

Green Buildings as Sustainability Education Tools

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Abstract

Purpose: To provide an overview of green building technologies and practices and illustrate how public libraries can use them as tools to teach their communities about sustainability and foster behavior change.

Design/methodology/approach: Through literature searches, case studies analysis, and individual phone and e-mail interviews, the author identified ways that public libraries can use their buildings to demonstrate green technologies and practices and show their patrons how to apply them at home, at work, and in the community.

Findings: Education is a component of LEED certification. Many LEED certified libraries publicize a list of the green technologies used in their building projects. Some sponsor programs related to the green building and include permanent displays in the library to explain how the technology works. The Fayetteville Public Library went beyond these basic techniques to not only improve the sustainability of their operations but also become a community test bed for a renewable energy project.

Originality/value: This paper sheds light on how building projects can be used not only to educate the public about green technologies and practices, but also inspire others to begin using similar techniques at home, at work, and in the community.

Keywords: Library buildings, sustainable development, public libraries, communities

Introduction

Libraries are trusted community institutions, which makes them ideal locations for green technology demonstrations and strategically positions them to become community models for sustainability. Green building projects are not only intrinsically valuable, but can also serve as excellent vehicles for launching a broader community conversation about environmental issues.

According to the Institute for Sustainable Communities, a sustainable community is one that “is economically, environmentally, and socially healthy and resilient. It meets challenges through integrated solutions rather than through fragmented approaches that meet one of those goals at the expense of the others. And it takes a long-term perspective -- one that's

focused on both the present and future, well beyond the next budget or election cycle.” (ISC, 2012)

Public libraries help to build sustainable communities because they focus on all three aspects of sustainability. They fulfill the economy role by being good stewards of the public’s money and adding value to the communities they serve (Biando, 2011). They foster equity by being a center for community activities and individual development (Boyden & Weiner, 2001). They have also embraced environmental responsibility, both through green building projects and by educating their communities about responsible environmental practices.

While green building projects have become much more prevalent in recent years, there is still a perception that they are expensive and that green technologies are not sufficiently proven. Generally, these perceptions result from a lack of understanding about the costs of buildings that do not incorporate green design principles. Successful demonstration projects adjust such perceptions and bring new technologies into the mainstream by showing a commitment to long-term return on investment through reduced operating and maintenance costs.

Public buildings are good models for such projects because they are often the result of shared consensus about community needs and goals. Because they are publicly accessible, they provide wide exposure to green technologies. They are built for long-term use, which allows for evaluation of the lasting environmental and economic benefits of such technologies. Finally, operating budgets for public agencies are often tight, so any savings achieved by increased energy efficiency is highly valued (Boyden & Weiner, 2000). This paper sheds light on how library building projects can be used not only to teach the public about green technologies and practices, but also inspire others to begin using similar techniques at home, at work, and in the community.

Overview of LEED and Green Building Technologies

Leadership in Energy and Environmental Design (LEED) is a rating system used to evaluate and accredit energy efficiency and sustainable design features of new and renovated buildings (Hawke, 2010). Created by the U.S. Green Building Council (USGBC), the LEED rating systems are developed through an open, consensus-based process led by committees. As of 2010, 189 library buildings were listed in the USGBC’s Certified Project Directory, which accounts for about 2% of all certified projects. The library community has embraced sustainability when designing new buildings, although some libraries use the standards to inform the design of their buildings but decline to spend the additional funds to become certified (Kuzyk, 2008).

The LEED rating system recognizes performance in five areas: sustainable site selection and development; water efficiency; energy & atmosphere; materials & resources; and indoor environmental quality. LEED also offers extra credit for innovation in design. LEED points are awarded on a 100-point scale and are weighted to reflect their potential environmental impacts. 10 bonus credits are available, four of which address regionally specific

environmental issues. A project must satisfy all prerequisites and earn a minimum number of points to be certified. Projects are awarded Certified, Silver, Gold or Platinum certification depending on the credits achieved.

Although community involvement is not specifically included in the LEED rating system, it is identified as a key component of building projects by library directors who have completed the process (Boyden & Weiner, 2000; Brown, 2003; Bosben, et al, undated; Schaper, 2003). Listening to the community during the design phase of a building project is critical for understanding and addressing their needs and concerns. It may also change the design in unexpected ways (Schaper, 2003).

