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## **New House Residence Hall: The First Green Building on Campus**



### **What is a Green Building?**

Green building, sustainable design, environmental design; what do these terms actually mean? And how is a “green” building different from a regular building? The U.S. Green Building Council (USGBC) has attempted to define this new generation of architecture as “buildings that are environmentally responsible, profitable and healthy places to live and work.”

The New House Residence Hall at Carnegie Mellon was designed and constructed as a green building in accordance with the USGBC’s LEED™ Green Building Rating System, and has achieved a LEED™ 2.1 Silver Rating! **It is the first LEED certified residence hall at a college or university in the country!**

The new building has positive effects both on the people that occupy it and on the natural environment by carefully developing the land that it sits on, conserving the amount of water and energy used to operate it, using materials that are healthy for people to live with and materials that conserve the natural resources used to make them. New House is the first building on campus to achieve LEED™ Certification, and the following article describes several aspects of green building that this building exemplifies.

### **The Team:**

#### **Housing Services:**

Tim Michael, Director

#### **Facilities Management Services:**

Peg Hart, Project Manager

Joe Greenaway, Construction Manager

#### **Architect:**

Bohlin Cywinski Jackson

#### **Mechanical/Electrical/Plumbing Engineer:**

HF Lenz Company

#### **Structural Engineer:**

Atlantic Engineering Services

#### **Contractor:**

Rycon Construction, Inc.

### **Environmental Features by LEED™ Green Building Category**

#### **Sustainable Site Development**

The site for the building is within an urban area on a college campus, and is therefore inherently sustainable. It is within walking distance of the Pittsburgh bus system and campus shuttle, as well as within walking or biking distance of the entire campus, which allows students to get from place to place without driving a car. Because of the proximity to campus and public transportation, no new parking was provided for the building, which allowed for more outdoor green space. One problem with urban development is “heat island effect,” which means that the density of dark paving (asphalt) and roofing (tar) materials, which absorb the sun’s heat, create an increase in the local temperature and a need for more air conditioning as a result. To avoid this, light colored and reflective materials were chosen for the brick paving and roofing material for New House. In addition, over fifty trees were planted on the site to provide shading and lessen the “heat island effect.”

### **Water Efficient Landscaping**

Trees were planted to shade the sidewalks and walkways around the building, and were selected for their ability to grow naturally in Western Pennsylvania without the need for irrigation and fertilizers, thereby creating a low-maintenance sustainable landscape. Marshall Ash and Serviceberry trees were the perfect choice for our Pittsburgh campus because they are tolerant of drought and freezing conditions as well as salt in the winter, and they are grown locally.

### **Energy & Atmosphere**

New House was designed as an extremely energy efficient building, and as a result will use 30% less energy than a standard comparable residence hall! An energy model of the building was created by the Carnegie Mellon Center for Building Performance and Diagnostics, which compared a standard brick construction building to New House, which has high performance windows and wall systems. The windows are insulated double-paned glass with a special low-e coating which will keep the heat in during the winter and out in the summer. The HVAC (heating, ventilating, and air conditioning) systems for this building were specially designed to keep each student room comfortable and to allow the students to adjust the temperature in their own rooms with individual fan coil units. Every room has operable windows for fresh air and natural



ventilation, as well as having a forced air ventilation system, so that each room will have a constant flow of fresh air even if bad weather prevents the windows from being opened. In several recent studies of indoor environments, fresh air has been shown to reduce the number of colds and respiratory problems, as well as increasing a person's ability to concentrate. In addition, the HVAC system contains no Chlorofluorocarbons (CFC's), a substance that is known to deplete the ozone layer, and is being phased out of production.

Once a green building has been efficiently designed to use as little energy and electricity as possible, the next step is to look at the source of the energy it will use. In this case, Carnegie Mellon has contracted with Community Energy to purchase 6% of its total campus electricity from wind-generated power. This "clean" wind energy reduces the amount of electricity needed from a coal-fired power plant, thus reducing air pollution and emissions.

Another important aspect of energy efficiency is to monitor the building's performance and verify that it is operating as intended. New House has installed measurement and verification equipment in order to track the amount of electricity being used for lighting, ventilation, heating, air conditioning and equipment plugged into room outlets over time, and Carnegie Mellon Facilities Management will use the data to improve the building's performance even more. And of course, the more understanding the students have about the design and operation of their green residence hall, the more aware they will be about how much energy and electricity they are using!

