

ECHO: Leahy Center for Lake Champlain

Jennifer Snyder

With growing population and development, designers and developers need to consider potential environmental repercussions. As is, the U.S. is the world leader in greenhouse gas emission without the further development that will inevitably occur. A number of environmentalists are aware of this problem and have created agencies such as the U.S. Green Building Council (USGBC). The USGBC has then developed LEED, the Leadership in Energy and Environmental Design Green Building Rating System, to evaluate various buildings and determine how environmentally sound or “green” they are. The building of interest that will be discussed in this paper is the ECHO: Leahy Center for Lake Champlain building in Burlington, Vermont.

ECHO stands for Ecology, Culture, History, and Opportunity. It is located in downtown Burlington, on the banks of Lake Champlain (Overview, 2008). It is a two-story lake aquarium and science center and it is 30,000 sq. ft. in size (Overview, 2008). It contains almost 100 interactive exhibits, 12,000 gallons of aquariums housing over sixty different species of fish, amphibians, and reptiles (Overview, 2008). The center is also home to “a theater, a walk-in replica of the General Butler shipwreck, and a Champlain Sea tide pool with native aquatic species” (Overview, 2008). It is classified as new construction and was completed May of 2003 (Overview, 2008).

In October of that same year, ECHO became Vermont’s first LEED certified building (Overview, 2008). This certification, of twenty nine points specifically, results from a number of ECHO’s eco-friendly features. Some of these features include a digital control system, T5 fluorescent and LED lighting, daylight-responsive atrium lighting, recycled-content materials, and more (Overview, 2008). More eco-friendly features will be elaborated later on.

According to the USGBC website, LEED “is a third part certification program and the nationally accepted benchmark for the design, construction and operation of high performance green buildings” (LEED Rating Systems, 2008). It specifies six performance criteria:

“sustainable site development, water savings, energy efficiency, materials selection and indoor environmental quality, and innovation and design process” (LEED Rating Systems, 2008).

In terms of its qualification as a sustainable site, it achieved five out of fourteen possible points. It fulfilled the prerequisite: erosion and sedimentation control. The building won four credits for alternative transportation and one for light pollution reduction. It earned credits in alternative transportation due to: public transportation access, bicycle storage and changing rooms, alternative fuel refueling stations, and parking capacity (Awards, 2008). The site is located 300 ft from various bus lines. There are three electric car charging stations on site as well. Preferred parking is provide for car pool cars and van pools. The number of parking spaces is below the minimum zoning requirement to dissuade the use of cars not involved in car pooling. There are a number of bike racks on site as well and the site is next to the Burlington bike path (Land Use & Community, 2008).

Very importantly in regards to the site as a whole, it was built on an brownfield site, a former Naval Reserve building (Gresham, 2004). Developers revegetated 20% of the site after cleaning up the contamination. Special measures were also taken to minimize erosion through the construction process (Site Description, 2008). Environmental considerations were also weighed heavily in the landscaping scheme. The site was landscaped in such a way that natural runoff would be directed towards vegetated areas (Site Description, 2008). Native plants were also used in the revegetation process, specifically those that are naturally drought tolerant (Site Description, 2008).

ECHO earned four credits in the water efficiency category as well. It utilizes water efficient landscaping and it earned two credits for water reduction. One credit was for a reduction of 20%, the other for 30% (Awards, 2008). It earned a total of four out of five points. The urinals in the men’s bathroom are waterless and the toilets are low-flow. There are also two options for flushing the toilets. The “half” option uses 0.8 gallons/flush, while the “whole” button uses 1.6 gallons/flush (E2 Quest, 2008). Also, building management and employees were educated on the topic of water conservation (Site Description, 2008).

In terms of the energy and atmosphere category, ECHO earned five of seventeen points. It fulfilled three prerequisites of “fundamental building systems commissioning,” “minimum

energy performance,” and “CFC reduction in HVAC&R equipment” (Awards, 2008). It then earned additional credits, all for optimizing energy performance.

