

U.S. Department of Energy
Energy Efficiency and Renewable Energy

federal energy management program

High Performance Buildings Database: Case Studies of Green Buildings and Other Resources for Green Builders

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U S Department of Energy
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DOE High Performance Buildings Research Initiative

- Develop, document, and promote examples of 'high performance' buildings
- Provide research (technical) assistance for 'top 5' high performance buildings
- Develop metrics of 'high performance'
- Provide tools to support design, construction, commissioning, and retrofit



4 Times Square

Chesapeake Bay Foundation

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FEMP
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General Topics

- Overview
- Process
- Finance
- Land Use/Community
- Site/Water
- Energy
- Materials
- Indoor Environment
- Images
- Ratings/Awards
- Lessons
- Learn More



A Resource for Transforming the Market
 for Green Buildings

- Documents 'real' buildings
- Shows that green is possible today
- Provides documentation of process, lessons learned, and tools necessary for success
- Supports the business case for sustainability



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Environmental Protection Agency Research Triangle Park Research (EPA Research Triangle Park Campus)

Overview

- Location: Research Triangle Park, NC
- Building Name: Environmental Office, Laboratory
- New construction
- 1,130,000 sq. ft. (100,000 sq. meters)
- Shared space, multiple buildings
- Completed: 2002
- LEED: LEED Platinum (achieved in May, 2002)

The EPA's new RFP Campus houses over 2,000 people in 100 laboratories, including one of the largest fluid-dynamic groups of environmental scientists in the world. The campus includes four custom laboratory buildings, three 3-story office blocks, and a 4-story office building that also houses special program areas. The facility design embodies the EPA's environmental ethics.

Environmental Aspects

The building was designed to be a model for green buildings. It was the first building in the world to be designed and built to LEED Platinum standards.



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EPA Research Triangle Park Campus

Energy

This EPA facility requires 42% less energy than a laboratory building of equivalent size that does not incorporate energy-saving technologies. Reductions in energy use for the office areas range from 52 to 64%.

The "Main Corridor" atrium that connects all the buildings increases energy efficiency by capturing the sun's heat. It is projected that 70% of the winter heating needs in the offices and 47% in the labs are provided by daylighting. Switch-efficient lighting is used to control exposure to the atrium spaces, so more than 40% of the exterior wall is occupied by closed office spaces, allowing the interior spaces to utilize daylight. The southern side of the building envelope is constructed to keep heat absorption. The cooling load is met using an advanced sun shading and glazing with high glazing coefficients.

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Annual Energy Data

Unit	Energy Use	Cost Use	Energy Use
Electricity	21,222,570 kWh	Electricity	15,225,360 kWh
Natural gas	25,276,970 kWh	Cooling	25,875,300 kWh
Fuel oil	700	Fuel oil pumps	15,917,000 kWh
Steam	700	Lighting	341,400 kWh
Other	700	Other	12,600,000 kWh
Total	46,999,940 kWh	Major loads	12,992,000 kWh
		Other	700 kWh

On-Site Power Sales	Energy Production
PH	3,200 kWh
Water Thermal	700
Wind	700
Micro-turbo	700
Renewable electricity	700
Renewable thermal	700
Other	700
Total	3,200 kWh

Peak Energy Demand

Energy Demand	Peak Load
Electricity	3,100 kW

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EPA Research Triangle Park Campus

Materials & Resources

As an important first step in the design process, it was critical to send to material manufacturers and suppliers to identify the amount of energy needed and accumulated, and the significance of green materials in the life cycle of different materials. Material evaluation topics included: raw material composition, the production process, packaging and shipping procedures, installation and use, resource recovery, indoor air quality issues, cost, and product life expectancy.

By designing service corridors rather than two parallel vertical shafts—floors between floors—Ode avoided a potential 30% increase in building height, which would have added the weight equivalent of 100,000 sq ft (9,300 m²) of space without increasing usable floor space. Minimizing the total volume of the building had significant advantages, most notably in reducing the amount of constructed materials and associated waste.

The compact design of the EPA facility strives to minimize the use of building materials. The 36,000-sq-ft (3,311 m²) interior parking garage below the building, which thereby reduces the amount of future storage, effective lighting and selection of durable materials also promote future material wastes in the building. The building's post-occupancy recycling plan includes implementing a recycling plan and a construction closure.

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Diversion of Construction & Demolition Waste

EPA required waste management and recycling plans from the contractor and subcontractors. Recycling bins were used to separate construction wastes, and weekly private hauling was required of wastes.

As a direct result of this project, concrete batch plants in the area now accept crushed concrete and reuse it as aggregate when appropriate.

Green Strategies

- Reduce material use by design**
 - Minimize width of roadways
- Job site monitoring**
 - Require a waste management plan from the contractor
 - Require weekly biweekly recycling orders
 - Set up labeled C&D to keep recyclable materials separate
 - Require that subcontractors keep their wastes separate
- Post-consumer recycled**
 - Use wallpaper from manufacturers that utilize gypsum from job-site scraps
- Post-industrial recycled (recovered)**
 - Use recycled materials by designers in the concrete
 - Use recycled carpet under flooring
- Protect habitat**
 - Use wood products from independently certified, well-managed forests for finish carpentry

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Cusano Environmental Education Center at the John Heinz National Wildlife Refuge at Tinicum in Philadelphia

Overview

- Location: Philadelphia, PA
- Building Type(s): Retail, Interpretive Center, Assembly Hall
- New construction
- 15,000 sq ft (1,393 sq meters)
- Green rating: LEED Gold
- Completed: August 2005

Two buildings were completed by August 2005. A third building, for administrative offices, will be completed in the future.

