Setting the Bar High in Design and Clearing It in Construction

Summary by Caroline Howe

Panelists
Kurt Teichert, *Brown University**
Paul Stoller, *atelier ten*

*Workshop organizer

This workshop featured an in-depth discussion of methods for creating university-wide standards for design and construction and ways to achieve those goals. Teichert and Stoller created a dialogue with attendees, with everyone sharing their own experiences from a variety of backgrounds and levels of expertise.

Each panelist began by introducing themselves before splitting into groups for small discussions among the conference attendees. Kurt Teichert teaches high performance design in an environmental studies course at Brown, where he is also an active participant in the design process and in monitoring the construction process. Paul Stoller works for atelier ten, an architectural consulting firm with offices in London, New York and New Haven. He also teaches environmental design and construction at the Yale School of Architecture.

The members of the audience split into small groups of six or seven, with several minutes to introduce themselves and come up with broad ideas they hoped to focus on in the rest of the presentation.

The break-out groups focused on the following issues:

- A "true construction standard." Should LEED (Leadership in Energy and Environmental Design) be the standard used, or are there others that should be considered? When and how should these standards be applied?
- Integrating cost considerations into these design standards.
- Advancing sustainable transportation strategies.
- Curbing the tendency for campuses to expand.
- Governance considerations, including garnering support from the board of trustees or regents, and empowering a single person (a sustainability coordinator or passionate student) to effect change.

GREEN BUILDING AT BROWN

Teichert brought up other questions that he had been considering, ranging from issues of determining and testing qualifications of green architects to issues of institutionalization and how to move from one green building to a university culture of sustainable design. Teichert briefly addressed some of the dilemmas of cost, since some stakeholders bear the burden (cost of construction) while others may reap some benefits (like electricity savings), which are similar issues caused by energy conservation in general.

The program of green design at Brown attempts to incorporate sustainable design into the highest and earliest stages of design. Though Teichert admitted that standards may not hold up throughout the process (due to budgetary pressure, or insufficient discipline in the project delivery process), he emphasized that high performance standards throughout the process greatly improve a building's quality.

Brown has developed a Project Delivery Process (PDP) document that includes requirements for design charettes, life-cycle cost analysis, and a significant effort from the design teams on high performance design objectives. LEED is used as a guideline and the PDP outlines the steps and timing of making decisions regarding LEED certification objectives.

ATELIER TEN'S WORK AT YALE

Stoller said, "If there is one message that I can send to you, it would be: if you want to get a really high performance building, you just have to ask for it." He has seen administrations fail to get the buildings that they wanted because they were afraid to set high standards for their architects. From a designer's standpoint, Stoller insisted it was up to the designers to determine whether or not the goals could be met on the budget available.

The firm atelier ten is now involved with about ten Yale projects. The university has always been committed to high performance buildings, and now sustainability is a major factor in that performance. Yale's Malone Center for Biomedical Engineering received LEED gold certification, and the Chemistry Research Building is rated LEED silver. These are both atelier ten-designed buildings.

Stoller's method of creating a project relies on a highly ordered, hierarchical process. Too often, Stoller claimed, this approach is neglected. The first step in any design process is to determine the principles which dictate action in the institution. Next, the university must determine what the goals of a specific building are, such as whether it is designed to be a teaching instrument. From these goals come objectives: the ways to achieve those goals. This might include building ratios or landscaping ideas. The final product can later be measured against these benchmarks.

It is only after this that the project teams should be selecting specific strategies and testing them to see if they meet the university's goals and objectives. The technologies chosen should support these strategies. Stoller reminded participants that far too often the technologies are chosen before the strategies or even the goals are discussed.

At Harvard, six sustainability principles guide the design process:

- to demonstrate institutional practices that promote sustainability;
- to promote health, productivity and safety;
- to enhance the health of the campus ecosystem;
- to develop planning tools;
- to encourage environmental inquiry;
- to establish indicators for sustainability.

Yale's principles are even simpler. President Levin's challenge is to reduce Yale's greenhouse gas emissions to 10 percent below 1990 levels by 2020 by reducing emissions of residential colleges by 15 percent, academic buildings by 10 percent, and by greatly reducing the impact of new buildings, though no specific goal has been set.