The walls, floor, and roof were insulated upon construction. Tests were conducted to determine the building’s air tightness. An energy-recovery wheel heats and humidifies air in the winter and cools and dehumidifies the air in the summer. Due to this wheel, 70% of energy in the exhaust air is recovered. According to USGBC.org: “the device is expected to save 15 tons of cooling capacity (representing \$35,000) and 300,000 btu/hr of heating capacity” (Energy, 2008). The window and door frames also have a low thermal conductivity (Energy, 2008).

To further conserve energy, LED lights are used in signs and some exhibit halls. Motion sensors are used in low traffic areas. High efficacy T5 fluorescent lights are used where LED lights are not. Indoor lighting and temperature, including fish tank temperature are monitored and controlled by computers (Energy, 2008).

In the Materials and Resources category, ECHO earned four of thirteen possible points. It fulfilled the requirement of storing and collecting recyclables. Two credits were earned due to construction waste management diversion. 85% of the construction waste was salvaged and sold for reuse or recycling (Materials and Resources, 2008). Another credit was earned due to manufacturing the materials locally. 25% of the building materials were manufactured within a 500-mile radius (Materials and Resources, 2008). Lastly, a credit was earned due to using certified wood (Awards, 2008). 50% of the wood was certified by Forest Stewardship Council (FSC) as being sustainably harvested and was salvaged as well. (Materials and Resources, 2008).

In terms of the Indoor Environmental Quality category, ECHO earned ten out of fifteen possible points. It met two prerequisites: minimum IAQ performance and environmental tobacco smoke (ETS) control (Awards, 2008). It was distinguished for using an IAQ construction management plan. It used low emitting materials, specifically adhesives and sealants, paints, and carpet. It earned a credit for controlling indoor chemicals and pollutants. A “track-off” grate was implemented by the front door to remove dirt from the visitors’ shoes as they enter the building. The chemical storage areas contain exhaust ventilation systems (Indoor Environment, 2008). In terms of thermal comfort, it complied with ASHRAE and utilizes a permanent monitoring system. Carbon dioxide monitors were installed around the building so

that the ventilation system automatically increases the expulsion of fresh air when the carbon dioxide concentrations are low (Indoor Environment, 2008). The ventilation system also exchanges heat and humidity between ingoing and outgoing air (Indoor Environment, 2008). It also earned a credit for allowing 90% of the spaces in the building to have daylight views (Awards, 2008). Figure 1 below of ECHO illustrates how much of the building is comprised of materials allowing the entry of natural sunlight.

Figure 1



Lastly, ECHO earned one out of five points for Innovation and Design Process (Awards, 2008). This one point signifies the automatic credit earned from involving a LEED Accredited Professional in the design process (Gowri, 2004).

Another benefit of ECHO, not directly related to LEED categories is its community involvement. According to USGBC.org, “ECHO uses the lake front as a classroom where students can see firsthand environmental threats to Lake Champlain, and learn to appreciate the ecological importance of this precious natural resource” (Land Use and Community, 2008). The center is also partnered with LakeNet, “an international lake preservation organization” as well

as with The Vermont Department of Employment and Training (Land Use and Community, 2008).

While ECHO is environmentally sustainable enough to meet LEED criteria, there is more work that could be done in order to earn a higher rating. This potential to grow is hard to believe at first when researching all of the sustainable amenities already in operation in the facility. Starting with the sustainable sites category, where only five out of fourteen points were scored, credits can be earned for storm water management (Gowri, 2004). Thus, one way to gain extra points in this category would be to implement measures for retaining storm water for later use.

In the Water Efficiency category, ECHO earned four of five possible points, an achievement. Possibly the only way to increase these points is to reduce the water use by a higher percentage than 50%.

ECHO earned only five out of seventeen points in the Energy and Atmosphere category. The breakdown of credits earned in this category indicate that ECHO has optimized its energy performance by a number of different percentages. It is possible that the inability to earn more points in this category is due to the animals ECHO houses. While the fish tank temperature is monitored and controlled by computers, a fair amount of energy is required to maintain the lighting and temperature for the amount of fish tanks in the center. ECHO would prioritize animal health and survival over energy conservation.

