

ENERGY MANAGERS' QUARTERLY

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Features

Tips for Using LEED Wisely 1

In Brief

Clean Energy Project Analysis Software 6

ASHRAE Releases Improved

Datacom Equipment Publication 6

Lab Study Estimates Annual Cost of

U.S. Power Interruptions at \$80 Billion 6

FEATURES

Tips for Using LEED Wisely

The Leadership in Energy and Environmental Design (LEED®) rating system was created by the U.S. Green Building Council (USGBC) to accelerate the development and implementation of “green” building practices. Since the USGBC introduced the LEED-NC (new construction) rating system in March 2000 for new commercial buildings, it has certified over 100 buildings, and thousands more have registered and are presumably on the path to certification.

The reason for LEED’s rapid success is evident: By bringing branding, standardization, and product differentiation to the disorderly green building market, LEED has succeeded in making sustainability a standard choice that’s widely available in the

construction and facility management industry. However, there are potential issues that energy and facility managers should be aware of when evaluating the real and perceived value and credibility of LEED certification for new construction projects. The USGBC is aware that there are a few chinks in the armor and is taking action to address potential problems. In the meantime, there are benefits that come from a facility becoming LEED certified. The key is knowing how to work the program wisely.

The Value of LEED

There are some very compelling reasons why energy and facility managers might consider LEED certification for new or existing buildings. The basic justification for building green is most often based on reducing operating costs over the lifetime of a building and commanding a higher resale value. Other bonuses—such as improved indoor air and water quality, reducing the environmental impact on the local community, and improved worker productivity—can often be found in a business case for building green. Although a facility can achieve these goals with the proper plan in place, LEED certified or not, there are additional benefits that LEED brings to green building projects. These can include:

- Improved company brand image through increased public recognition

- An element of credibility and reliability because LEED is a national standard, plus the possibility of replication at multiple facilities
- A program that is, for the most part, easy to follow, concrete, and actionable
- Influence on employee awareness and behavior
- Credits earned under LEED certification can, in some cases, provide increased efficiency and environmental benefits

Use Caution in Choosing Credits

LEED's success has not come without cost. In making the LEED system simple enough to allow mainstream industry players to participate in green building projects, much of the critical information that designers and facility managers need to make informed choices has been lost in the shuffle.

Just because the LEED rating system rewards a particular technology with points doesn't mean that the technology is always an economical or reliable means for achieving environmental benefits. A few LEED credits are actually unlikely to produce either monetary or environmental benefits; they are often, in truth, a waste of money for everyone involved. Several other credits do produce benefits when applied properly, but those applications are not universal. Last, there are many credits that clearly do produce benefits, but it's debatable whether the building could obtain similar or greater benefits through less-expensive means.

Good examples of credits that are not universally applicable are those for which performance is regionally dependent. For example, water conservation is more of a priority in hot, dry climates, yet the USGBC awards the same number of credits for water conservation in Seattle as it does in Phoenix. The same goes for cool roof technologies. A cool roof will not perform the same way in all areas of the country—in fact, it could impose an energy

penalty in colder climates—but LEED doesn't recognize that fact.

An example of a technique that undoubtedly produces benefits but may not be the most cost-effective means for achieving those benefits would be the four points LEED makes available for using materials that give off low emissions of volatile organic compounds (VOCs). These materials, which include adhesives, sealants, paints, coatings, and carpets, are specified to improve indoor air quality. It is not clear that using low-VOC materials is always a cost-effective means for accomplishing this goal. Lawrence Berkeley National Laboratories recently released a study of several portable classrooms, some of which were built with low-VOC materials and some of which were not. The researchers found that even though the low-VOC materials did contribute to better indoor air quality, supplying adequate ventilation was a more effective—and less expensive—means of ensuring low concentrations of VOC emissions.

