



Fleshing Out Green

By Sherry Ahrentzen, PhD, Assoc. AIA

"Sustainability is in truth all about health."
—Vivian Loftness and colleagues, 2006

Browsing through the home magazine section of a Border's bookstore last month, I was struck by the number of green building articles heading the magazine covers. Sustainable building and green architecture are headlining our professional magazines, Web sites, and newsletters as well. But among all of these, the rhetoric and images typically stop at the boundaries of the natural resources. The concept of the triple bottom-line—environmental, social and economic sustainability—rarely frames the projects and talk within architecture and even that subset of the profession which I'm involved, housing. While rhetoric of economic and social sustainability sometimes permeates the academic architectural literature, it is largely absent in the daily province of those architects preaching green. What we see is advocacy of design and building practices that focus on resource conservation: energy, water, air, and material resources. Yet clearly the buildings and landscapes we create, recycle, restore, and preserve impact the triple bottom-line whether our actions are intended to or not.



My premise here is that our professional role should embrace and express this triple bottom line in a more prominent way than it has to date. Without conscious effort to do so, we may be left following standards that so resolutely reinforce one

leg of the stool that it collapses from the weakening of the other two legs. I advocate greater efforts to "flesh out green." By this I mean engaging in practices that not only sustain natural resources but also enrich and sustain the human systems—social, cultural, economic, physiological—that occupy and experience the buildings and landscapes we create. We can do this by partnering in sustainable place-making in its broader context (i.e. the triple bottom line), and developing and using our knowledge resources in a manner that provides for more evidence-based practice.

Let's consider what happens when we don't act upon a solid understanding of people's experiences of the places we design and they occupy. Having conducted POEs of the sustainable design efforts of several state agencies, John Carmody, the director of the University of Minnesota's Center for Sustainable Building Research (CSBR), discovered that architects' and builders' emphasis on daylighting in green buildings often neglected considerations of shading and light control. As a consequence, occupants combated excessive glare by installing blinds, covering windows with cardboard, and even in some cases using umbrellas over their desks to block out that very daylight.

Another example comes from the Stardust Center for Affordable Homes and the Family at Arizona State University (ASU), where I work. In the summer of 2005, the Center designed and built a new home for an elderly couple, the Augustines, living on the Navajo reservation in Nageezi, N.Mex. Their home was a dilapidated structure falling apart, and water leakage was slowly eroding it further. Their only heating source was a wood-burning stove in the kitchen; in the winter, they slept there to keep warm. They had electricity and running water, but the stick frame structure, only 20 years old, was slowly collapsing.

With the assistance of tribal members and ASU students, the Center constructed a 1,300- square-foot house that incorporated elements of Dine' culture, such as a central courtyard that reflected the traditional Hooghan. Honoring the four elements of fire, water, earth and air, the home incorporated a central outdoor fireplace, a roof designed to collect rain water, the use of local materials, and a natural ventilation system. The home is passively ventilated, cooled, and heated, supplemented with a radiant floor heating system. With the passive solar design and the construction materials used, we expected the home would use 60 percent less energy than a conventional stick-frame home in the same area.

FlexCrete, a 12-inch thick aerated, fly ash, self-insulating (R35) concrete block produced by the Navajo Nation, was used as the building material. The Augustines' home was the first ever built of Navajo FlexCrete. In concert with LEED recommendations of obtaining building materials and components within a 500-miles radius of the construction site, the FlexCrete blocks were obtained from the Navajo production site 275 miles away; windows and doors were recycled from houses in Phoenix, 445 miles away; and supplies and logs used for beams in the courtyard came from trees that had been thinned from Navajo forest land. In considering sustainability, the Center used not simply geographic environmental standards but economic and social ones as well. The Navajo Nation is one of the poorest areas in the country, with a per capita income of \$6,625 (in 2001) compared to \$30,472 for the United States as a whole, and \$27,439 for the greater Southwest region of the country. Unemployment stands at 42 percent. The house we developed with the FlexCrete building materials of their new industrial plant is becoming a prototype for other housing developments the Navajo are building on the reservation.

