

AIA/COTE TOP TEN GREEN PROJECTS 2008

# Pocono Environmental Education Center

Location: Dingmans Ferry, PA

Architect: Bohlin Cywinski Jackson

## OVERVIEW

The Pocono Environmental Education and Visitor Center is designed to reinforce the organization's mission of environmental stewardship and education.

The building is a flexible, multipurpose gathering space for dining, meetings, lectures, and other environmental learning activities. The building is designed to serve as a teaching tool for environmental education. Arriving at the site, visitors pass through a forest, cross a wetland, enter the building through an opening in the dark north wall, and cross through a bar of service spaces into the bright, daylit main room. The south-facing shed is designed to take full advantage of the warmth of the sun, cool mountain breezes, abundant natural light, and views of the forest.



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BIOCLIMATIC DESIGN

LIGHT & AIR

WATER CYCLE

ENERGY FLOWS & ENERGY FUTURE

MATERIALS & CONSTRUCTION

LONG LIFE, LOOSE FIT

WISDOM & FEEDBACK LOOPS

JURY COMMENTS

### Full project profile:

[www.aiaopten.org/hpb/  
overview.cfm?ProjectID=1016](http://www.aiaopten.org/hpb/overview.cfm?ProjectID=1016)

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This photo, taken from the south at dusk, shows the main activity area.

Photo: Nic Lehoux

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## Sustainable Design Intent & Innovation

Through careful siting, materials selection, analysis, and design of building systems, the structure outwardly expresses the principles of green design. Because it serves as a teaching tool, the building makes many of its green building strategies apparent to visitors.

The north wall at the main entrance to the building is clad in shingles cut from reclaimed tires gathered from local sources where they had been discarded. Operable windows provide natural ventilation to the main activity space, encouraging occupants to think about their own comfort and the environmental impacts of heating and cooling. South-facing windows provide passive solar gain in the winter, lowering heating costs. Overall, the building was designed to be resource and energy efficient, both from a first-cost standpoint and from an operational one due to the tight budgetary constraints of this small environmental center.



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This photo shows the building from the north, including the recycled-tire wall.

*Photo: Nic Lehoux*

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## Regional/Community Design & Connectivity

The project team used an environmental assessment to evaluate the project's impact on its surrounding natural, cultural, and socioeconomic environments. This assessment confirmed that the design met the client's program requirements without adversely affecting the neighbors or local ecosystems. In addition, the team focused on optimizing the building's size and operating efficiency.

Most activities on the site are group-centered, and participants such as school groups arrive by bus or other forms of mass transit. Many programs involve overnight stays, when participants reside on the center's campus. As such, most users of the building arrive by foot, meaning that no new parking was needed for the project.

The project serves as community gathering place that is used by the Pocono Center as well as local community and environmental groups as a meeting place, conference center, and public hall.

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### JURY COMMENTS

Use other transport options: 88%

Parking spaces per person: 0.30



This photo shows the main activity area, which faces south for passive solar heating and has operable windows for ventilation.

Photo: Nic Lehoux

# Pocono Environmental Education Center

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## Land Use & Site Ecology

The Pocono Center campus is located within a predominately native forest containing mixed oaks, conifers, and a well-developed understory. The design of the environmental education and visitor center and the project team's choice of building site minimized disruptions to this native forest. The building site had been previously cleared by a former owner, and its lack of mature trees, southerly orientation, and proximity to the main educational and residence facilities were all benefits for the project.

The detailed environmental assessment prepared for this project determined that construction on this site would not disrupt the habitat of any known wildlife in the region. In addition, the study confirmed that the project would not adversely affect local waterways or other ecosystems near the project site.

As part of the site design, native grasses were planted to provide a landscape that is low maintenance and integrates the project into its natural surroundings. In addition, a low-lying, wet area north of the building was maintained to allow the species that inhabited it to remain and to provide onsite stormwater management. A boardwalk constructed using wood-plastic composite lumber provides access to the building and lightly touches the ground, minimizing disruption of that low-lying area and its inhabitants. To minimize impervious surfaces on site, mulch paths and a crushed-stone service road were provided instead of hardscape solutions.