LEED standards encompass every aspect of building design and construction, although some are more appropriate for use as sustainability education tools. Some of these are described below.

Sustainable Site Selection and Development

Green roofs or living roofs are partially or completely covered with vegetation and a growing medium and planted over a waterproofing membrane. Green roofs absorb rainwater, provide insulation, create a habitat for wildlife, and help lower urban air temperatures by mitigating the heat island effect. Because of their visibility, they are excellent candidates for demonstration projects. They can also add to the aesthetic appeal of the building (Fountaindale Public Library). Reflective roofs use materials with high solar reflective indexes to help reduce the building's heat island effect (Champaign Public Library). Both of these technologies are scalable to smaller buildings or residential projects.

Siting a location near public transportation encourages people to use mass transit when they visit the library. Make it easier for people to bike to the library by installing ample bike racks. Some libraries also loan bike locks to their patrons. The Elk River (MN) branch of the Great River Regional Library included showers and changing rooms for staff to make biking to work more attractive (Pepper, 2008). Libraries can also provide preferred parking for low-emitting and fuel efficient vehicles (Fountaindale Public Library). This could encourage other community organizations to do the same.

Stormwater management is an important consideration for any building project. Permeable/pervious pavement and grid pavers assist with management of stormwater runoff, particularly in parking lots. Rain gardens, vegetated swales, and constructed wetlands reduce imperviousness and allow rainwater to reabsorb into the ground. Rain water can also be collected for landscape irrigation, toilet and urinal flushing, and custodial uses. These features can also be highlighted in education campaigns because they are easily scalable and transferrable to residential, commercial, and public properties.

Water Efficiency

Reduce potable water use by considering alternative on-site water sources (e.g. rainwater, stormwater, and air conditioner condensate) and graywater for custodial uses and toilet and

urinal flushing. These technologies can easily be transferred from public buildings to residential areas. For example, a library could use their rainwater collection system as a springboard to educate the community on residential use of rain barrels.

Libraries can also incorporate native or adapted plants into landscaping to reduce or eliminate the need for irrigation. Landscaping projects like these could be done in cooperation with local community groups or Master Gardener programs. They are also easily scalable to residential properties, which make them good candidates for educational tools.

Energy & Atmosphere

On site renewable energy systems, including solar, wind, and geothermal, provide an independent supply of energy. Take advantage of net metering with the local utility company. The library may generate enough energy to sell some back to the grid. Such systems also make excellent local demonstration projects and may be eligible for grant funds to install. Libraries can also contract for green power if that is an option in their region.

Energy dashboards and other energy monitoring software allow tracking of building energy use over time and provide data for measuring overall energy efficiency. They also make it easier to publicly report and display the building's energy use over time, which visibly illustrate the building's energy use to the public. Libraries can also translate energy savings into numbers relevant to the community (e.g. number of cars taken off the road, number of library materials purchased due to cost savings).

Materials & Resources

During the design process, it is relatively easy to incorporate green materials, including rapidly renewable materials like cork, wool, cotton insulation, wheatboard, strawboard, agrifiber, linoleum, wood certified by the Forest Stewardship Council (FSC), and other durable traditional materials. Building materials made from post-consumer recycled content (e.g. flooring made from recycled rubber) are particularly good alternatives. Showcasing the use of green materials in the library not only raises public awareness of these products but also tests their durability in high traffic public buildings.

To reduce demand for virgin materials and reduce waste, libraries can integrate salvaged materials into the building design when practical. Materials like beams and posts, flooring, paneling, doors and frames, cabinetry and furniture, brick, and decorative items can all come from salvaged materials. Reuse is an often overlooked environmental practice. By incorporating salvaged materials and publicizing their use, libraries can encourage the community to rethink their own consumption patterns and perhaps influence others to use salvaged materials in new ways. Create a community connection by hosting a community tag sale or swap meet at the library to encourage people to look for ways to reuse materials.

