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Falling Water is one of the most famous homes in the world due to its biophilic elements, argues Bill Browning. Rather than providing a safe, remote view of the waterfall, the house is positioned so that the water engages all five senses.

Green Is Beautiful

Beauty, place-making, and even love are motivating many green designers, who see these values complementing core sustainability tenets.

By Paula Melton

In the movie *Monsters, Inc.*, the title characters extract the energy needed to run their city by sneaking out of closets in the night and making human children scream. But the novelty is wearing thin, and as the children become less scared, the community's power supply is threatened. Our monster heroes, whose true nature is more goofy than scary, end the crisis when they discover that human laughter provides ten times the energy of a scream.

Sustainability-focused designers never intended to make people scream, but inspiring joy has not always been front-of-mind for clients in an industry where economics rather than ergonomics is the prime mover. And with many project teams working hard to push the envelope of energy perfor-

mance, an "added" focus on beauty, wellness, or happiness has often gotten short shrift.

"The emphasis on technology rather than what we need to do to make this a really good habitat for people," is a huge part of the problem for the sustainable design community, argues Judith Heerwagen, Ph.D., environmental psychologist and affiliate faculty member at the University of Washington. While she was interviewing the occupants of one award-winning green building, she told *EBN*, "People said it was like a beautiful corpse. It was so technologically focused; it wasn't humanized in a way that they felt was pleasant and sensory."

Savvy designers are finding ways to create allure that dovetail not only with energy and water performance but also with tight budgets. "Post-re-

cession, we're looking for high design but good value," notes James Timberlake, FAIA, co-founder of KieranTimberlake. "To the extent that the climate allows us to do it, we're also making buildings simpler" by exploiting passive design principles and other low-tech strategies. "I think clients appreciate that because they're not spending money on architectural fetishes" that don't also provide functional benefits.

In this article, we'll explore several ways in which the green building community is trying to bring joy back to architecture—with design solutions that also enhance the durability and performance of buildings and neighborhoods.

Sensory Delight

"Beauty—no matter what anyone says—is still in the eye of the beholder," opines James Russell, FAIA, architecture columnist for Bloomberg and the author of *The Agile City: Building Well-Being and Wealth in an Era of Climate Change*. "There will never be a perfect consensus on what counts as beautiful."

Perhaps not, counters Lance Hosey, AIA, but the chief sustainability officer at RTKL and author of *The Shape of Green: Aesthetics, Ecology, and Design* ([see our book review](#)) defends his use of the word throughout his book. "While reams of literature have been written about beauty and how to pin it down, in my book, I define it simply as 'sensory pleasure,'" he explained to *EBN*. "I believe that we can't fulfill the full promise of sustainability without embracing sensory experience."

On this, Russell can agree: "If you build a fortress and put solar panels on top of it, it's a failure as a green building and a failure as a building."

But Hosey goes deeper in his critique of sustainable design.

Not only have we sometimes left beauty behind, he argues, but the industry hasn't necessarily embraced a new paradigm where sustainability isn't an add-on to design but rather a whole new way to create beautiful forms. "Originally, the concept of sustainability promised to broaden the purpose of design by adding ethics to aesthetics—but instead, it has virtually replaced aesthetics with ethics," he says. "It's not enough just to make sustainable design aesthetically pleasing. The most exciting opportunity for designers is to erase the difference between how something looks and how it works."

Although neither commentator believes that beauty can be attained by ticking boxes, Hosey asserts that there's promise in the work of researchers like Heerwagen. "Over the past decade or two, science has revealed more and more about how the brain and body react to certain images, shapes, spaces, colors, and patterns," he says. "All of this is just geometry, geometry is just math, and math, by definition, is quantification." Hosey adds, "I believe we're on the verge of a revolution in the science of design, and the only thing holding it back is designers' willingness to rely on more than intuition alone."

The beauty petal

Quantifying beauty does *not* come into play, however, in the [Living Building Challenge](#) (LBC)—the stringent green building rating system that requires net-zero energy and net-zero water in addition to beauty and other "petals." In fact, "mandating beauty is, by definition, an impossible task," version 2.1 of the standard says. In contrast with the rest of LBC, the beauty petal is explicitly about intentions rather than proven performance.

"We're not intending to define for people what is beautiful," says Amanda Sturgeon, FAIA, vice president of the Living Building Challenge. "It's actually about starting that dialogue for people to make sure that beauty is in

the forefront of their minds." She adds that, somewhat counter-intuitively, "it's not about aesthetics." Sturgeon admits the petal is often misunderstood but says that's not necessarily a bad thing: "Ideally, it can open up the dialogue to be less about expressing an ego and more about how this building can emerge from the sense of this place, this culture" and provide sensory pleasure to occupants.

She noted two contrasting examples of beauty and how it aligned with other design goals in living buildings: a wraparound roof "becomes a hill" to

protect the rural [Hawai'i Preparatory Academy Energy Lab](#) from strong trade winds while still permitting natural ventilation and vistas, she notes, while the "[irresistible stairway](#)" in the urban Bullitt Center invites people to bypass the energy-intensive elevator while connecting them with one another and to the metropolis of Seattle. "I didn't realize how strong [the connection] would be when you're actually in that stair," she says (her office is in the new building, which is aiming for LBC certification).