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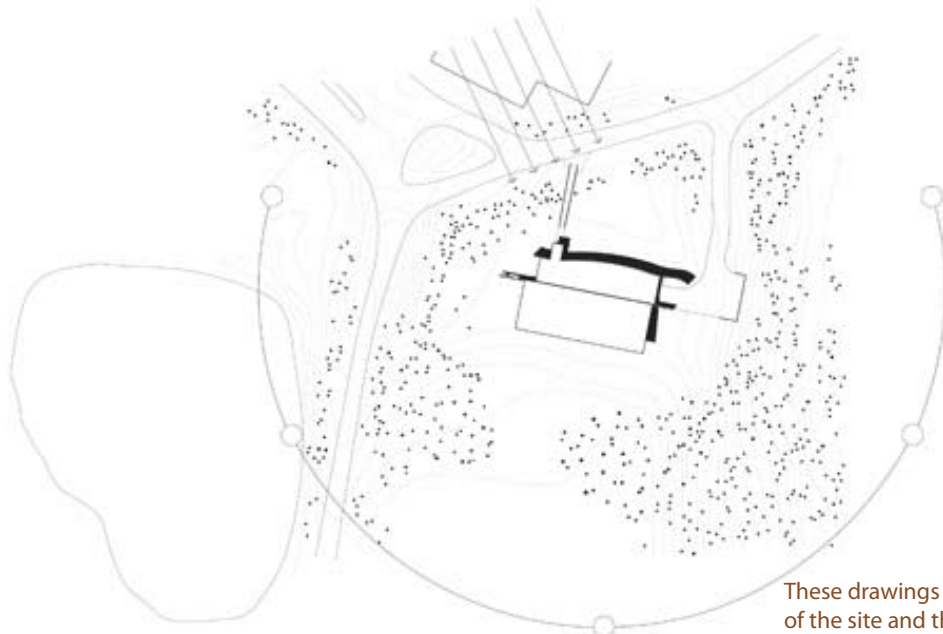
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These drawings show the context of the site and the site plan, as well as the path of the sun in relation to the building.

Rendering: Bohlin Cywinski Jackson

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## Bioclimatic Design

The building orientation and massing of the education and visitor center maximize the site's passive solar and natural ventilation potential with simple but effective strategies. The long south face maximizes solar gain in winter months and the floor slab of the main space serves as a heat sink to store solar energy. The north side of the building, conversely, shields the building from winter winds. The tilted main roof aids both of these functions, maximizing solar radiation and light to the south, while deflecting north winds. The roof covering is light colored to minimize the heat island effect on the surrounding environment. Natural ventilation is optimized by bringing cool air in from the shaded porches to the east and west and exhausting warmer air through windows high on the south face. These porches and south roof overhang also shield the building from direct summer sun. The sloped main roof moves warm air in the space to the high exhaust windows, and the venturi effect aids in ventilation as wind moves over its top. To increase natural ventilation during extreme conditions, the south face of the main space contains large sliding doors that can be opened to maximize ventilation.



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The south facade, shown in this photograph, features extensive glazing for passive solar heating and large overhangs to protect the building from the summer sun.

*Photo: Thomas E. Solon, AIA*

# Pocono Environmental Education Center

Location: Dingmans Ferry, PA

Architect: Bohlin Cywinski Jackson

## Light & Air

The design maximizes daylighting (93% of public areas) and natural ventilation (91% of public areas) while minimizing dependence on artificial light and ventilation. To test these principles, as well as the passive solar design strategy, an energy model was developed for this project, allowing the project team to refine the design to maximize the effectiveness of these passive systems. To support the Center's mission to use the building as a teaching tool, manual devices rather than automated systems were selected to control natural ventilation and artificial lighting so that the users, mostly small children, would become part of the process of making energy choices and learn about green design.

In order to ensure a high degree of indoor air quality and reduce project cost, the project team eliminated finishes wherever possible. For the finishes that were used, the project team chose water-based options with low or no levels of volatile organic compounds, no solvents, and no added urea-formaldehyde.

