

White Paper #21

High Performance Buildings – LEED® and Energy Star®

Pushing the Envelope of Energy Savings beyond Code Minimums



Energy Codes determine minimum performance levels for new and renovated buildings. Improvements to these codes are made periodically to reflect current conditions. Generally, new buildings are expected to use less energy than ones built previously, which is good. Until a building meets the criteria of “renovation”, it is not required to fully meet current energy codes (or other codes), except that new equipment installations must meet current code for that specific work. Beyond the mandatory compliance of applicable codes, customers are always able to voluntarily pursue a higher standard of energy conservation. Sometimes this is done for prestige, some times for marketing benefits, sometimes for plain old dollar savings for business profitability. This white paper provides a brief overview of two popular programs for customers in their pursuit of high performance buildings. Each of these includes a formal certification process and can include an award in the form of a plaque to display upon the building.

ENERGY STAR® Building Rating

This program is a joint program of the U.S. Environmental Protection Agency (EPA) and the U.S. Department of Energy (DOE). The focus of the ENERGY STAR program is energy, as the name implies. This system applies to existing functioning buildings, and not to buildings being designed or built. The basis of compliance is the electric and gas consumption, per square foot (SF), compared to similar buildings with similar uses. The

process includes the use of the Portfolio Manager software (free) in which the particular building is divided into individual pieces according to the categories provided. For example a building may have 50,000 SF of office area, 2500 SF of restaurant area, and 10,000 SF of retail space. Other factors with known impacts to energy use are defined, such as climate zone and percent of occupancy.

Customers enter actual utility bill information into the Portfolio Manager software along with building size and usage, ultimately evaluating energy use per SF and creating a benchmark for a “base building” of similar size and usage. The software output is in the form of a calculated score for the building; if the score is at least 75 the building qualifies as an Energy Star building.

Since this system uses actual energy consumption from utility bills, it applies only to buildings that exist and can be measured. For new building designs, Energy Star provides design guidance information that architects and engineers can use to steer the new design toward Energy Star rating success. After the building is built, Portfolio Manager is used to track the energy use and, after 12 months, the building can be rated.

A quality check for the certification process is to have the information reviewed by a third party Professional Engineer (PE). The PE must review and sign off on the validity of the data input and verify the low energy use is not at the expense of reduced comfort, lighting, or ventilation. The Energy Star award must be renewed periodically to assure the low energy accomplishment stays put. The use of actual data and the retraction of the award without continued low energy performance is an important feature of this program.

Once rated, the building can optionally renew the rating each year by continuing to enter monthly data into the Portfolio Manager software. Since each Energy Star plaque is marked for that year only, the program has a built-in incentive for annual renewal.

With or without annual renewal, continuous monitoring of energy use for the rated building is good practice and encouraged as a management practice. Keeping tabs on energy use makes good business sense and early detection of changes can save money.

LEED® Building Rating

This program is the verification arm of the U.S. Green Building Council (USGBC®), a non profit organization that certifies sustainable businesses, homes and communities. LEED is an acronym for Leadership in Energy and Environmental Designs. The “two E’s” (*Energy and Environmental*) differentiate this program from ENERGY STAR. The LEED measurement system includes a combination of required and optional points for both of the E’s in five areas:

- sustainable site development

- water usage
- energy efficiency
- materials and resources used
- indoor environmental quality

This program goes beyond energy and water conservation to the overall concept of sustainability of all surroundings and resources (Green Buildings), related to the five categories. Both E's are important for our community, however the association of LEED to utility core business relates most closely to energy and water conservation.

LEED uses a system of points for individual measures, and the ultimate rating depends upon the total number of points. The LEED rating hierarchy is based on increasing levels of measures implemented. To achieve a higher rating, more points are required. Each point has specific requirements for performance.