Photo: Ben Benschneider

The new science wing at the Bertschi School in Seattle features beautiful, student-inspired elements—like this indoor living wall, which doubles as a graywater filtration system. Such features also helped the project meet performance requirements for Living Building Challenge certification.

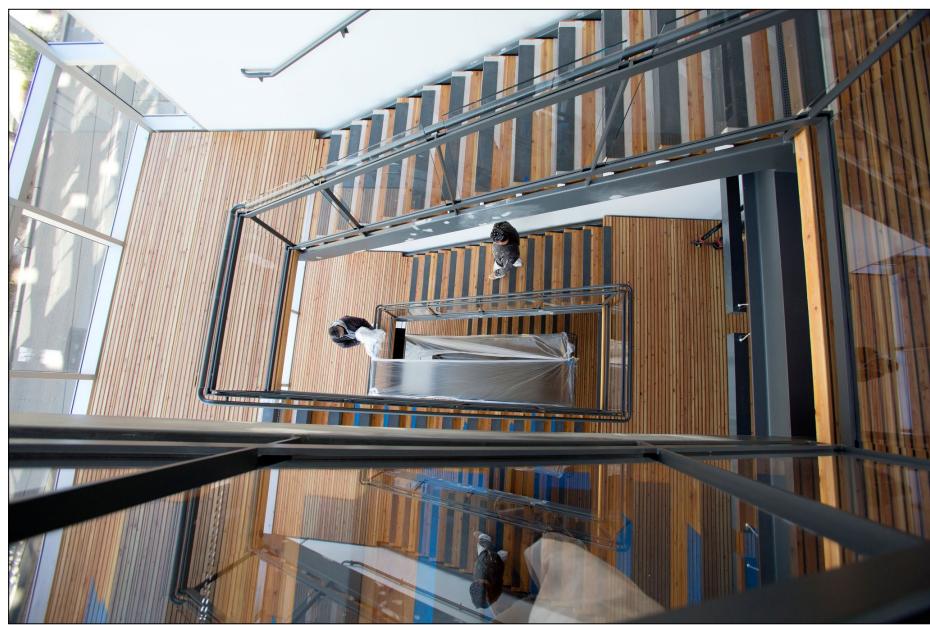


Photo: Copyright Sian Hayes for the New York Times

Dubbed the "irresistible stairway" by Denis Hayes of the Bullitt Foundation, this feature of the Bullitt Center connects occupants with one another and with the city while also saving energy and promoting health.

Alicia Daniels Uhlig, principal and director of sustainability at GGLO, confirms the power of the beauty petal to make sensory delight part of the discussion—"so teams aren't saying, 'Yeah yeah yeah, it's that beauty thing, it's going to take care of itself.'" GGLO provided landscape architecture for the Bertschi School Living Science Building (certified "Living" in April 2013). "If you put it on the checklist, it matters," she says. "You might not be measuring it, but it's part of the discussion, and how does that help you achieve all these other performance goals?" In this project, those achievements included a stream running through the classroom (also a graywater tunnel) and an interior living wall (also a graywater filtration system).

A Focus on Wellness

Human health has been part of sustainable design from day one—expressed most directly as indoor air quality, though the foundational principles of green building, like preventing smog and CO₂ emissions, also aim to protect us from major downstream health consequences.

What's new in the last few years is an attempt to broaden the conversation to include wellness (rather than

simply the absence of sickness) and to measure the success of once-ineffable qualities like happiness and creativity.

Biophilic design

Many advocates of *biophilia* (the innate love of nature) in design argue that certain natural forms and patterns are universally recognized as beautiful. (See "[Biophilia in Practice](#).") As Bill

Browning, Hon. AIA, puts it, biophilic elements represent "survival value." Clean water is healthy, says Browning, the founder of sustainability consulting firm Terrapin Bright Green, and a flower "is indicative of a healthy ecosystem and is frequently the precursor of food."

Not everyone is convinced. "I think biophilia being beautiful is highly overrated," objects Lloyd Alter, managing editor and design critic at Tree-Hugger.com. "There are some awfully ugly fish around, and insects give me the creeps sometimes. I think that [designers] tend to pick and choose what they like and call it biophilia."

A fair critique, perhaps, and one the biophilia movement is trying to move past by measuring human responses to natural colors, patterns, and other features. It isn't always easy, though, says Heerwagen; many studies clearly show a positive reaction, like decreased cortisone and lower heart rates, but scientists can't always narrow down what it is about these forms that reduces stress. Still, she notes, we're pretty sure that "daylight and views are a huge part of this, and without those, it's really hard to make a space biophilic."

