



CASE STUDY: North Carolina Botanical Garden

TOPIC AREA(S): LEED, Sustainable Sites, Energy Efficiency, Renewables, High Performance Buildings, Water

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ABSTRACT

The mission of the North Carolina Botanical Garden is *to inspire understanding, appreciation, and conservation of plants in gardens and natural areas and to advance a sustainable relationship between people and nature*. In 2009, a new 31,200 square foot Education Center opened at the Garden, the first publicly-owned LEED Platinum building in the state. Four Star certification will also be sought under a new Sustainable Sites Initiative, under development by the American Society of Landscape Architects, the Lady Bird Johnson Wildflower Center at the University of Texas at Austin, and the United States Botanic Garden, to encourage sustainable practices in the gardens that surround the new Education Center. The Garden is gateway to 1,000 acres of land—including many exemplary natural areas that support teaching, research, and biodiversity conservation.

GOALS AND OUTCOMES

Goals

The Garden strives to be a leader in the world of botanical gardens, and a leader on campus, at integrating sustainability with building performance and outdoor spaces.

Accomplishments / Outcomes

ENERGY EFFICIENCY AND RENEWABLE ENERGY

The NCBG Education Center has achieved an energy cost savings of 50% relative to standard buildings of comparable size. Some strategies employed include:

- Optimized solar orientation
- Broad roof overhangs restrict excessive summer heat gain
- Highly insulated thermal envelope; 6 inches in walls and 10 inch structurally insulated panels in roof
- R values of the walls = 19.5; Building A & B roof = 42; Building C roof = 30
- High efficiency glazing
- Geothermal wells for efficient heating and air-conditioning system with 31 wells, most of them 500 ft deep, and 5.3 miles of closed loop "plumbing" to bring the earth's 55° F temperature to the surface
- Daylighting of interior spaces reduces electric lighting 60%
- Photo sensors automatically dim lights when there is sufficient daylight
- Occupancy sensors activate/deactivate lights
- Photovoltaic panels produce 7.5% of the building's electricity



WATER CONSERVATION

- Water-efficient native landscaping
- Low-flow plumbing fixtures achieve 50% savings relative to industry standards
- Eight rainwater cisterns (54,400 gal) collect almost all of the roof water for use in irrigation
- Eleven rain gardens and bio-retention swales
- A permeable paving parking lot system with stormwater storage
- Reclaimed water for toilet flushing
- Runoff after construction is no greater than runoff prior to construction

BUILDING MATERIALS

- To minimize transportation costs and carbon dioxide emissions, and to stimulate local economies, many of the building materials were locally and sustainably sourced (28.5% from within 500 miles, 22.6% recycled)
- Low VOC compliant finishes, paints, and adhesives
- A traction elevator that avoids use of hydraulic fluid
- Atlantic White Cedar siding salvaged from Hurricane Isabel damage in the Dismal Swamp
- Wood salvaged from the site provided 6,000 board feet of interior trim
- 96% of construction waste was diverted from the landfill

HEALTHY BUILDING CLIMATE

- Furnishings and finishes release no or low volatile organic compounds (VOCs)
- Daylight and views for 100% of building occupants
- Operable windows for ventilation and comfort
- Lighting and temperature controls for building users
- Air quality monitoring
- Universal access design in buildings and grounds
- 1.5 acres of new garden space
- Exterior lighting is covered and faces downward

TRANSPORTATION

- Two free public bus routes modified to serve the site
- A crushed gravel sidewalk constructed to reach the bus stops
- Connected to town bike and pedestrian network
- Extensive bike racks
- Staff shower and locker area
- Parking was not expanded at the site

Challenges and Responses

The biggest challenge was funding limitations. The entire project was privately funded and made possible by more than 500 individual gifts. Fundraising is still underway for the last 2



million of this \$12 million project.

FUNDING AND ENGAGEMENT

Leaders and Supporters

The North Carolina Botanical Garden worked with its membership support organization, the Botanical Garden Foundation, Inc., and many donors to raise funds to for this project.

Funding and Resources

As of May, 2010, the Garden's supporters donated \$10 million of the \$12 million needed to complete the project. This includes a \$210,000 award from the student-run Renewable Energy Special Projects Committee, RESPC, to help construct a geothermal well system. RESPC funds are generated by a self-assessed \$4-per-semester student fee.

Education and Community Outreach

Building tours are offered to interested classes and groups (call 919-962-0522) and are given every Saturday at 1:30 pm. Brochures that describe all environmental features are available. See also: www.ncbg.unc.edu

IMAGES

Photovoltaic panels on the south facing roof of the central building





Cisterns at the Education Center



Sidewalk rubble diverted from the Cary Landfill forms the retaining walls of the Conservation Garden.