Using 21 monitoring sensors embedded within the structure, we monitored the energy usage for one full year. Trying to decipher the erratic energy consumption patterns and higher-than-expected water usage after the first few months, one of our architects visited the family—to discover an electric cord trailing from the Augustines' home to another neighboring house. Their neighbors had no electricity and so were piggybacking onto the new home. Children and grandchildren in the community were taking hot showers in the home; neighbors (all whom were Augustines' kin) were using the washing machine instead of the hand-laundering that they had always done. We had designed the home for the family, but being the nicest, most spacious, and accommodating house in the area, it became not simply a single family's home but a community resource. Creating a better environment in which to live in this community with few resources resulted in certain behaviors that, in part, sabotaged our initial energy-savings calculations—but provided a home that could sustain a more comfortable life for extended kin living in the community.

Looking at the complexities of how people use and live the buildings we design and construct is a challenging and nuanced art and science. And not simply when we look at the residents but also other populations impacted by our building efforts. In a *Metropolis* article, "The Ethics of Brick," Lance Hosey reminds us that the U.S. building construction industry helps power the economies of extremely poor people in developing countries—those outside that LEED recommended 500-mile radius. Restricting materials derived from these poorer countries may cut down on fuel emissions from transportation in our communities, but reversely have long-range economic and survival consequences for those living on the edge in poverty-stricken areas.

Vivian Loftness and her colleagues at Carnegie Mellon University's Center for Building Performance (CBP) contend that sustainable and green design is, at its foundation, simply healthy design. The center has paid particular attention to the human health issues involved in architecture's sustainability agenda, drawing attention to health as an all-encompassing design issue. But as we better understand the complexities of human systems, we need to continually revisit standards—performance measures, if you will—of sustaining healthy human development. Some human health and development issues that are not so clearly identified in the CBP practices, for example, are those of children's development: cognitive, social, and motor, as well as physiological which most green building guidelines address in terms of toxins and respiratory ailments. If sustainability addresses the present to ensure the future, the developmental needs of children need to be front and center, particularly in those environments where they spend an inordinate amount of time: schools, homes, and neighborhoods. Inclusive health considerations for all our populations need to be an integral part of our rhetoric and advocacy of sustainable design.

There are other commendable efforts occurring intended to broaden the sustainable mission of the profession. The emerging SEED (Social Economic Environmental Design) Network plans to develop a method for evaluating design work based on principles of social equity, inclusiveness, voice, local capacity-building, and natural resource conservation. But in general the profession as a whole has not embraced this more inclusive approach to sustainability. Simply consider the use of green building standards for homes. I am not sure how many architects involved in housing and residential design have looked at the report by the National Center for Healthy Housing, *Comparing Green Building Guidelines and Healthy Homes Principles: A Preliminary Investigation*. (I queried the four architects in my Center about it, and none of them had.)

In gauging the extent to which green building residential guidelines addressed health and safety hazards, the National Center for Healthy Housing (NCHH) compared five major national green building and indoor air quality guidelines with a set of recommended healthy housing criteria. They included guidelines produced by public and private sectors: US Green Building Council's LEED for Homes; the National Association of Home Builders' NAHB Green Home Building Guidelines; Enterprise Community Partner's Green Communities Criteria; the U.S. EPA's Energy Star with Indoor Air Package; and the American Lung Association's Health House Builder Guidelines. The NCHH researchers compared each agency's green building guidelines with NCHH's set of health standards for homes, standards that were developed by a group of national experts under a cooperative agreement from the Centers for Disease Control and Prevention (CDC). These seven Healthy Homes principles are uncomplicated: keep it dry, clean, well-ventilated, pest-free, free from contaminants, safe (from physical hazards), and well-maintained (the performance standards of these seven principles are detailed further in the report). Some critics contend that these criteria are not inclusive of health concerns, that there are other conditions that make a healthy home, such as the absence of violence, diminished sources of stress, sufficient and appropriate environmental stimulation for child development, and so on. But clearly these seven are a well-established, solid list.

The comparison between the green standards and the Healthy Homes principles are detailed and well-documented. The chart to the right, taken from the report, summarizes the comparison between the guidelines of the 7 different programs and the healthy homes principles. Most programs had guidelines for reducing moisture, improving ventilation, and providing instructions for continuing maintenance. Injury prevention was absent from all programs. Protection from containments, such as lead and pesticides, varied across programs. Only one program, Green Communities, focused on affordable existing housing, an important consideration since low-income families are disproportionately impacted by housing-related health problems.