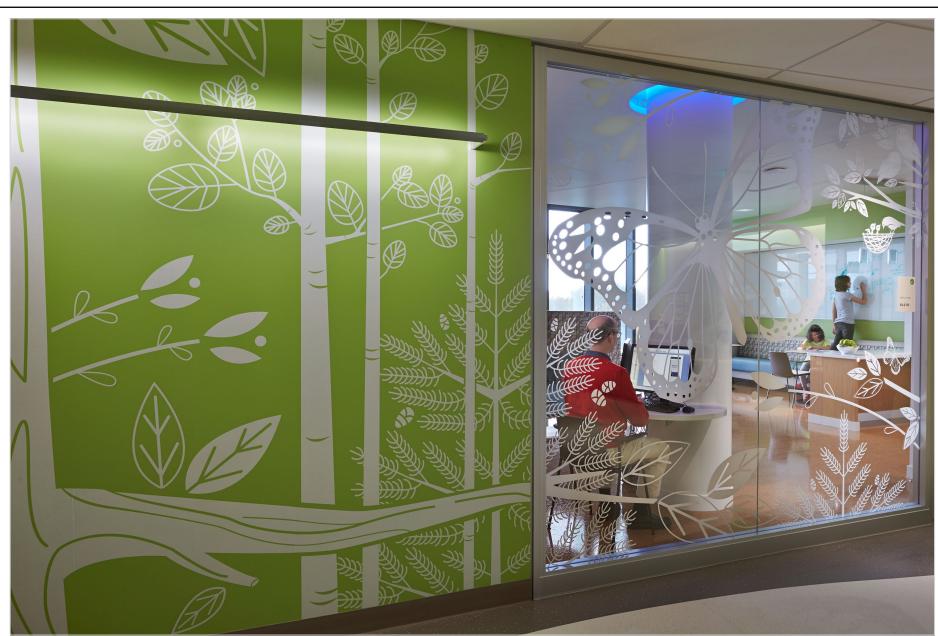


Photo: Ben Benschneider

A forest motif graces both opaque and glass partitions throughout the Seattle Children's Hospital. Biophilic design typically does not include literal representations of nature, but this motif was appropriate to the setting and provides a "positive distraction" to reduce stress, according to designer Anita Rossen.

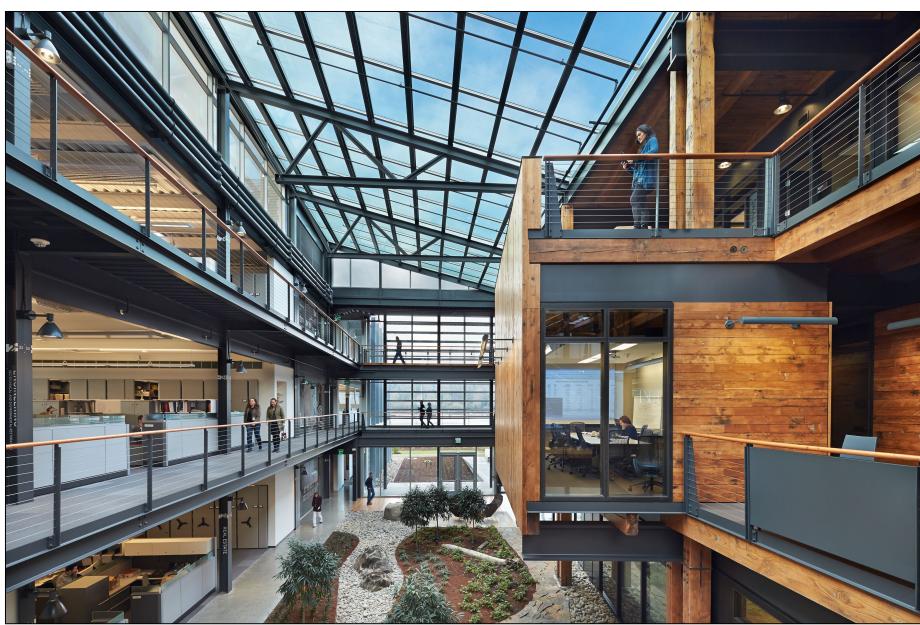


Photo: Ben Benschneider

The ZGF-designed Federal Center South had to meet tight contractual energy requirements, re-purpose an existing timber warehouse on the site, and many other challenges. The project team turned the challenges into opportunities with a human-centric workplace design that features a spectacular atrium with live plants, ample daylight, and 200,000 board feet of reclaimed wood.

Working with Google (see “[A Peek Inside Google’s Healthy Materials Program](#)”), Terrapin Bright Green has developed what Browning calls “a pattern language for biophilia”—14 design principles that Google can use to promote wellness in its workplaces (and which may eventually be adopted into the biophilia petal of the Living Building Challenge). Among these are concepts like *prospect* (the desire to have a long view), *refuge* (the need to feel sheltered), and *mystery* (the compulsion to see what’s around the corner), along with non-rhythmic sensory stimuli, dynamic changes in airflow and daylight, and varying levels of complexity and simplicity.

Heerwagen cautions that biophilia shouldn’t be an excuse for ecologically inappropriate design elements. “Just look at Las Vegas and their use of water in the desert,” notes Heerwagen. “It’s just appalling.” She contends that a good designer can create a biophilic space in a windowless room.