More Points Don't Add Up to More Benefits

Given that the LEED system gives more prestigious awards (Silver, Gold, and Platinum) to buildings that attain more credits, you might think that the more points a building gains, the more environmental benefits it will provide. You would be wrong. There seems to be little connection between the quantity of credits awarded and environmental benefits. For example, when designing renovation projects, developers can save more material resources by reusing 75 percent of an existing building's structure and shell—walls, floors, and roof—than by incorporating at least 5 percent salvaged or reused building materials, but both strategies earn one point in the LEED ratings.

The Center for Sustainable Systems, based at the University of Michigan, does research based on life-cycle models and sustainability metrics. In one study funded by the National Institute of Standards and

Technology, researchers from the center calculated the lifetime energy and material resources that could have been saved had a number of LEED requirements been implemented at a recently completed six-story classroom building on the university's Ann Arbor campus. The study report, published in late 2002, concluded that there were wide disparities in savings achieved per LEED point awarded.

Such disparities in benefits per point contradict the intention of the LEED program—to ensure that buildings garnering more LEED points are more environmentally beneficial than buildings garnering fewer points.

What You See Isn't What You Get

There should be no doubt that buildings require constant scanning to ensure consistently efficient performance. Some of the techniques that can help accomplish this ongoing task include post-occupancy commissioning, measurement and verification, continuous commissioning, and automated diagnostics.

Although LEED-NC gives credit for measurement and verification, that process isn't required. And even if it were, there is no requirement to make modifications based on the results of that process. Many energy-consuming building features that earn LEED credits require ongoing maintenance. How valid is LEED certification if the features the USGBC is awarding points for aren't being maintained properly? How likely is it that certified buildings will duplicate the performance of the simulations on which their certifications are based?

Is LEED Worth It?

No one has yet completed a rigorous assessment of the costs and benefits of the LEED certification process. Certainly, the cost part of that assessment could be objectively evaluated, but it remains virtually impossible to generalize what costs are associated

with LEED certification, as the actual features that may be implemented in any given building to obtain certification can vary widely. In most cases, the costs are probably low enough that they can be offset by cuts to other building features. That practice, though, makes it hard to determine the actual costs of LEED itself. A recent study by the U.S. General Services Administration attempts to get at these issues by comparing a variety of LEED scenarios for two hypothetical buildings. The researchers found hard costs that ranged from virtually zero to over 8 percent of overall project costs. They also estimated that soft costs (including additional design and documentation costs) could vary from about \$0.80 to over \$1.50 per square foot.

Aside from the cost of constructing a green building, LEED certification imposes three additional costs: the fees the USGBC charges for registration and certification, the time and effort that goes into producing the necessary documentation, and the additional design time required to make the building green.

The USGBC charges separate fees for registration and certification. Developers and design teams pay registration fees on a sliding scale based on building size. The registration fee can run from as little as \$750 for a building with less than 75,000 square feet to as much as \$3,000 for a building with more than 300,000 square feet. The fee for certification is higher, ranging from \$1,500 to \$7,500. These fees should represent a tiny portion of a building's overall cost.

Some consider the LEED documentation requirements to be too data-intensive. Others, including Timothy Moore, a design consultant and LEED Accredited Professional, claim that compiling LEED certification documents requires virtually no additional work. Moore states that a well-designed, high-performing building should already be recording this type of information. In fact, Swinerton Builders, a general contractor active in the western U.S. that has been in business since 1888, is finding the LEED

documentation process to be instructive as to what it should have been doing all along.

Over time, documentation-related costs should go down as innovators develop more efficient techniques. Here are a few tips:

- *Use specially designed software.* Several firms have recently developed software that streamlines project management and eases the pain of documentation. The USGBC is also developing its own web-based tool and is moving toward a paperless system.
- *Improve designer teamwork.* Peter Rumsey, an award-winning California design engineer, states that if design teams think that creating LEED documentation is a hassle, they probably aren't working together enough. He says that a disjointed design process will definitely make applying for a higher rating difficult and expensive.
- *Be quick and dirty.* An article in *The Construction Specifier* by Christopher Dixon, a registered architect and LEED booster, asserts that LEED applicants could cut documentation costs by providing no more documentation than is required; by providing less information than required, whenever possible; and by not spending a lot of time making the LEED application attractive.