Stoller emphasized that such goals help designers understand the university's targets broadly or for a specific project. Greenhouse gas targets may not be exactly related to energy targets, and it is important for designers to know which goals are most important to the university. He emphasized that such goals should be put in the Request for Proposal (RFP) if possible.

Stanford Business School's RFP sought not "a good or even great project, but a spectacular product that is recognized as moving the field of building academic campuses forward." Though Stanford appropriately listed the certifications they desired for the project, LEED was an alternate option and sustainable design was not mentioned at all, which Stoller believed should be incorporated into the RFP as well.

In contrast, Ithaca College decided they wanted environmental design to revolutionize their campus, so they changed everything about their design process in order to go for LEED gold and LEED platinum. They set this as their criteria for all design projects on the campus, which got some of the best architects to fly to Ithaca and apply for the project. All of the best architects want a LEED platinum building, and although they would lose money on the project, architects were impressed by Ithaca's straightforward proposal for a LEED platinum project.

Although LEED certification may not be the only qualification or the only way to express the specific goals of a project, it is a general term that can attract specific architects to the project. It can also attract a construction team that does know what the architects are talking about in the dialogue around LEED and green buildings. The bottom line is to specify as much as possible in the RFP to program for success.

One challenge is being as specific as possible in the RFP. Another is answering the common query from administration: "Will it cost more?" Stoller advised that the budget should be set in advance, allowing the design teamwork around it. Up front, recognize that the green design process will cost more because there may be more consultants on the project. Since the largest impacts on cost come from timing, supplies, and the availability of contractors, these will not be affected by whether it is green or not. He emphasized that if a school is building high quality buildings, the

cost differences with green buildings will not be significant. The dialogue about cost is shifting away from purely financial considerations about efficiency gains and towards a dialogue about greenhouse gas emissions.

Addressing the cynical adage, "the greenest building is the one that had not been built," Stoller encouraged exploring the true cost and future benefit of buildings. Sometimes older can be better. For example, some older "charismatic" buildings may be less energy intensive than new buildings. Old buildings often have no air conditioning and they have strong daylighting because they were built before consistent electric lighting was available.

PARTICIPANT QUESTIONS AND DIALOGUE

Energy Intensity

RFPs should include energy intensity targets on a level of energy use per square foot per year. Even a goal such as "30 percent less energy-intensive than traditional buildings" can control preferences, independent of existing technology that will change over time. It can allow designers more flexibility while also giving them a very high standard to reach. Energy intensity also allows for greater comparison between campuses and between other high performance buildings.

In Germany, energy intensity requirements are much stricter than in the United States. They are 50 kWh /sqm/ year, 10 percent of the energy intensity of traditional buildings. These difficult targets force designers to make innovative design decisions, while not tying them to specific technologies.

Energy intensity measurement can allow campuses to better project their emissions for a predicted amount of square foot expansion. With a set energy intensity and a projected build out, emissions predictions are much simpler and more easily defined. With more accurate predictions of a building's demand, electricity and cooling infrastructure can be more properly sized.

Brown's approach is to quantify the energy intensity of the existing building stock and to analyze the necessary changes for these structures before new buildings are constructed. This allows for funds to be partitioned more appropriately for emissions reductions.

Payback Time and Life-Cycle Cost Analysis

The problems with such analysis included increasing energy costs, inflation rates, and the present and future climate negotiations in New England and how these could affect carbon markets or energy cost. It may be useful to apply the skills of university energy strategists and business schools to payback projections.

The integrative design process relies on value engineering, which is always about cutting the budget. True value engineering must include life-cycle cost.

Site Design Issues

Stoller advised focusing on the building envelope. He said, "The envelope is where the sustainability comes in: it is where the energy comes in or goes out; it is where all the action is."

Getting buy-in from mechanical engineers is critical, since they design for a constantly comfortable building. Most engineers will not design for a building to fall outside ideal temperature parameters – they must be directed to do so by administrators. The engineers' conservatism stems from the fear of being sued. Most building lawsuits are related to HVAC systems.

Attitudes among engineers are changing, as their expertise is increasingly required to address the more nuanced and challenging issues related to green construction. For example, light is no longer strictly a question of the level of foot-candles on a work surface, but about contrast, glare, and overall room light.