In fact, bringing daylight into buildings is one of the trickiest elements of biophilia. Although it appears to integrate beautifully with other sustainable design goals, saving lighting energy, it’s easy to do wrong, causing discomfort, glare, and unwanted heat

gain (see “[Doing Daylighting Right](#)”). There’s also some question, according to Heerwagen, about “whether we can use daylight not only as a psychological benefit but also as a health benefit” (research suggests that the amount of daylight needed to affect circadian rhythms is much greater than the

amount needed to illuminate a work area).

Hosey also laments that daylighting can cramp designers’ style, asserting that our current use of daylight may not even be that biophilic. “The conventional approach to daylighting has stunted architecture,” he claims. “Many green buildings look alike, regardless of location and function, in large part because they share a similar goal with daylight—to flatten it.” Because we require “consistent light levels” to support open office plans and a certain type of workday, he continues, “the typical green building lacks the rich mystery of the most inspired architecture because it is intentionally monotonous—not too bright, not too dark. But the eye craves variation, and it’s unnatural for us to limit its exposure to monotonous light.” He believes architects can provide abundant, dynamic daylight in any space—and that a less monotonous workday wouldn’t hurt.

Human-friendly workplaces

Indeed, evidence is mounting that workplace happiness is a function not only of the work we do but also of how building design supports and



Photo: Tim Griffith

The KieranTimberlake-designed Keeling Apartments at the University of California–Santa Barbara take advantage of a mild marine climate to meet performance criteria through natural ventilation and lighting—the latter attractively filtered by the fiberglass screens shown here. With views to the ocean, rooftop gardens, and many ways to connect with fellow residents, the apartments have become one of the most popular places to live on campus, according to James Timberlake.



Photo: Ben Benschneider

This "quiet room" at Seattle Children's Hospital provides natural light and views in a setting that is also free from the facility's intercom announcements.

improves our ability to work well. Although many in the sustainable design community view human health and wellness as ends in themselves, these goals are difficult to argue for unless they also energize clients' bottom lines. Fortunately, according to Gail Borthwick, AIA, design director at Gensler, they do—making a focus on this aspect of interior architecture a budget priority for forward-thinking employers (especially those who face high, costly turnover rates).

"Employee staffing costs are 86% of your operational costs—much bigger than energy," which Borthwick says amounts to only 8%–9% of costs for many companies. "If you can work on recouping that a little better, you've done a lot more than putting in a high-efficiency HVAC system." Through its periodic U.S. [workplace surveys](#), Gensler has compiled data about how employers can achieve this, and she says the main point is to reduce so-called *presenteeism*, meaning "people are at work but not actually working," according to Borthwick. "That is actually the biggest cost of the unwell to employers. 58% is presenteeism and 7% is absenteeism," she continues. "If you can put strategies in place to reduce that, that's a huge amount of money that employers save."

Solutions may include something as simple as free, abundant drinking water, but the main point is to provide choices, according to Borthwick. Design teams can promote this by arguing for the importance of "spaces where you can collaborate but also spaces to focus." Good air and light quality, the ability to find quiet, and a measure of comfort and lighting control go a long way toward supporting workplace performance—as Borthwick puts it, "creating spaces where innovation happens."

Although innovation doesn't require biophilia, a recent project from ZGF for the U.S. Army Corps of Engineers (USACE) exemplifies both biophilic and human-centered workplace design—along with top-notch energy performance—accomplished on a slender government budget. "Everything about the design had to solve multiple problems," explains Dan Simpson, principal at ZGF. Challenges like a contaminated industrial site for Federal Center South led to opportunities like live plants in the building, which designers claim will help clean the indoor air (some research has challenged the notion that typical indoor plantings can have this effect; see [Bringing Nature Indoors](#)). The spectacular, park-like atrium originated as a way to provide daylighting as

well as use the stack effect for passive ventilation. And the rich, weathered wood that defines the interior, beloved of the engineers and other scientists who work there, fulfills a contract imperative to reuse or repurpose an existing warehouse from the site.

The building's very form came about, in fact, because of energy goals. Referred to as "the oxbow" because of the nearby river and to echo the nature of USACE's work, the curved shape "creates the social heart" of Federal Center South, says Chris Chatto, Assoc. AIA, associate partner at the firm. But that might not have happened without the ultra-low modeled energy target required by the contract. Although the project team originally envisioned an atrium with a full-on westward view from the building to the river, "it became clear that a building that maximized the view to the west would create an energy penalty," he told EBN. By curving around the atrium instead of opening to a vista, the building conserves energy. The oxbow form also mirrors the river's form. "It was a great synergy."

Evidence-based design

In healthcare, the benefits of biophilia have been recognized for a long time (see ["Hospital, Heal Thyself"](#)) because it promotes healing; together with other strategies, certain biophilic principles are called *evidence-based design*. More recently, hospitals—which must constantly battle staff burnout—have integrated evidence-based design with human-centered workplaces. An unusually "lively and interactive space helps staff make it through their day with a little more joy," notes Chatto of a new wing in the Seattle Children's Hospital, another recent ZGF project.