## Materials & Resources

One of the most impressive stories to tell about the construction of New House is about the recycling of the construction waste. On a typical construction site, nearly all of the scrap materials such as steel studs, drywall, plywood, carpet and everything else leftover ends up in a dumpster to be carted off to a landfill. In this case, the contractor, Rycon Construction, separated and recycled 97% of the construction waste! The waste recycling plan was implemented as early as the initial clearing of the site, when the existing concrete and asphalt paving was crushed up and reused as a roadbed. During the construction of the new building, wood scraps were either ground up for mulch or donated to other building projects, scrap metal was recycled, drywall was ground up and used on local farms, and all leftover brick and concrete block was used in other building projects. The careful management and recycling of construction waste prevented over 200 tons of material from going to a landfill!

In a green building, materials are scrutinized to determine whether or not they will have a negative impact on the environment as they are being created, or on the occupants of the building after they are installed. The architect, Bohlin Cywinski Jackson, carefully screened and selected the materials for New House, making sure that they met the LEED™ green materials requirements. Many of the materials used in building New House contain recycled content and therefore use less raw materials and deplete fewer natural resources. The concrete contains fly-ash, a waste product of burning coal for electricity, for a portion of the cement mix. The structural steel is inherently recycled because nearly all new steel construction products contain steel scrap which has been melted down and reused. The carpeting used throughout the residence hall contains 50% recycled fiber, and even the drywall and ceiling tiles contain recycled materials.

Another important consideration when choosing materials is the distance they must travel from the manufacturing facility. Many of the materials in New House were manufactured within 500 miles of the campus, which reduces the amount of fuel energy required to transport them as well as the air emissions generated by the diesel trucks carrying them. The concrete, steel, brick, insulation, roofing, drywall and ceiling tile were all manufactured within our region of the country.

Wood as a building material can often have a beautiful and lasting impression, but our forests are being depleted more rapidly than they can replenish themselves. The Forest Stewardship Council (FSC) has created certification standards for forests that are sustainably managed and harvested and produce wood products that are less destructive to the world's forests. In New House, all of the cherry veneer wood doors are from FSC certified forests.

## Indoor Air Quality

In many commercial buildings, poor indoor air quality can often be the source of health problems for the occupants. That "new carpet smell" is actually Volatile Organic Compounds (VOC's) being emitted from the fibers and dyes of the carpet into the air you breathe, and creating headaches and nausea for many people who are sensitive to them. Green buildings attempt to eliminate the sources of chemicals and pollutants in the indoor air by eliminating the materials that contain them. The most likely sources of VOC's are carpeting, paints, and glues or adhesives. In New House all of the paints, carpet, and adhesives used contain very low amounts of VOC's, and contribute to a healthier indoor air environment for the students living there. And as mentioned before, fresh air is brought to every room to

ensure that indoor air quality is the best it can be.

Green buildings inherently have a connection to the outdoors and natural environment, but it is important that people living and working in buildings have daylight and a view to the outside throughout the day. Daylight in classrooms has been proven to improve students' ability to achieve and a view to the outdoors gives people a sense of time and place. New House was designed with many windows in both the student rooms and the social spaces to provide extensive sunlight and reduce the need to use electric lights whenever possible. Also, the building has been furnished with over 60 living plants which help to clean the indoor air and contribute to a more pleasant environment.

All of these features make New House an environmentally friendly green building and a wonderful place to live! Carnegie Mellon is dedicated to pursue green buildings certified by the LEED™ Green Building Rating System for the future of all campus buildings. This commitment ensures an environment that is beneficial to the students that live and learn here, and helps to preserve the future of our natural environment.

## More Information

To learn more about New House and see floor plans, please visit the Housing Services' website at [www.housing.cmu.edu/buildings/newhouse](http://www.housing.cmu.edu/buildings/newhouse).

If you would like to learn more about green buildings, visit the website of the U.S Green Building Council at [www.usgbc.org](http://www.usgbc.org).

If you would like to know more about Carnegie Mellon's Green Practices throughout the campus, visit the website at [www.cmu.edu/greenpractices](http://www.cmu.edu/greenpractices).