Renewable Energy and Conservation

At atelier ten, renewable energy is an end-stage consideration, as the first priority is to design for efficiency and demand reduction. Another top priority is to include in early stages decisions about core materials such as concrete vs. steel. Too often these decisions are left until fairly late in the design dialogue.

In addition to energy, some participants were interested in the discussion of consumption and reuse. One mentioned that just by setting the water fixtures at a lower level, you can drop the consumption of water by 30 or even 40 percent. To be more restrictive there are other technologies, including the dual flush toilets and waterless urinals, that can reduce water consumption by 50 percent. Greywater use was considered as another option to reducing potable water consumption.

Examples at Yale

The firm atelier ten consulted on the design of the Malone Center at Yale, one of the first two sustainable buildings on campus. The process brought together architects, engineers, and consultants and asked: What is a sustainable building today? Though not every project needs this, Stoller emphasized that this can be a really helpful process for a university at this stage.

The firm is currently working on the new Kroon building for the Yale School of Forestry & Environmental Studies, which the administration hopes will be a carbon neutral building in its operation. For this building, the Facilities Office stepped into the project, committing to maintaining photo-voltaics if they were installed by the designers.

Passive solar design, integrated thermal systems, and efficient lighting and heating all brought the energy demand of the Kroon building down. Designers were considering incorporating an underground "labyrinth" for heat recovery and storage. Questions remained on how it would integrate with the HVAC system and whether Yale would be able to commit to a hundred-year payback period. Despite the length of time that the university has existed, it is still difficult to invest in building elements with such long-term financial returns. The project team chose not to install a labyrinth, and instead focused on other measures to reduce energy demand. The university has chosen to use renewable energy credits to offset any remaining emissions from electricity use. Ideally, in the future, the building will be supported by Yale's off-site renewable energy sources, such as wind from Yale's forests.

Figure 1 LEED gold-certified Malone Engineering Center at Yale

Buildings as Learning Tools

Buildings fall along an environmental curve. There is a regulatory minimum of environmental standards just above which most buildings fall. University buildings are most often farther down the curve even without intentional green design. They are in the high quality building sector because these are more than just structures, but places to build community and in which to learn.

Buildings touted as sustainable can and are used not only to bring pride to an institution, but also to teach the students who pass through it. Yet, Stoller supported downplaying the information given on the walls of a building and using other means to educate about sustainable building design. Making greenness seem simple is important for it to attain social acceptance.

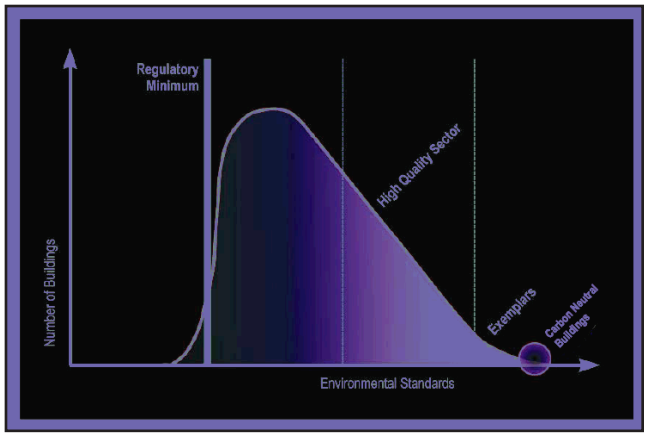
The discussion shifted towards the fact that is also important for the building to be enjoyable to be in. A building with a positive built environment will support its researchers and students in a more positive way. A sustainably-designed building can in fact draw funds by bringing top researchers into the university. Part of building a green structure is "occupant delight," the idea that people will love to be in the building and work in the building, that they'll come earlier and work later if the environment is a positive one.

Funding Sustainable Building Design

A participant described her experience trying to create a maintenance endowment in the initial fund-raising. Since some of the more complex lab buildings require personnel to maintain that building alone, the administrators were aware of the need for funds. By bringing this up early in the process, they could then later follow up with the budgeting office, saying that they hadn't gotten the funding they had requested

from the beginning. They were looking into bringing outside foundations to support the project, including the Henry P. Kendall Foundation, but were unsure how that might affect the design process.

Figure 2 Sustainability curve of buildings



Teichert answered that people in the development office are always looking for new initiatives that will animate the donor community and they need to know that green buildings are perceived as exciting.