What's an Energy Manager to Do?

Use good judgement. Energy and facility managers should not rely solely on the LEED checklist to guide them to all viable efficiency and economic solutions. Remember that LEED is just a menu-like list of possible technologies and strategies and that it was never intended to be a design guide. LEED isn't a substitute for scientific analysis of what would be appropriate in certain facility types and in certain locations.

Focus on existing buildings first. The USGBC recently released a new version of LEED called LEED-EB that is targeted at existing buildings. This version is a rating system for the sustainable operation and upgrades of existing buildings. LEED-EB improves building operation and performance while reducing overall operating costs, and “provides a structure for maintaining performance over the long term.” While the green building community awaits the release of more performance-based and scientifically rigorous versions of LEED-NC, you might be well advised to begin with the possibility of certifying an existing building first. There can be several benefits from taking this approach. First, it will allow you to take a go-slow approach—identifying what does and doesn't work well in your type of facility—and allowing time for thorough life-cycle cost analysis. Without the pressure to essentially predict performance up front based on the credits you choose in order to certify a new build under LEED-NC (a task that is daunting and very difficult to do accurately), this approach will allow you to determine meaningful measurement and verification of performance, benefits, and savings. Integrating the actual performance of your facilities under LEED-EB will then help you determine how you can use LEED-NC to design high-performance buildings.

Don't go point shopping. At its heart, LEED is a checklist, and it's a checklist that includes measures that vary in their cost-effectiveness. Although many energy managers who go through the LEED process undoubtedly make use of integrated energy design techniques that are effective, simply using the checklist will not guarantee sustainability. Some credits and points are easier to obtain (lower cost) and can potentially lead to a “blue light special” mentality where users check as many boxes as possible to obtain certification as quickly as possible. A least-cost approach might get your building LEED certified, but it doesn't mean that you've implemented a plan that will produce sustained benefits over the life of the building.

Create green specifications for your facilities. If going through the entire LEED process isn't appealing to you or your organization, then there are a few ways to "use" LEED for new construction without going through the traditional LEED process. Some companies build to specifications similar to or based on LEED but don't bother to register their project or obtain actual certification, and others develop their own guidelines.

One example of a firm that builds new facilities to LEED-like standards but doesn't register or certify its projects is Wal-Mart. The retailer has a green template it uses for some of its new stores to incorporate efficient features such as daylighting, efficient lighting, and others. Wal-Mart's director of project development said that "LEED is just another approach. We'll get the same benefits but we don't have to go through the paperwork." Wal-Mart isn't focusing on the public relations aspects of building green; the corporation seems more concerned with reducing operating costs, which building green can help it do.

The Collaborative for High-Performance Schools (CHPS), based in California, also developed its own guidelines similar to LEED. Many of the CHPS board members are also USGBC board members, and the program is based on LEED but doesn't bear any upfront registration or certification costs. It uses the measures that are specific to schools and productivity gains. Some school districts now mandate CHPS adherence.

Other organizations have developed their own guidelines or standards for building green. It is expensive to register and certify LEED buildings, and doing the paperwork and documentation can be cumbersome. If you develop your own standards, you could look at a variety of resources, including LEED, and then pick what matters to your business and what you could feasibly achieve.

Certify one facility. If you have a chain of facilities, such as retail stores, bank branches, or multiple office buildings, you could get one building LEED

certified and then mimic those procedures on subsequent buildings. If you were the energy manager for a bank, for example, the administrative costs of LEED would make it difficult to register and certify all your branches. If you are planning new branch construction, on the other hand, you could get that branch LEED certified, and then use the experience as a template for the others. To capitalize on the public relations benefit of certification, the GAP, Honda, and Toyota each certified one facility, but none of them have certified all of their facilities.

Be transparent. A good practice is to be transparent about your efficiency measures so people know your facility is really is green. For example, specifically identify how much green power you are buying in any media materials and press releases. You could also put up a kiosk, easel, or bulletin board for your patrons and employees that explains the green features of that building and others like it.