Table 3. Comparison of National Green Building Program Guidelines with Key Healthy Housing Principles

| Healthy and Affordable Building Principles | LEED for Homes | NAHB Green Home Building Guidelines | Enterprise Community Partners | EPA Energy Star with Indoor Air Package | American Lung Association |
|--|----------------|-------------------------------------|-------------------------------|---|---------------------------|
| KEEP IT DRY* | ● | ○ | ● | ● | ● |
| KEEP IT CLEAN | ○ | ○ | ○ | ○ | ○ |
| KEEP IT WELL VENTILATED | ● | ○ | ● | ● | ● |
| KEEP IT SAFE | ○ | ○ | ○ | ○ | ○ |
| KEEP IT FREE OF CONTAMINANTS | ○ | ○ | ○ | ○ | ○ |
| KEEP IT PEST FREE | ○ | ○ | ○ | ○ | ○ |
| KEEP IT WELL MAINTAINED | ● | ● | ● | ● | ● |

* Replaced with the Healthy Housing Building Code.

Clearly the emphasis and inclusiveness of the goals of the green building

guidelines and those of health-related housing standards are contingent upon the mission and constituency of the organizations that develop them. When I see architects running through their designs to see if their point tally will get them silver or gold, or when I see architecture students mindlessly using LEED standards as their design template, I wonder if our efforts to encourage green practices by developing and perhaps even glamorizing widely available guidelines are pushing the profession and schools to adhere to these standards without critically thinking through the assumptions behind them. Recognizing human as well as geographic diversity and the political interests underlying guidelines means that the stewardship role of architects and the educative role of architectural educators demands us to pay attention—at the very least to continually question how the standards are constructed and if what they strive towards sufficiently addresses sustainability in its broad sense.

What steps can we take?

1. Unfortunately the design professions—architecture, interiors, industrial, landscape—have not developed a sufficient, well-documented knowledge base that addresses these concerns. We do not have the type of comprehensive, well-developed, and accessible performance criteria for social and economic outcomes as, for example, LEED guidelines have put together. In this regard, we practice based on very limited research. The profession needs to tangibly encourage and support more research and post-occupancy evaluations, on which evidence-based practices can feed, not simply in the health-care design arena where evidence-based design is emerging but across all building types and industry efforts. We need to focus on measurables and outcomes that include not only energy and conservation ratings but human and community economic health conditions as well. Establishing return-on-investment (ROI) of specified design and building efforts could make these practices convincing to policy makers and building owners. The BIDS (Building Investment Decision Support) tool being developed at Carnegie Mellon's CBP identifies soft (e.g. health, productivity) and hard (e.g. rent, energy) life cycle costs of high performance building systems. Too, the design professions need to develop creative and strategic avenues on which research information can be effectively disseminated to the design communities. One possibility is documenting evidence-based best practices.

2. Addressing the triple-bottom line can only be effective if it is a collaborative effort. Take for example the practices of affordable housing which extends beyond creative design and financing efforts. Understanding the sustainability of these homes means understanding the lives lived in and surrounding these homes and how best to foster healthy and productive social and economic growth to sustain and enrich them. Collaborative practices, and thinking more comprehensively of what we mean by sustainable design, may frighten some architects. Such efforts may lead to solutions where new construction is not the most viable, sustainable outcome. Consider our efforts in addressing the negative consequences of build-out and sprawl. As Dolores Hayden maintains, "Housing is tied to the political economy. Better architecture cannot, in itself, change the larger patterns of social and economic exploitation developed by growth machines which profit from round after round of fringe development. If the United States is to become a more sustainable and more equitable place, older suburbs have to be saved rather than abandoned on the way to new projects." Also advocating a more inclusive orientation to developing sustainable communities, Michael Pyatok, FAIA, a leading architect of affordable housing in this country and executive director of the ASU Stardust Center, has challenged the profession to reconsider what we claim are some of our most successful architectural accomplishments in affordable housing:

"It is often argued that the dramatic removal and rebuilding of communities is what the poor also want. But what choices are given? If, instead of a new HOPE VI unit that may cost up to \$250,000 to develop, a family were offered an alternative in the form of a minor code rehabilitation of its existing home accompanied by an annual grant of \$25,000 for five years (taken from the annual interest on \$250,000 to create an educational trust fund for their children), which would that family choose? A family may reside in the newly built unit for five years; maybe for a decade as its gets older and more worn. What is the asset life span of a quality education? A lifetime."

A lifetime. Generational growth of healthy lives and communities. The foundation of sustainability.

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