Platinum Buildings

If green buildings are the goal, then a lot of people shoot for the highest ranking possible, which is LEED-Platinum. Without exactly knowing what it takes, many building owners and design teams begin their green building project by proudly proclaiming a goal of LEED Platinum. Usually, rather quickly they find out there is more to making a project "super green" than just declaring good intentions.

As of early 2007, there were fewer than 30 LEED Platinum new buildings in the US in all four USGBC rating systems — about 4% of the total number of certified projects. Even among those buildings, there were some that barely made it over the bar (52 points out of 69 possible in the LEED-NC rating system), while others achieved as many as 60 points. (It's well-nigh impossible to get all points in any of the rating systems for a single project.)

Anton Grassl

Genzyme Center, Cambridge, MA. Behnisch Architects/ Architekten, with House & Robertson Architects and Next Phase Studios.


Gerding Edlen Development

Center for Health and Healing at Oregon Health & Science University, Portland, OR, designed by GBD Architects.

To date the highest point total belongs to the 110,000-square-foot (excluding parking) corporate campus renovation for Alberici Constructors, Inc., in St. Louis, Missouri, completed in 2005. In this building, a 50-year-old manufacturing facility on a 13-acre brownfield site was renovated into a modern two-story office building, with solar thermal panels for hot water on the roof and a 65-kilowatt wind turbine onsite for additional renewable energy.

At the end of 2006, the largest Platinum-certified building was the 344,000-square-foot, 12-story Genzyme Center corporate headquarters in Cambridge, Massachusetts, completed in 2003. Its building envelope is a high-performance curtain-wall glazing system with operable windows on all 12 floors. More than 32% of the exterior envelope is a ventilated double-facade that blocks solar gains in summer and captures solar gains in winter. Steam from a nearby power plant is used for central heating and cooling. The project is owned and operated by Lyme Properties, with Genzyme as the major tenant.[122] Including 20 kW of photovoltaics, overall energy use is projected at 41% less than in a conventional building.

In 2007 the Oregon Health and Science University's new Center for

Alberici Headquarters, St. Louis, MO, designed by Mackey Mitchell Associates.

Health and Healing, a 412,000-square-foot mixed-use medical office, lab and classroom building became the largest Platinum-certified project in the world. This project combines 60 kilowatts of building-integrated photovoltaics, a large site-built solar collector for water heating, a 300-kilowatt microturbine plant, an onsite sewage treatment plant, an extensive green roof and 100% recovery of all rainwater for reuse. Occupied in the fall of 2006, it is projected to save more than 60% of the energy use of a similar conventional building and more than 50% of the water use. Total cost premium was reported at 1%, net of all incentives.

There are also LEED Platinum projects in Dubai (United Arab Emirates), China and India. In 2007 and 2008 we expect at least 50 more projects, recently completed or currently under construction, including one as large as one million square feet, to receive LEED Platinum designations in one of the four established LEED rating systems.

Post-occupancy Evaluation

One of the key principles in sustainable design is to have a feedback loop, a process that helps organizations and individuals to learn from their decisions and to make better choices in the future. The key feedback loop in green building design is called post-occupancy evaluations (POE), in which someone goes back after a building has been completed to see if energy and water use are meeting projections, whether the indoor air quality is as predicted, whether the building operators are running the monitoring and control systems properly and so on. A key element in a POE is a survey of occupant comfort because so much of the resulting productivity gains expected from green buildings have to do with daylighting, lighting, ventilation quality and thermal comfort.

Developed in England, POEs have been slow to catch on in the US, primarily because no one has provided a budget for such work, and because most of the design and construction team has moved on to other projects. So it's left to the building operators and managers, many of whom might be under contract to the building owner, to make the building work.

In some ways the lack of interest in POEs represents a huge black eye for both architects and engineers. For architects, it indicates a lack of professional interest in how their designs actually work for the people in the building, beyond perhaps a few anecdotes. This may be because user groups are typically not well incorporated into the design process and have little input into important design decisions that affect the future occupancy of the building. Beyond commissioning the building at the end of construction, engineers seldom return to assess results. Perhaps it's because they are afraid of getting sued for buildings that don't perform as designed. If green buildings are to realize their full potential, there has to be money in every building budget to assess results and feedback to future designs.

A recent example of a successful POE was performed for Portland State University's (PSU) Stephen E. Epler Hall, a 130-unit dormitory that was awarded a LEED Silver designation in 2003. A master's degree candidate at PSU, Cathy Turner, did a POE for this project. The result evoked widespread interest in the Pacific Northwest in performing a similar assessment for other projects.[123] If one thinks about it, there are hundreds of graduate students in various sustainability-oriented degree programs who would welcome the task of performing POEs on behalf of building owners and project design and construction teams. All that's needed is a little funding for their time and a solid connection to their degree programs.