When evaluating which green features to include in a facility or group of facilities, it's important to make the economics of individual features transparent to management and other stakeholders. Then it's up to those stakeholders to choose which features to implement based on their cost-effectiveness or other value. Some may well want to pay for certain features or LEED credits that don't meet commonly accepted criteria for cost-effectiveness for their own reasons, and that's their prerogative. For example, some developers might want to install solar panels on their buildings, even though there are far less expensive means for reducing building energy consumption.

When used wisely, LEED can add value to new construction projects. By following these steps, an energy manager can ensure that the path to a green building is achievable, credible, and—most importantly—sustainable.

For more information about LEED programs, please visit www.usgbc.org and www.greenerbuildings.com.

IN BRIEF**Clean Energy Project Analysis Software**

The Canadian government's RETScreen software is a decision-support tool developed for clean energy projects with the contribution of experts from government, industry, and academic circles. The international software, which the Canadian government provides for download at no charge, can evaluate the energy production, life-cycle costs, and greenhouse gas emission reductions for various types of energy-efficiency measures and renewable energy technologies. The tool also includes product, cost, and international weather databases; an online manual; a case study-based college-level training course and electronic textbook; and an Internet-based marketplace.

The RETScreen software now has more than 49,200 users in 202 countries and is growing at more than 200 new users every week.

To download the free software and other related tools please visit the RETScreen web site at www.etscreen.net.

ASHRAE Releases Improved Datacom Equipment Publication

ASHRAE (the American Society of Heating, Refrigerating and Air-Conditioning Engineers) has written a new guide for architects, engineers, planners, and operations managers of datacom facilities. This publication allows datacom users to better understand how computer equipment affects the cooling requirements of datacom facilities. Because computer parts quickly become outdated and are replaced, the cooling equipment should be designed to accommodate system changes and updates. ASHRAE suggests that the building-cooling/facilities industry and the datacom

equipment/information technology (IT) industry should collaborate to most effectively utilize both cooling and computer systems.

Other useful components of this publication are power trend charts and examples of their uses, background on the derivation of the data, forecasting up to 2014, demarcation of the multiple types of servers and communication equipment, instructional information, important features of planning a facility, a description of power density loads, and an exhaustive glossary.

For more information about *Datacom Equipment Power Trends and Cooling Applications* (cost: \$48; \$38 for ASHRAE members), contact ASHRAE customer service at 800-527-4723 (U.S. and Canada) or 404-636-8400 (worldwide), fax 404-321-5478, or visit the bookstore at www.ashrae.org.

Lab Study Estimates Annual Cost of U.S. Power Interruptions at \$80 Billion

Researchers at Lawrence Berkeley National Laboratory (LBNL) have released a study that estimates electric blackouts and outages cost the U.S. approximately \$80 billion annually.

The study, titled "Understanding the Cost of Power Interruptions to U.S. Electricity Consumers," based its estimates on survey data from electricity customers, event data from electric utilities, and U.S. Energy Information Administration statistics on location, type, and number of end-use customers. LBNL scientists then categorized interruption events into those lasting less or more than five minutes, and gives a total number of events per utility service territory.

LBNL researchers caution that because there were inherent limitations in the data available for the study, true cost estimates could vary significantly. However, one of LBNL's goals was to enter outage and interruption costs to the U.S. economy and

consumers into the grid-modernization discussion. Investment estimates from industry experts—most recently debated in the wake of the 2003 blackout—range anywhere from \$50 to \$100 billion. By shedding light on the avoided costs or “the value these investments might bring in the form of improved reliability or fewer or shorter power interruptions,” researchers hope to promote a national effort for better outage and interruption data collection in order to more accurately assess true costs.

Top-level cost estimates from power interruptions include:

- \$80 billion annually in the U.S.
- \$57 billion annually in the commercial sector (14.9 million customers)

- \$20 billion annually in the industrial sector (1.6 million customers)

To download a copy of the report, please visit LBNL's web site at <http://certs.lbl.gov/pdf/55718.pdf>.

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