For customers pursuing LEED certification, documentation efforts can be considerable. The scope of technologies that are part of LEED are wide ranging and thus each customer pursuing LEED certification will learn a great deal. This raised awareness and education effect is an excellent byproduct of the LEED process and probably intentional. Many customers will retain a LEED Accredited Professional to guide them through the process and shepherd the project from conceptual planning through construction phases. Since LEED projects address construction materials and methods, customers pursuing new LEED building rating will select Architects, Engineers, and Construction Contractors that have experience in LEED buildings.

LEED has evolved since its inception and now includes existing buildings, labs, schools, core and shell, retail and other categories, allowing for the realities of those different business segments. Each category has specific requirements, but follows the same theme of overall sustainability. For new buildings LEED energy and water savings figures are based on engineering calculations or modeling instead of actual values. However, the existing building rating system (LEED-EB) is based on actual performance metrics.

How Will This Benefit Me?

- Tangible benefits are utility cost savings. Designs that inherently use less will reduce the operating expenses for the life of the building. The reduction of monthly utility expenses first must pay back any premium first costs associated with the upgrade, but then provide continued savings that improve profit margins.
- Intangible benefits will vary by customer and business. Often, the prestige of achieving these certifications is a differentiator and helpful in increasing business.

With permission, the certifications can become integral to marketing plans. Buildings with such certifications may benefit appraised property value.

- Personal benefits include the satisfaction that your building embraces the concept of conservation and serves as a visual example for others to follow.

Design Considerations

Each of the programs offer design guidelines and suggestions. These are an excellent resource for owners and design teams to use as they customize a solution for each building. It should be noted that there are any number of combination of measures that will achieve a stated goal, but some are more palatable than others. For example, “passive” items have the distinct advantage of having no moving parts and naturally tend to last longer. Other solutions that depend on technology need to have an accompanying commitment to that technology which will include training and TLC to keep in top shape. Measures that depend upon automatic control settings need special vigilance for sustained savings due to their propensity to creep back from initial savings levels during the first few years. All of the measures have merit and each will be the “right” solution for some customer. Finding the best fit for each customer should be an over-arching goal of the planning stage. To this end, seasoned individuals on the design team and an involved owner and their operations/maintenance staff are invaluable.

Other Options

The design guidance provided by both LEED and Energy Star programs are aimed at reducing utility consumption. Some customers may choose to implement conservation measures and enjoy the savings without the certification. In the case of LEED, a customer may have a particular interest such as water conservation, and can utilize the program material to achieve that specific goal. However it should be noted that by skipping the third party certification step there can be some risk that actual achieved savings do not match estimated savings.

Resources

LEED

- USGBC: <http://www.usgbc.org>
- From there, choose LEED or Certification tabs for more information
Links are valid for the date of this paper, but links change. If that happens, use a search engine with keyword “USGBC LEED” and you’ll get results.

Energy Star

- Portfolio Manager <http://www.energystar.gov/buildings?s=mega>
Links are valid for the date of this paper, but links change. If that happens, use a search engine with keyword “Energy Star Portfolio Manager” and you’ll get results.

Technical Assistance

Of the two programs, Energy Star is more geared toward customer self-service. For Energy Star, a score lower than the 75 point threshold will often need design assistance for new measures to boost that score. LEED has a variety of programs, some for existing buildings and some new construction. For new construction projects, LEED certification will usually entail computer modeling by an energy professional.

When seeking advice from a private consultant, be sure to verify that they have appropriate expertise and experience in similar projects. Interviewing several consultants can help improve your confidence level. Sometimes contractors will offer advice as part of construction services; however the benefits of independent third party consultant opinions may provide additional comfort in decision making.

Concluding Remarks

High performing buildings are those that outperform their code-minimum counterparts. Owners of such buildings are role models of conservation and sustainability that others follow. Like anything else, such commitment is not without risk. New technology vs. tried and true, maintenance implications, whether savings are sustained or creep up, cost impacts, and others are important questions to ask. To this end owners are strongly encouraged to participate in the discussions and evaluations of options – in fact this educational process is a valuable and integral part of both program's intended goals.