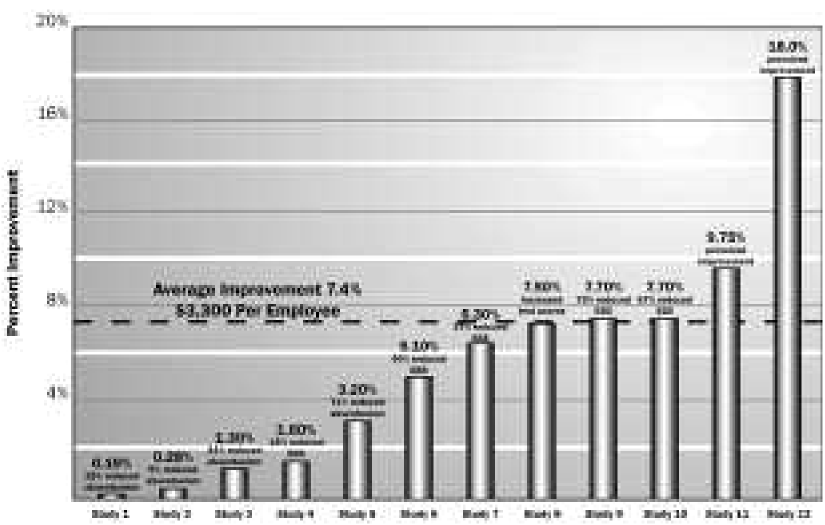
A study by the Center for the Built Environment at the University of California, Berkeley, compared 21 LEED-certified and other green buildings with more than 160 conventional buildings. The responses to more than 33,000 questionnaires showed that green buildings had higher occupant satisfaction overall (statistically significant difference) and specifically higher satisfaction with indoor air quality (average satisfaction in

80th percentile of users surveyed) and thermal comfort (average satisfaction in the 90th percentile).[124] This demonstrates the value of green building design properly executed to generate two key benefits: human health and worker productivity.

Productivity

Productivity gains are one of the major business case benefits of green buildings. Why is productivity so important in justifying green buildings? Consider typical annual building operations costs for people (salary and benefits), rent and energy. For example, a $60,000 per-year employee (salary and benefits) in an average space of 200 square feet will cost $300 per year per square foot. For commercial buildings, people costs are about 10 to 20 times greater than rent ($15 to $30 per square foot per year), which is in turn about 10 times greater than energy (about $1.50 to $3 per square foot per year). This result does not say that saving energy is *not* important, but rather that even a 1% gain in worker productivity will offset the entire annual energy bill.

Productivity gains from mixed-mode conditioning and natural ventilation systems.



Redrawn with permission from Center for Building Performance and Diagnostics, Carnegie Mellon University. eBIDS: Energy Building Investment Decision Support Tool

Moreover, a 5% to 10% gain in productivity will pay for the entire rent on a building. So, if a green building costs 5% more than a conventional building, but has daylighting, views of the outdoors and healthy indoor air, those features will likely lead to a productivity gain of 3% to 5% or more — that has a value of $9 to $15 per square foot in the first year! In other words, for a corporate or institutional owner who can reap the benefit of the investment, the first-year return on investments is more than 100%. If the funds are available, that return makes the investment a no-brainer. For this reason alone, green building design more than pays for itself, even if there are higher costs. If a company can realize a 10% productivity gain from a green building, it pays to build a brand-new building for employees!

Furthermore, there are dozens of studies that link higher productivity to a number of the building's green features. These buildings are also linked to improvements in illness and absenteeism among employees. If employees are healthier and on the job more often, productivity gains are a direct result. A number of academic studies[125] show gains in productivity from the use of mixed-mode and natural ventilation systems that average 7.4%.

Question Authority

Green buildings represent a challenge not only to the authority of architects and engineers, but also to the codes and standards prevailing in the building industry. In many cases, building code officials in cities and counties are unaware of new technologies, putting the burden on the design professional to make a case for evaluating a new idea on a "performance" vs. code-prescriptive basis. In a performance evaluation, the proposed design is assessed to see if it provides the same level of protection of public health and safety as the prescriptive standard. This may occur with such simple technologies as water-free urinals or with complex approaches to building fire protection and energy efficiency.

As an example, in 2002 one engineering design firm in Portland wanted to harvest rainwater from a building roof and reuse it for toilet flushing in a college dormitory, something the students favored. The design included a water treatment system using sand filters and ultraviolet light to destroy pathogens, so the finished product was basically safe enough to drink. As the first such project in the city, the code officials were a bit nervous. So they only allowed the first-floor public restrooms to have the recycled water, not the dorm rooms! And, they made the project put a sign over each toilet, proclaiming "Rainwater — Do Not Drink!" Since the toilets had no tank, but only a valve flush, this seemed a bit much!

Progress occurs in slow increments; these same code officials relaxed their restrictions with each successive project, so that in 2007 rainwater harvesting is now part of the tool-kit of engineers in the Portland area. Ironically, Oregon still prohibited water-free urinals at the end of 2006, largely owing to opposition from union plumbers, so efforts to conserve water in building projects there still face obstacles.

The point is that green buildings often butt up against a well-entrenched system for designing, constructing and operating a building. That system needs to change dramatically if we are to achieve the full benefits of green buildings. If even simple systems like rainwater harvesting take several years to achieve acceptance in each jurisdiction, how will we ever be able to make green buildings deliver, in a timely manner, the energy and water savings we all agree they need? How will dramatically different new technologies gain acceptance and critical mass for marketplace success if the battles have to be fought one project, one city and one contractor at a time? Local officials need to work closely with architects, engineers, contractors and the building products industry to make needed changes in conventional practices.

One final note: often the authority that needs to be questioned is not external, but more subtle, namely, the internal pressures on architects and engineers to be far more conservative in their designs than required by circumstances. This is the pervasive authority of rules of thumb, sales engineers, engineering handbooks and the collective experience of more senior architects or engineers in a firm. Their experience tells them, for example, to oversize HVAC systems to avoid future complaints from building occupants or the possibility of lawsuits over the adequacy of building design.