The Cusano Environmental Education Center (CEEC) is located at the John Heinz National Wildlife Refuge at Tinicum in Philadelphia. The project consists of two buildings—a classroom building and an exhibit building—spread on a boardwalk. A third building, for administrative offices, will be completed in the future. The CEEC's three main goals are: preserving and restoring Tinicum marsh, providing environmental education, and providing visitors with an opportunity to enjoy wildlife in its natural habitat.

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Pennsylvania Department of Environmental Protection's Cambria Center (DEP Cambria)

Overview

- Location: Cambria, PA
- Building Type(s): Commercial office
- New construction
- 46,000 sq ft (4,262 sq meters)
- Project stage: 2-year building
- Completed: October 2000

The Pennsylvania Department of Environmental Protection's newest green office building, Cambria, has many green features and a higher level of environmental awareness than its DEP's first building—the South Central Regional Office Building. This 46,000 sq ft facility, designed for approximately 125 occupants, has collected data and documented many levels of its green design initiatives.



Site & Use

- A 3-acre conservation area

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We want your federal (and other) green buildings in the database!

- Process
 - Go to www.highperformancebuildings.gov
 - Enter detailed project information
 - Release information (photos, text, etc.)
 - Submit for editorial review
 - Panel reviews and publishes
- Custom interfaces
 - Web portal for your buildings?
- We can help, contact us!

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Data Base Resources

High Performance Buildings initiative
www.highperformancebuildings.gov

High Performance Buildings Database
http://www.eere.energy.gov/buildings/highperformance/case_studies/

DOE Building Technologies
www.eere.energy.gov/buildings/



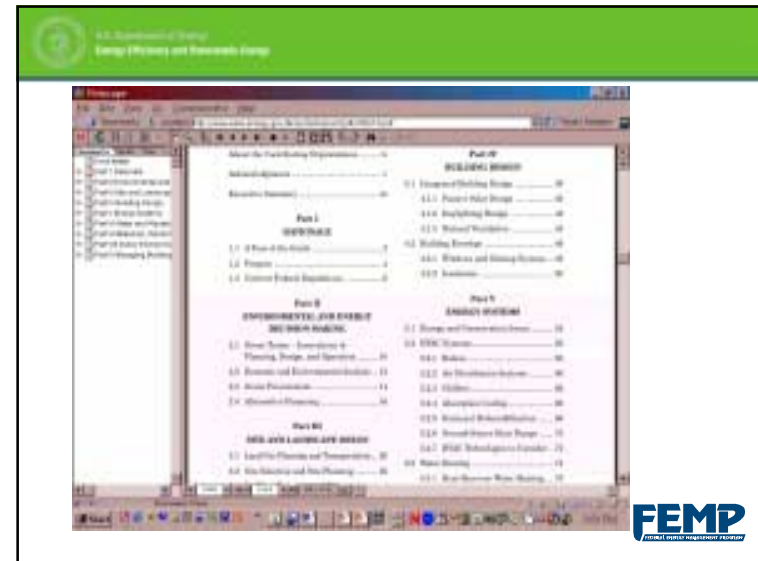
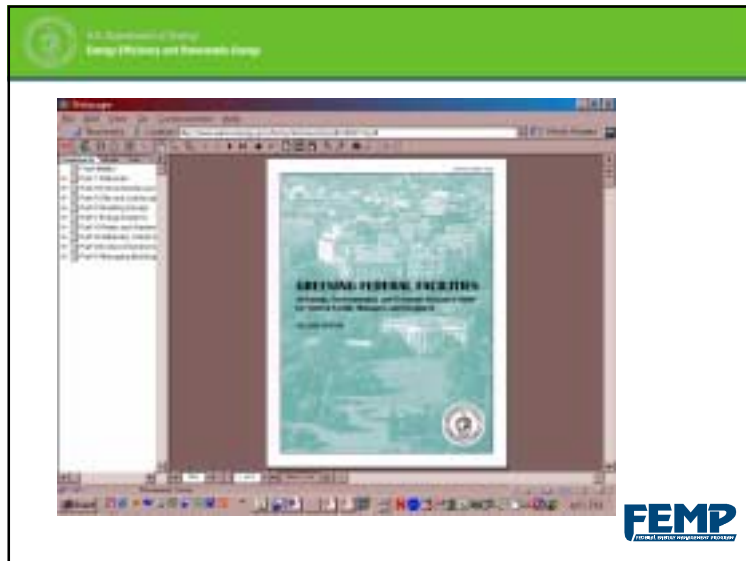

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Sources for More Information

- FEMP Web Site:
www.eren.doe.gov/femp
- FEMP Help Desk: 800-363-3732
- Energy 2003: Real World – Real Solutions” FEMP Annual Workshop and Exposition, Orlando, FL, August 17-20, 2003
- Anne Sprunt Crawley
 - USDOE/EERE/FEMP
 - 202-586-1505
 - anne.crawley@ee.doe.gov




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Sources for More Information

- Whole Building Design Guide:
 - <http://www.wbdg.org/>
- Low Energy Building Design Guide:
 - http://www.eren.doe.gov/femp/prodtech/low-e_bldgs.html
- Greening Federal Facilities:
 - http://www.eere.energy.gov/femp/techassist/green_fed_facilities.html