Libraries should also plan to recycle waste created during the demolition of an old building and construction of a new one. Construction and demolition recycling diverts material from

the landfill and may allow materials to be used in other building projects or turned into new products (Fountaindale Public Library; Champaign Public Library). Publicize the recycling and reuse efforts to raise community awareness that this option is also available for smaller building projects. Designate recycling collection areas in public and staff areas of the library to reduce the amount of waste sent to landfills. These areas also provide a visible commitment to continued environmental stewardship once the building project is complete.

Products manufactured or sourced locally result in lower transportation costs and fuel consumption and create demand for local goods (Fountaindale Public Library). Use these as examples to educate the public about the environmental costs of transporting other products over long distances. One way to link this to the community could be to organize a fair in the library parking lot that showcases locally produced products.

Indoor Environmental Quality

During the design phase, specify low- or no-VOC materials for items like adhesives, paint, sealants, carpeting/tile, composite wood products, and furniture. Not only is it better for the environment, it is also makes a healthier space for people to occupy.

Lighting is a critical part of library building design. Occupant controlled and task lighting provides adequate lighting while managing overall building energy use. Install motion sensors in break and meeting rooms to automatically turn off lights when the rooms are unoccupied. Daylighting uses natural light in combination with sensor-controlled artificial lighting to reduce energy bills. Design space to maximize daylighting and view for building occupants. Some technologies include lower partitions, interior shading devices, interior glazing, and automatic photocell-based controls. Adjustable window shades can help filter light during the day. Lighting considerations are also easily transferred to residential building and remodeling, so they make good candidates for educational programs.

Innovation in Design

Evaluate the library's cleaning and maintenance routine to identify and reduce the use of hazardous chemicals (Fountaindale Public Library). Have the library's cleaning staff or contractor give a talk about why green cleaning is important. Teach people to make their own household cleaners from non-toxic items.

Select a pilot project from the LEED Pilot Credit Library (<http://www.usgbc.org/pilotcreditlibrary>). Some examples include low emitting interiors, exterior noise control, material disclosure and assessment, reconciling designed and actual building energy performance, sustainable watershed management, and light pollution reduction. Most of these pilot projects also make good demonstrations for the community.

Educational Tools

Libraries use a variety of tools to educate their patrons about the features of their green buildings. These include in-library displays, publications, and library programs.

In-Library Displays

Libraries can use both permanent and temporary displays to educate the public about sustainability.

The Fountainsdale Public Library in Bolingbrook, IL uses digital displays throughout the building to describe its green features. Each slide includes information about a particular technology as well as how many LEED credits the library earned for that feature. The library's slide describing their indoor environmental quality projects is shown in **Figure 1**.

In an e-mail dated 25 April 2012, Sharon Jarvis, the branch manager at The Bronx Library Center explained that the library uses wall mounted plaques on each of its six floors to display detailed information detailing the green features of that particular space. General information about the library is also posted at the entrance.

Book displays are also excellent educational tools. Circulation of practical books and DVDs on living simply, building green homes, or residential use of renewable energy increases dramatically when they are displayed prominently in the library (Schaper, 2010).

Energy Dashboards

Energy monitoring software can be connected to a public dashboard to provide display information about building energy use. Dashboards can be used as in-library displays or on a library's web site. They can sometimes be configured to include sustainability tips, information about the library's green features, and detailed explanations of how the building's green technologies work. Some libraries that use energy dashboards include the Carroll County Public Library's Finksburg branch (Erdman, 2009), the Rosemary Garfoot Public Library (Rosemary Garfoot Public Library, 2007), the West Vancouver Memorial Library (West Vancouver Memorial Library, 20??) and the Drake Community Library (Erdman, 2011).

The West Vancouver Memorial Library's energy dashboard is available on their web site (<http://my.pulseenergy.com/dashboards/westvanlibrary#/location/75>). It not only displays building energy use in daily, weekly, monthly, and quarterly increments, but also translates those numbers into the length of time that the same amount of energy would light the Golden Gate Bridge. The dashboard's energy use graph displays both actual use and typical