The connection to the outdoors was maximized in all occupied areas through abundant views to the surrounding natural environment. At locations where the building's program did not permit large glazed openings, such as the kitchen, smaller windows were incorporated to connect users to the outdoors.



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JURY COMMENTS

Percent of building  
area that is daylit: 62%

Percent of building that  
can be ventilated or  
cooled with operable  
windows: 63%

The main activity area, shown in this photo, is fully daylit, with operable windows for ventilation.

Photo: Chris Barone

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## Water Cycle

Only native grasses that were known to be present in the region and have been proven to thrive locally were used as part of the landscaping for the project. Therefore, it was not necessary to provide an irrigation system as part of the site design. These low-maintenance grasses also serve to integrate the site into its neighboring surroundings.



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JURY COMMENTS

Precipitation managed  
on site: 33%

Total water used indoors:  
300,000 gal/yr

Total water used  
outdoors: 0 gal/yr

Percent of total water from  
reclaimed sources: 0%

Percent wastewater  
reused on-site: 0%

Calculated annual potable  
water use: 38.7 gal/sf/yr

This photo of the west facade shows the exposed concrete structure as well as the patio that expands the meeting area into the outdoors.

*Photo: Nic Lehoux*

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## Energy Flows & Energy Future

Daylighting, natural ventilation and passive solar heat are the primary illumination and conditioning systems for the Environmental Education/Visitor Activity Center. Mechanical and electrical systems are used only to supplement these natural systems. Forced air systems were entirely eliminated in all natural ventilated areas and ceiling fans were provided to increase air flow if needed. Where mechanical ventilation was required in areas such as the kitchen, energy efficient systems were selected. To supplement the passive solar heating, a hydronic radiant floor system was used. This system conserves energy, provides more effective comfort at the user level, and greatly improves indoor air quality by reducing air born dust and contaminants.

Lighting in public areas is designed to supplement daylighting. Where artificial lighting was required as primary illumination, energy efficient fluorescent fixtures with occupancy sensors were used. During power interruptions, daylighting will provide sufficient light to allow continued use of the facility during daytime hours. Battery powered lighting was provided for emergency illumination when needed. The building also includes a generator connection to maintain operation of the walk-in coolers if necessary.

Manual window operators and light switches allow users to control the building environment and become more conscious of energy choices and conservation.



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## ENERGY PERFORMANCE

### Ratings

EPA:

HERS:

Percent total energy savings: 43

	Base Case	Design Case
Total energy (Btu/sf/yr)	58,800	33,900
Electricity (Btu/sf/yr)	47,040	26,200
Natural gas (Btu/sf/yr)	11,760	7,700
Other: (Btu/sf/yr)		

Heating (Btu/sf/yr)	12,130	7,940
Cooling (Btu/sf/yr)	11,080	2,540

Cooling capacity (sf/ton)		0
Lighting load connected (W/sf)		1.5
Lighting load after controls (W/sf)		1.75
Plug load (W/sf)		2.0

Peak electricity demand (W/sf)		8.5
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Percent on-site renewable energy: 0

Percent grid-supplied renewable energy: 0

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## Materials & Construction

The project team chose materials for their durability, long life span, low maintenance, and low environmental impact. Reused, recycled, or recyclable materials were chosen wherever these qualities would not compromise the materials' performance. Many of the building's materials—including the exposed concrete floor slab and structural frame, ground face concrete masonry units, wood structural system, and north wall cladding—will not require refinishing during the life of the building, reducing first costs and operational costs and improving indoor air quality. The wall, roof, and glazing systems were carefully designed to maximize energy efficiency.

Some products, such as the recycled-tire cladding for the north wall, were selected for their ability to serve as visible examples of environmental design, enhancing the building's mission as a teaching tool for its users.



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This photo, showing the north wall at dusk, highlights the tire shingles and entrance porch beyond.

