

What is a “Green” Building?

Pre- and Post-Visit Activities: What is a “Green” Building?

Overview:

These activities, which support the Staten Island Museum’s lesson “Our ‘Green’ Building,” introduces students to the process of LEED certification and the importance of sustainable living.

Background Information:

LEED, or Leadership in Energy and Environmental Design, is a development program implemented by the U.S. Green Building Council as a way to promote sustainable living and conscientious building design. Buildings pursuing LEED certification are awarded points across several areas that address sustainability issues. Depending on how many points the building earns in the six areas of assessment, it will be awarded a Certified, Silver, Gold or Platinum rating level.

LEED buildings specifically aim to be more efficient; reducing water usage, use energy-saving fixtures, and limit greenhouse gas emissions. They use materials that have been recycled or come from local sources. They are non-toxic or limit the amount of airborne toxins. LEED buildings also are spaces that promote a healthy work environment, with open design features and windows for natural lighting. LEED certification process encourages designers to think critically about how buildings are planned and developed, and consider the impact the project will have on the environment, the occupants and surrounding community.

Vocabulary:

Climate: weather conditions in a particular area

Closed loop geothermal well-field: an energy system that uses the Earth and a series of circulating pumps to heat and cool buildings. In a closed loop system, a heat exchanger is buried underground. In the winter, the fluid circulates continuously inside the buried pipe and absorbs heat from the earth for use inside the building. In the summer, the fluid takes heat from inside the building and transfers it back into the earth

Erosion: the gradual destruction of something

Geothermal energy: clean and sustainable energy that comes from the heat deep inside the Earth

Greenspace: an area of grass, trees, or other vegetation set apart for recreational or aesthetic purposes in an otherwise urban environment

Heat exchanger: a loop of piping filled with fluid that is typically buried underground

Net-Zero: a building that uses no more energy than it generates itself

Ozone layer: a part of Earth’s atmosphere that helps absorb harmful ultraviolet radiation from the sun

Refrigerants: a substance used for cooling something by absorbing heat from it

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Renewable Energy: energy that comes from sources that are naturally replenished like wind, sunlight, tides, or geothermal heat

Sustainability: development that can last forever and meets the needs of the present without compromising the needs of future generations

Before Your Visit:

Grades 6-8

Read the article “Green Infrastructure: What Makes a Structure a ‘Living Building?’”

Have the students answer the *Article Investigation* handout. Then engage students in a group discussion about their answers and opinions.

After Your Visit

Grades 6-8

Have the students take the modified *LEED Checklist* and, continuing their duties as building inspectors, look for these elements of sustainable living in their own homes or school. Have a discussion about what elements they discovered being used—which ones do they think were the easiest to implement, which ones might be more difficult? Were there several checked boxes or only a few?

TECHNOLOGY

Green Architecture: What Makes a Structure a "Living Building"?

A Pacific Northwest organization has defined an environmentally sound structure as one that generates its own energy, captures and treats all of its water, operates efficiently, and is aesthetically pleasing

December 15, 2009

Dear EarthTalk: I recently heard the term "living building". Can you explain?

—Rebecca Gordon, Seattle, WA

Over the past couple of decades, architects and builders looking to green their projects turned to the addition of various piecemeal elements to save water here or cut down on electricity there. Those who added more than a few green touches could apply for and get certified by the United States Green Building Council (USGBC) under its Leadership in Energy and Efficient Design (LEED) program. While these efforts have been laudable—essentially launching the green building industry as we know it today—they represent merely the infancy of what green building might someday become.

The concept of the "living building" has now emerged as a new ideal for design and construction. The Cascadia Region Green Building Council (CRGBC)—the Pacific Northwest chapter of the USGBC—defines a living building as a structure that "generates all of its own energy with renewable nontoxic resources, captures and treats all of its water, and operates efficiently and for maximum beauty." The group has been pushing for adoption of the concept by construction industries here at home, and also helped to launch the International Living Building Institute to promote the concept internationally.

"We view our role as the organization that is meant to ask the really tough questions, to push the boundaries as far as possible," says Jason McLennan, CEO of CRGBC. To this end, in 2006 the group launched its Living Building Challenge (LBC), a "call to the design and construction community to pursue true sustainability in the built environment." So far 60 different projects around North America are vying to meet the high standards of the LBC, which exceed even the highest status of LEED certification.

The first building to be completed for consideration under the LBC program is the Omega Center for Sustainable Living, in Rhinebeck, NY. The 6,200 square-foot, one-level building, which serves as

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headquarters for the Omega Institute for Holistic Studies, features a geothermal heating and cooling system, solar panels, rain gardens that direct water run-off to irrigate plantings, a 4,500-square-foot greenhouse that helps filter wastewater for reuse, “daylighting” design that brings natural light indoor to minimize electric light usage, and eco-friendly building materials all around. It was designed—per LBC criteria—to be “net-zero,” meaning it uses no more energy than it generates itself. Once the building has been in operation for a full year next summer, CRGBC will audit it to see if its performance lives up to the green hype. Dozens of other LBC contenders around North America will be audited, as well.

Of course, the costs of creating a living building today are very high. Achieving net-zero can be especially costly, and stands out as one of the biggest obstacles to greater interest in the living building concept. Another challenge is finding materials that meet LBC standards, since many common building materials—such as PVC piping for wastewater transport—off-gas chemicals and have other hazardous attributes. LBC also expects builders to source locally as many materials as possible to boost local economies and make efficient use of nearby natural resources. McLennan remains confident that costs will come down as green materials, technologies and methods become more commonplace within the general building industry.

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What is a "Green" Building?

Article Investigation

Name: _____

Article: _____

What is "green infrastructure"?

In what ways can we use nature to design buildings that are better for the environment? What examples does the article reference?

Why do you think incorporating nature and natural ecosystems into our buildings is important?

What is a "Green" Building?

Name: _____

LEED Checklist

Check the boxes next to the listed qualifications!

Sustainable Sites:



Alternative Transportation
Provides bike storage, public transit access, fuel efficient transit

Site Development
High ratio of open space to promote biodiversity

Rainwater Management
Reduced areas with materials that cannot absorb water or rainwater storage

Water Efficiency:



Water Use Reduction
Maximizes water efficiency in water fixtures i.e water efficient toilets, sinks

Energy and Atmosphere:



Optimize Energy Performance
Uses energy efficient light fixtures i.e. LED lights

Energy Metering
Tracks of energy use by using meters

What is a "Green" Building?

Material Resources:



- Recycling Program
Uses a recycling program on the premises

- Recycled Content
Used building materials from other recycled content

- Regional Materials
Used building materials that are produced from the region

Indoor Environmental Quality:



- Good Ventilation
Clean air vents that promote good air circulation

- Thermal Comfort
Provides a thermal environment that supports productivity and health of the occupants

- Daylight and Views
Provided connection to outdoor spaces and light by using large windows for viewing areas

- No Environmental Tobacco Smoke
Clean air to breathe