As a children's hospital, the building liberally employs literal representations of nature in addition to abstract references of the kind more common in an office setting. "The concept for the building was the forest," explains Anita Rossen, an associate at the firm. Interior glass partitions allow daylight to penetrate deep into the building, give a sense of transparency and openness, and provide a canvas for

a forest motif that “supports positive distraction and reduces stress,” Rossen says. “It’s not just a picture of a leaf on the wall”—a common and inexpensive way to express “biophilia” in an otherwise conventional hospital building. “Because of the way light interacts with the graphic, there’s an ethereal quality you get out that makes it more dynamic.” The design also foregrounds sweeping views through narrow floor-to-ceiling windows, uses lighting timers in public spaces that “mimic circadian rhythms,” and offers full control of lighting (including color-changing LEDs that children can play with) in inpatient rooms.

Rootedness and “Rightness”

Feeling rooted is not a purely sensory experience like beauty, but a sense of “rightness” in a building or neighborhood can contribute to individual and community well-being. Not surprisingly, a building inspired by and rooted in its place—whether through an optimized orientation on the site, a climate-appropriate form, or locally sourced materials—has a good chance of operating more efficiently and enjoying a longer service life.

“I’ve found that most places with strong character have evolved around environmental conditions,” argues RTKL’s Hosey, “so respecting that character means responding to the environment sensitively. There are reasons why buildings look different in Nantucket, Santa Fe, and Charleston, and their architecture has evolved



Image: HOK

China’s government requires that all living units provide a certain number of hours of daylight to residents. This typically leads to a “monoculture” of tall towers, says Tom Knittel, but by mimicking forest layers, HOK was able to meet the requirements while also creating a more dynamic and pleasing design that includes 50% open space.

in large part around local climate, materials, and culture.”

That doesn’t mean we should try to replicate [the vernacular architecture of the past](#), but there’s a lot we can learn from it, notes Russell. Architects helping rebuild in New Orleans after Hurricane Katrina, “were very enamored of the shotgun house,” he says, but the style, consisting of a long column of rooms that open one into the next, doesn’t take modern sensibilities about privacy into account. “People are not going to accept that today,” he asserts. “Vernacular is a starting point. In very positive ways, a lot of [buildings after Katrina](#) learned some very valuable lessons and applied them in a more modern context.”

Biomimicry—Studying local ecosystems

Vernacular architecture is just one way of responding to the local climate. The biomimicry movement attempts to go deeper, studying how local ecosystems work and adapting those strategies for buildings. By mimicking the resource-consumption patterns of local

habitats, the theory goes, we can make a smaller impact on the environment.

In the recent *Genius of Biome* report, HOK and the [Biomimicry 3.8 Institute](#) “developed a way to think about how our manmade challenges are very similar to challenges that nature has already solved for so many organisms over time,” explains Tom Knittel, AIA, senior designer and biomimicry expert at the firm. Biomimicry, in his view, “gives us a process, a database of biological functions that is there for our taking.”

Biomimicry can be expressed in the building’s design—or not. For a recent project in Brazil, HOK worked to balance rainwater collection in the same way as the nearby rainforest: using 50% for the building’s own needs and releasing 50% back to the ecosystem. Upon hearing the design concept, the clients asked to have this aspect of the design “manifest in the building,” Knittel relates. “We were specifically asked to generate a building that was inspired by nature in addition to trying to fit into a place according to how the natural system functioned.”



Photo: City of Toronto. License: CC BY 2.0.

Many view the controversial “Crystal” addition to the Royal Ontario Museum as a successful artistic statement, but it fails at place-making, argues Kaid Benfield. “It’s not beautiful, it’s not lovable, and it desecrates a historic building,” he says. “Everything about it is wrong.”



Photos: Lara Swimmer (top), Corey Leamon (bottom)

To most people, these filters from old beer vats would look like scrap metal. Lake | Flato made them into a striking design element that invites visitors to encounter the rich history of this adapted brewery.

Other projects may use nature's principles without expressing them as such, but the unique forms can still generate opportunities to invite and inspire. The Chinese government mandates daylighting in residences, says Knittel, a good idea that can unfortunately "lead to a monoculture of towers." To mimic different canopy layers of a forest in a recent multifamily complex, "we created some slender towers, a series of midrise buildings, and a series of low-rise buildings," he told EBN. Because of its form—and to support the wastewater system—the project also includes 50% green space

that residents can use as parkland and bike paths.

