energy efficiency.
The facilities manager worked closely with the property manager to modify the operation of the building in other energy-saving ways, including:

- Expanding night/weekend hours when lab and office temperatures and air volumes are moderated in order to save heating and cooling;
- Identifying analytical equipment and processes which can be shut down when not in use and/or batch processed when constant operation is not necessary;
- Manually adjusting chiller/heat supply temperature and humidity controls relative to the demand due to seasonal ambient temperature and humidity loads;
- Reducing illumination levels in common areas by utilizing only emergency and natural lighting in building hallways; and
- Conducting daily "end of day" laboratory and office walk-throughs manually closing fume hoods and shutting lights.

EPA New England continues to explore ways to achieve further energy savings at the EPA New England Laboratory. The laboratory is investigating both an energy recommissioning of the facility and implementation of an on-site renewable energy project.

Awards

LEED Gold Rating (2003)

LEED (Leadership in Energy and Environmental Design) is a rating system developed by the U.S. Green Building Council to encourage and facilitate the development of more sustainable buildings. The laboratory was awarded a LEED 1.0 Gold Rating, and was the first laboratory facility in New England, and the first EPA building nationally, to receive a LEED rating at any level.

EPA H_2Overachiever Award (2006)

EPA BTU Buster Award (2005)

Leader in Energy Conservation Award (2003)

Presidential Closing the Circle Award (2002)

GSA National Build Green and Beyond Award (2002)

GSA National Demolition Derby Award (2002)

Eagle Excellence in Construction Award (2001)

Resources & Contact Info

EPA New England
Regional Laboratory
11 Technology Drive
North Chelmsford, MA
01863-2431
(617) 918-8300
(888) 372-7341

ENERGY STAR®
www.energystar.gov
ENERGY STAR® is a joint EPA and U.S. Department of Energy (DOE) program to protect the environment through energy efficient products and practices.

Labs for the 21st century
www.epa.gov/lab21gov
Sponsored by EPA and DOE, Lab21® is a voluntary partnership dedicated to improving the environmental performance of U.S. laboratories.

Environmental Management Systems
www.epa.gov/ems/
www.epa.gov/ne/ems/

♻ printed on 100% recycled paper, with a minimum 50% post-consumer waste, using vegetable-based ink