In terms of the Materials and Resources category, there is room for improvement. Four out of thirteen possible points were earned in this category. While some points is better than none, more could have been earned by increasing the percentages in a few categories. For instance, 25% of the building materials were manufactured locally. If a higher percentage of local materials were utilized, ECHO could have earned more points. The same concept applies with increasing the percentage from 50% of the wood being certified by the Forest Stewardship Council to maybe 75%.

ECHO earned ten out of fifteen points in the Indoor Environmental Quality category. There is not as much room for improvement, but there may be some ways to earn additional points. In terms of carpets and paint: "Indoor source control strategies included specifying low-

or zero-VOC paints, adhesives, sealants, and rugs” (Indoor Environment, 2008). Maybe instead of specifying low VOC, they could have aimed for only zero-VOC to earn additional points.

Lastly, ECHO earned a fifth of possible points in the Innovation and Design Process category. Points in this category are earned by utilizing innovative features and “for incorporating green building categories not addressed in the LEED rating system” (Gowri, 2004). The USGBC released a publication in March 2008 Innovation in Design Credit Catalog, listing suggestions for earning credits in this category. Two suggestions listed in the catalog is the implementation of a food composting facility and vertical landscaping when designing the building (Innovation in Design Credit Catalog, 2008). These are examples of two innovative measures ECHO could consider.

In conclusion, ECHO has successfully engaged in a number of environmental practices and has earned LEED accreditation. While it could have earned a higher level of accreditation, the LEED certification in itself is an honorable achievement. A number of reasons may exist as to why ECHO strove for LEED certification opposed to silver, gold, or platinum. One reason may be funding. As is, the project cost 14.5 million dollars. Approximately half the funds came from the federal government under the guidance of Senator Leahy. Other than federal money, the rest came from benefactors. Thus, relying on the federal government and wealthy benefactors is difficult to do and environmentally sound features would probably cost even more. Also, it is likely that ECHO was proud to be the first LEED certified building in the state of Vermont. This distinction may have been sufficient without having to strive to be granted silver, gold, or platinum. Regardless of the LEED certification, scientists and designers successfully designed ECHO to be environmentally sustainable.

References

1. echo Leahy Center for Lake Champlain. E2 Quest. www.echovermont.org/ourmission/leed.html. Accessed on October 8, 2008.
2. Gowri, 2004. Green Building Rating Systems: An Overview. *ASHRAE Journal*. November 2004.
3. U.S. Green Building Council. Awards, 2008. <http://www.leeedcasestudies.usgbc.org/ratings.cfm?ProjectID=238>. Accessed on October 22, 2008.
4. U.S. Green Building Council. Energy, 2008. <http://leeedcasestudies.usgbc.org/energy.cfm?ProjectID=238>. Accessed on October 22, 2008.
5. U.S. Green Building Council. Indoor Environment, 2008. <http://leeedcasestudies.usgbc.org/indoorenv.cfm?ProjectID=238>. Accessed on October 22, 2008.

6. U.S. Green Building Council, 2008. Innovation in Design Credit Catalog.
7. U.S. Green Building Council. Land Use & Community, 2008.
<http://leedcasestudies.usgbc.org/landuse.cfm?ProjectID=238>. Accessed on October 22, 2008.
8. U.S. Green Building Council. LEED Rating Systems, 2008.
<http://www.usgbc.org/DisplayPage.aspx?CMSPageID=222>. Accessed on October 22, 2008.
9. U.S. Green Building Council. Materials & Resources, 2008.
<http://leedcasestudies.usgbc.org/materials.cfm?ProjectID=238>. Accessed on October 22, 2008.
10. U.S. Green Building Council. Overview, 2008.
<http://leedcasestudies.usgbc.org/overview.cfm?ProjectID=238>. Accessed on October 8, 2008.
11. U.S. Green Building Council. Site Description, 2008.
<http://leedcasestudies.usgbc.org/site.cfm?ProjectID=238>. Accessed on October 22, 2008.