Cultural heritage

Biomimicry isn't always the greenest answer, though, argues Lloyd Alter. In the old days, he asserts, designing beautiful, durable buildings was more straightforward because there were "plan books and guidelines: you studied the *Beaux-Arts* and had a sense of proportion." If we're not master designers and builders, he contends, some visually stunning, biomimetic forms can merely "make a million new

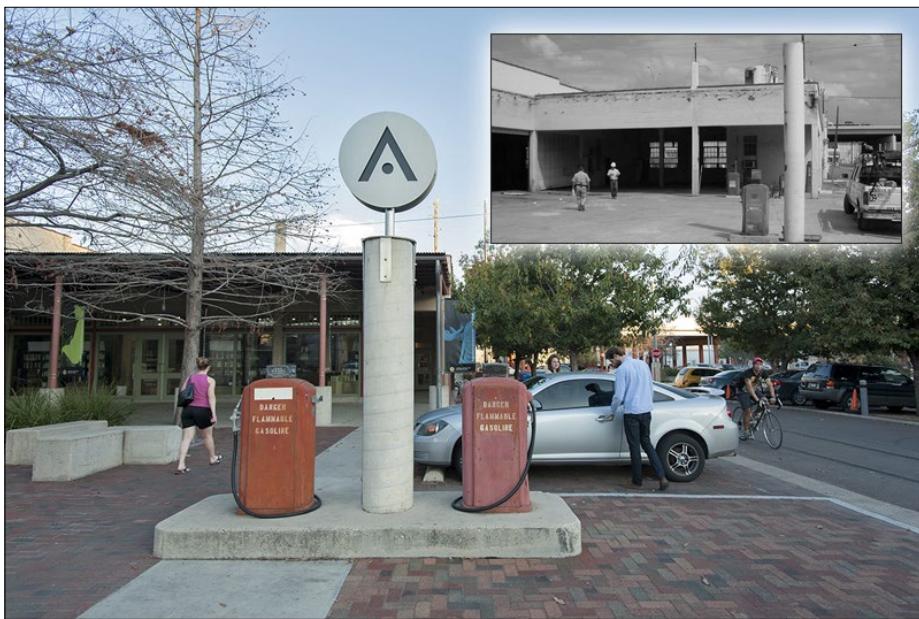
places where eventually the caulking's going to dry out and leak." Alter argues for practical but not-always-fashionable features—"overhangs and windows that don't fill a whole wall"—concluding that "traditional rulebooks are better than these new rulebooks."

Although most contemporary architects wouldn't go that far, it's clear to many that older buildings can teach us a great deal about both performance and aesthetics (see "[Historic Preservation and Green Building: A Lasting Relationship](#)").

"A willingness to embrace and redevelop and utilize the energy stored up in old structures is one of the most important things that architects need to learn," contends Robert Harris, FAIA, partner at Lake | Flato. "Not everything can be a brand-spanking-new, fresh idea that just came out of their own heads." Harris doesn't necessarily advocate going back to the "old rulebooks," but he does recognize beauty in "the way the city has developed; it's a reflection of that place and that community."

With the firm's [Pearl Brewery](#) project—which repurposes a historic beer-brewing site as mixed-use commercial and retail—explains Harris, "our goal is to honor that collective wisdom and also to make it relevant to today and take into account those conditions of comfort" like the need for fresh air and light. One small interior detail exemplifies the project's entire philosophy: huge industrial beer-vat filters, now a "useless technology," were re-purposed as dramatic light fixtures. "People look at them and wonder, 'What is that?'" Harris told EBN. When they learn the history, "they connect to that, and it becomes aesthetically beautiful."

Although an advocate of biophilia, Harris says the main expression of nature in this project involved adding clerestories to bring daylight into a formerly dark space. "We need to use materials that are economical, durable, and appropriate to the area," he argues. You might not want to curl up with bricks and corrugated metal in



Photos: Corey Leamon, Lake|Flato (inset)

Starting with the assumption that most existing buildings can and should be preserved, Lake|Flato made this gutted service station (inset) into a thriving, walkable retail block that celebrates the neighborhood's industrial heritage.

your lap, he jokes, but these materials "honor the industrial past" of this neighborhood, reuse existing materials, and provide "the right cost-value equation." And that, claims Harris, makes them beautiful.

Place-Making: Promoting Joy

In addition to responding to place, buildings must also *create* places. Developing a built environment centered around people—rather than around roadways and parking lots for cars—can promote joy. It can also make sense.

"Before the age of the automobile, neighborhoods looked very different than they have since," states Kaid Benfield, special counsel for urban solutions at the Natural Resources Defense Council. "[Places are unwalkable, people gain weight](#), and we have more diabetes when we start designing places for cars first rather than for people first." On the flip side, people-first neighborhoods can reduce the environmental and air-quality impacts of driving and vehicular infrastructure.

"Whom does design really serve?" asks Fred Kent, founder and president of the Project for Public Spaces,

[in a recent blog post](#). While exploring Sherbourne Common, a new Toronto waterfront park, he notes, "Everything is placed just so, in a way that has created an environment so totally uninviting and ignorant of how human beings want to use public space that I knew, within moments of arriving,