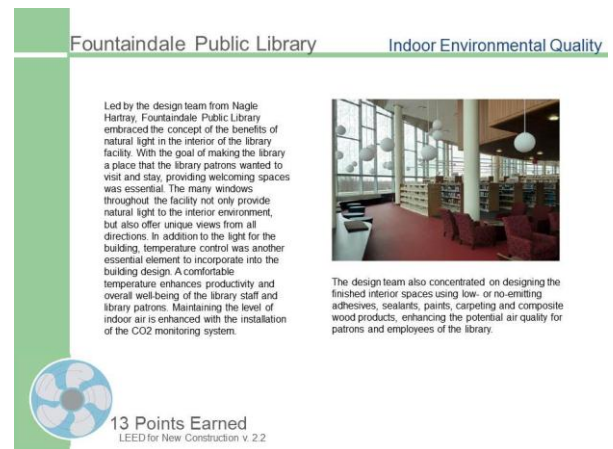


Figure 1

use for a comparable building. Other features include energy saving tips, descriptions of the library's other green initiatives, and a form that allows site visitors to submit their ideas about how the library can save energy. This social feature is particularly important because it provides an easy way for the community to contribute to the library's sustainability efforts.

Programming

Sustainability programming options for public libraries are limited only by the creativity of the librarians scheduling them. This section highlights a few notable ideas.

After the Bronx Library Center opened its new building, they hosted a green libraries conference, co-sponsored by the Library Association of the City University of New York and the New York Public Library. During the conference, the Center's branch manager gave a talk about the new library building. Speakers at the conference included the founder of the Sustainable South Bronx, who discussed the Bronx greenway master plan and other community initiatives. (Evans, 2008).

Fountaindale Public Library (Bolingbrook, IL) and the Champaign (IL) Public Library both offer facilities tours that highlight their building's green features.

When the Champaign Public Library opened their new building in 2008, they invited the architect to discuss the design of the new building during the library's dedication celebration. Such talks are helpful not only to explain a building's green features but also to illustrate how the library was designed with the community's needs in mind.

The Princeton Public Library has hosted an annual environmental film festival since 2007. The festival's mission, as stated on their website, is "to explore a wide range of environmental sustainability issues through viewing documentary films, and engaging with the filmmakers and others who connect with our community at this annual event" (Princeton Public Library, 2012). While not specifically connected to a sustainable building project, a library could choose to host a similar event to showcase a new sustainable building. For example, the Rosemary Garfoot Public Library in Cross Plains, WI hosts a Green Tuesdays film and lecture series to encourage environmental awareness. They have also hosted Eco-Talk book discussions.

Libraries should also consider bringing in speakers to give more information about specific technologies within the building. For example, if the new building includes a geothermal system, the library could host a speaker who explains not only how the technology works but also how it can be used in residential construction. This not only showcases the library's use of the technology but also shows how the technology can be applied more widely.

Some other programming ideas that relate to green building include partnering with local organizations to teach the community how to do some of these things at home. Have a Master Gardener do a program on planting rain gardens or using rain barrels, compost, and organic gardening techniques. Partner with other local organizations to have a local artisan's

festival. Display local art made from salvaged materials in the library. Start a tool lending collection. Partner with other community groups to host a community tag sale. All of these programs ideas encourage the community to start thinking differently about consumption and factoring sustainability into their everyday routines.

Publications

Brochures are a common tool that libraries use to describe their new building's features. A notable example of such a publication is the Rosemary Garfoot Public Library's self-guided tour of LEED features, available on the library's web site. The publication not only lists the green features of the building but also gives detailed explanations of how the technologies benefit the environment. It also provides citations and links to sustainability materials in the library's collection. The section on the library's rain gardens also includes a link to the University of Wisconsin-Extension's publications web site, which contains materials about rain gardens, yard care, and clean water, all of which are targeted at consumers.

The library also has a section of their web site entitled "What's a Green Library?" The section highlights the library's environmental collection, which was purchased with funds from the Madison Community Foundation. Bibliographies and pathfinders can easily be integrated into library web sites, either by creating booklists in a word processing program, saving them as PDFs, and posting them on the library's web site or using a tool like LibGuides.

The West Vancouver (CA) Memorial Library devotes a section of their web site to sustainability (found through the About Us tab). It includes a detailed explanation of the green features of the building, their green practices, and the work of their green team. The site also provides links to their energy dashboard, green building operations policy, a list of green suppliers, and their 2011-2015 strategic plan, which includes sustainability as a core value. The inclusion of sustainability in the library's strategic plan is particularly important because it illustrates their ongoing commitment to the environment, economic efficiency, and the community.