*Photo: Nic Lehoux*

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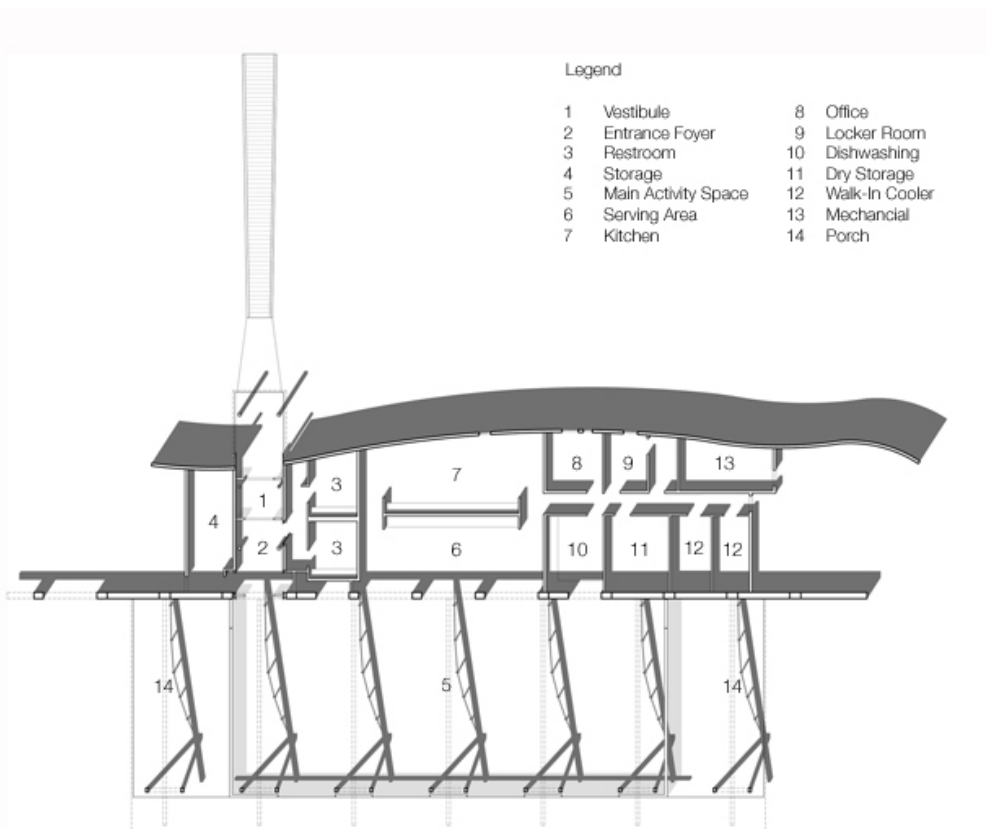
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## Long Life, Loose Fit

The project team sought to design a building that people would love, want to maintain, and continue to use in the future. During the design phase of the project, to the project team ran best-fit studies to test different building sizes. The resulting floor plan optimizes space efficiency and provides opportunities for future growth. The porches on the sides of the building provide overflow space for dining and gathering in warm weather, the busiest operating period for the Pocono Center. The large, open main activity space creates a multipurpose facility that serves the social, dining, and education needs of the Center and accommodates conferences, exhibits, and other group functions for the surrounding community. The design provides a high degree of flexibility and is readily adaptable for many potential future uses.

Much of the structural system can be disassembled, allowing its components to be salvaged and reused if the building outgrows its useful life. The kitchen was also designed to be flexible and to accommodate future technologies and configurations.



This drawing shows the floor plan, with the open main activity room on the south side of the building.

Rendering: Bohlin Cywinski Jackson

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## Collective Wisdom & Feedback Loops

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This photo shows the south facade of the building.

Photo: Nic Lehoux

## Jury Comments

"This project grows from the site. This is 'how to mainstream Sam Mockbee.' Great scale and materials." –**Marvin Malecha**

"This had good metrics, and it was also very whimsical—it makes it cool to use tires in this way." –**Jason McLennan**

"This is a dramatic transformation of a site by using the materials removed from its cleanup, to create the exterior envelope, which is exciting to see. The use of the recycled tires and the texture they produce are inventive." –**Susan Rodriguez**

"This building is much more than its simple shed design might initially suggest. The wall of recycled tires is beautiful, textural, and compelling as an educational statement, and is reflective of the entire building's mission to serve as a tool for environmental education." –**Gail Brager**

### Primary Design Team Members

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