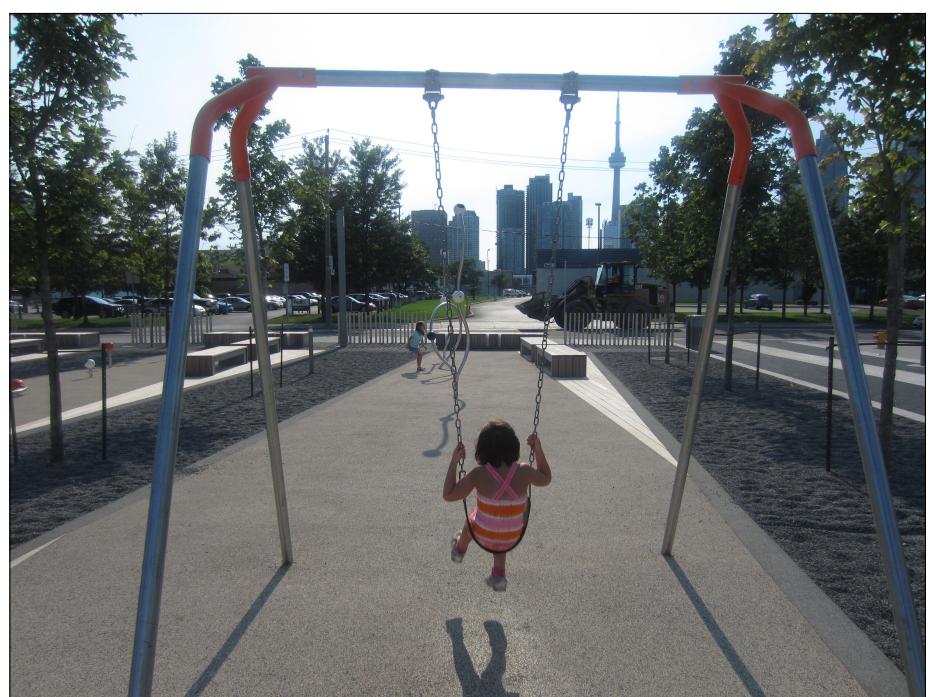


Photo: Amy Brown. License: CC BY 2.0.

Sherbourne Common has won design awards, but urban planning critics contend it will have a harder time winning hearts. Elements like this lonely swing amid expanses of concrete and gravel make a statement but do not encourage play.

that what I was seeing was undoubtedly an 'award-winning' design. ... Watching the handful of youngsters that were there trying to play on aimless gravel strips and concrete steps was almost painful."

Good "place-making"—the art of creating inviting public spaces for communities to share—may be as hard to mandate as beauty. "The idea that somehow you can codify this into something, and if you check all the boxes, you've done place-making, I reject," says James Russell. Yet good place-making is an essential function of building architecture, interior architecture, landscape architecture, and urban planning. How to do it right?

Community engagement lays the groundwork, says GGLO's Uhlig. "Of course, people talk about community engagement a lot, and we've all seen successful and unsuccessful examples of that," she remarks. But well done, engagement produces a "common vision"—and without that, she says, "it's really hard to create these neighborhoods and turn these spaces into actual places."

Once there's a common vision, good urban and landscape design still have to do much of the heavy lifting. In a multifamily project, Bridges at 11th, Uhlig explains, "we were really pursuing this idea of more permeability of the site, activating the street edge, and creating opportunities for healthy living." The project, which takes up almost an entire city block, is three buildings instead of one, with a number of front stoops at the street level as well as a mews between buildings to encourage neighborly gathering as well as safety. Other amenities—like a cycling club where people can tune up their bikes, rather than a simple storage area—promote the same goals.

Integrated design supported the project. "We sit in project teams, so that you'll have an interior designer sitting next to a landscape architect sitting next to an urban planner. We're thinking of these spaces as outside rooms—not the empty space left over." Uhlig hopes this will lead to longevity: "If the design doesn't support a healthy lifestyle, people don't love it. People are more likely to steward these neighborhoods over time."

And that's key to sustainability, argues Benfield: "If it doesn't work for people, it's never going to work for the planet. If it's not literally sustainable, it's not going to be environmentally sustainable."

Lovable Buildings?

"What's love got to do with it?" asks Tina Turner.

Everything, answers architect Steve Mouzon.

"Architects want to talk about beauty as the standard," says Mouzon, also the author of the [Original Green blog](#). "Beauty is good, but beauty has problems. The fact is, there are so many ways of defining beauty, but beauty is an academic exercise. When architects debate, it very quickly gets lost in the esoteric." The word "love," though, is "completely unprofessional," and Mouzon uses it to be provocative. "Architects have some kind of a convulsion" when you suggest that buildings



Images: GGLO

Bridges at 11th, which will take up almost a whole city block, is designed to promote community at every level, from multiple front stoops to sky bridges between buildings to help residents stay connected. Regarding landscape and urban design, says designer Alicia Uhlig, "We're thinking of these spaces as outside rooms."

should be more lovable, he claims, but for virtually everyone else, "the vote would be almost 100% to zero that people want more lovable buildings."

The profession better wake up about love, he contends, because "our survival—maybe even as profession, but certainly as individual practitioners—depends on how much we realize what is changing." He likens this shift in thinking to the move away from ice and toward refrigeration in the early 20th century, and he faults some architects for trying to impose their own aesthetic rather than listening and responding to what clients and occupants want. Sustainable buildings

come not from the ego, he suggests, but rather from the heart.

Other designers might not use the word "love," but it's clear there's a certain something that can be created but not measured—and designers do have an expert role in guiding that work when clients' states desires might work against their own goals, argues ZGF's Rossen.