Bringing It All Together: The Fayetteville Public Library

When the Fayetteville Public Library's Blair Library (FPL) opened in 2004, it became one of the first LEED certified buildings in Arkansas. Sustainability was first mentioned during the public input process when citizens began asking specifically for green building technologies. Although LEED certification required an extra \$26,000, the city's administrators were convinced by the argument that a LEED building would be more efficient and save the city money. According to then-Executive Director Louise Levy Schaper, "Public input drove home the need for our participation in the LEED™ program, which resulted in a greener design -- a compelling argument for libraries to use construction projects as community learning experiences." (Schaper, 2003).

FPL's commitment to sustainability did not stop with the dedication of the new building. Once the new library opened, Schaper realized that the library was designed and built on a

set of values that was not being carried out in daily operations (Schaper, 2010). Schaper said that she felt the disconnect immediately but really experienced it, “when I gave or went along on our building tours. Most of our tours for adults include some green component. I saw the library from a wider perspective -- in all that we do and all that we stand for. I am going around explaining all these great features, and then I'd look around and see things that clashed with values, and I'd think, ‘Please don't notice that we printed out ten zillion newsletters, or that we're giving you water bottles.’” (Miller, 2010).

To improve the situation, Schaper focused on finding and supporting champions who could recognize where change needed to happen and move those changes forward. Change occurred slowly but “the things we'd begun to do were simple, like [which] cleaning products we used, and how and when we did our cleaning. That reduced the amount of electricity we were using. It made for a much healthier climate for our employees and our customers. Those were pretty obvious impacts.” (Miller, 2010).

One champion is Lynn Yandell, the library's Director of Information Technology. Under his direction, the library has cut server energy use by 66% and at catalog stations by 90%. He accomplished this in part by installing remote systems to power the computers on and off and by replacing tower computers needing 250 watts of power with thin clients, which are low-end terminals sufficient for searching the catalog that require only 25 watts to operate (Library Journal, 2012).

Yandell also spearheaded the library's solar test bed project. In 2008, the library was awarded a \$60,000 International City/County Management Public Library innovation grant for the project. The library raised an additional \$109,000 in labor and in-kind funding. FPL contributed \$7,600. The system went live in 2010, generating 13 kW power. The array supplies both the library and the local energy grid. The library hosted a series of green energy programs and received an \$8,500 grant from the Arkansas Energy Office to fund a solar energy kiosk. Real-time energy information from the array is available via the web at http://www.solrenview.com/cgi-bin/cgihandler.cgi?&view=0,2&cond=site_ID=316.

The library's project qualified for two alternative energy rebate programs for energy production in 2011. The first rebate came from the Arkansas Energy Office, funded by the American Reinvestment and Recovery Act of 2009. It totaled \$30,821.10. The other, sponsored by the library's local electric service provider, totaled \$3,592.60. The library plans to save the rebate income to fund additional green projects and initiatives. The project blog is available at <http://www.fplsolar.org/>. This solar demonstration has inspired similar projects at the University of Arkansas-Fayetteville and L'Oreal USA.

For FPL, LEED certification was only the beginning of their sustainability journey. Rather than stop with the building itself, Schaper and her staff changed their thinking and continued to identify ways that they could integrate sustainability into their operations. As Schaper says, “I can promise you that if a library is greener and the staff have been involved in [the process], you'll have a better work environment, you'll have more networking between the

library and other local organizations. More people are going to want to work in that library, everyone is going to be learning, residents are going to respect you even more, and you are going to be modeling great behaviors for the whole community.” (Miller, 2010).

Conclusion

As trusted community institutions, libraries are ideal locations for green technology demonstrations. Combining such projects with public education programs strategically positions them to become community models for sustainability. To take advantage of this positioning, library directors, staff, and board members need to think past a one-time building project and aim to start a community conversation. For librarians to become true sustainability leaders, they must rethink their operations to ensure that their actions match their message. They must identify, nurture, and support champions who will continue to improve, innovate, and integrate new green technologies and practices. Finally, they must inform and educate the public about their practices and explain how they apply throughout the community. Library leaders need go beyond telling their patrons about the green features of the building to show them how these technologies and practices can be used to improve the environmental quality of their homes, workplaces, and community.

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