"For the longest time, we have had clients who will ask for these wood-look sheet vinyls. They believe that the wood-look sheet vinyl looks like real wood, and it brings this warmth to the space." Rossen does not agree, and



Images: ZGF

Hospital clients want to get away from the cold, white glare of yesteryear—and designers can guide them toward a warmer and more inviting aesthetic, says Anita Rossen. These renderings contrast the sterile look with a more appealing combination of dark and light tones, direct and indirect lighting, and other contrasting features that mimic what nature provides—without resorting to faux-wood products that ultimately would not have the desired effect.

she suspects her clients would come to regret the choice of faux wood once it was installed.

Rossen says she offers what she believes her clients are actually looking for, beyond a type of material or a surface pattern. To demonstrate her point, she shows them pictures of a cold, white hospital hallway in contrast with one that “replicates qualities of nature,” starting with “a darker, saturated color on the floor plane and a combination of direct and indirect light to eliminate the glare on the floor.” There are no regrets, she says. “After it’s installed, they say, ‘Yes, I get it!’”

Whether you call it love, joy, humanism, beauty, or “getting it,” there’s an

emerging consensus that our buildings must serve the people who inhabit them. While that might once have gone without saying, it’s gone without saying for so long now that some projects simply aren’t doing it—and more and more designers argue that it’s the job of the green building community to push back, working with their clients to develop designs that simultaneously serve not only economic and energy needs but also human ones.

“If we can shift the dialogue about design to focus more and more on how buildings can create value for the communities they serve—both human and ecological—everything changes,” argues Hosey.

Harris echoes these thoughts and adds, “In sustainability, unless we can inspire people and create things that they find elegant and beautiful, then we’ve missed the boat.” Sustainable design, he contends, “shouldn’t be seen as a counter-culture or a counter-aesthetic. It is higher culture and a higher aesthetic; they have to go together. If we don’t do that, then we can’t make the change we need to make.”



NEWS

Green Globes Board Member Quits Over ANSI Claims

A disgruntled technical committee member suggests the new Green Globes tool has not gone through the consensus process, a claim GBI rebuts.

By Paula Melton

Skirmishes over the validity of major green building rating systems continue, even as the [federal government recognizes Green Globes as on par with LEED](#). A board member of the Green Building Initiative (GBI), the group behind Green Globes, has quit over frustrations that Green Globes isn’t meeting its potential. [Harvey Bryan, Ph.D., FAIA](#), a professor at Arizona State University, has alleged that the newest version of the Green Globes tool contains questionable energy-performance goals and does not align with the associated ANSI standard, GBI / ANSI 01-2010 (see “[Green Globes May Be an ANSI Standard At Last](#)”), despite the ANSI process being used as a selling point for the tool.

“I fear that there were not enough eyes reviewing the new protocol to give it a proper technical review, which will challenge its credibility moving forward,” wrote the former board member and former technical committee member of GBI in a resignation letter he shared with EBN. “Erin [Shaffer], Ward [Hubbell], and I have spent considerable time in Washington informing all those who would listen

of the merits of an ANSI-approved green rating system, and now we have failed to deliver one."

GBI has dismissed Bryan's claims.

You say consensus, I say contentious

Green Globes' status as an ANSI standard is not a mere technicality.

GBI has argued since its inception that Green Globes is better suited than LEED for federal government use specifically because of the group's ANSI standard, and it claimed recently that it was finally bringing its online tool into alignment with the ANSI-approved document.

[Along with industry groups like the American Chemistry Council](#), GBI has also long claimed that LEED does not follow a "true consensus process" because it is not an ANSI standard; timber and vinyl industry groups have even appealed the recent LEED v4 vote on the grounds that the process didn't achieve consensus by resolving their objections, [as Stuart Kaplow has reported at the Green Building Law Blog](#).

As Erin Shaffer, vice president for federal outreach at GBI, has [told BuildingGreen](#), "We're the only organization that has put one of our tools through the ANSI process—a transparent, open, public process." (GBI's standard is the only one at least in part because ANSI's "[Essential Requirements](#)" include non-duplication of existing standards, so the U.S. Green Building Council would face an uphill battle if it wished to create a competing ANSI standard for LEED.)

Departures from the standard

Bryan's concerns about divergences between the ANSI standard and the new version of the Green Globes tool released in June 2013 primarily involve energy and materials. For energy, he told *EBN*, "They added two more paths" for compliance, which, along with other modifications, "changed the point structure significantly."



Images: GBI

Although the ANSI standard developed by GBI and the group's Green Globes tool were supposed to be aligned after the new release in June, a side-by-side comparison suggests they don't match up as well as their covers might suggest.

EBN reviewed both the ANSI standard and the freely available [Green Globes Technical Manual](#) and found that energy compliance paths and point allocations differ radically, with benchmarks from tools like [Energy Star Target Finder](#) and the ASHRAE [Building Energy Quotient](#) offering large numbers of points (see table). Also new: there are no minimum point thresholds—meaning that, in theory, a building could achieve Green Globes certification without achieving a single point for modeled energy performance. That's highly unlikely, but the ANSI standard requires a minimum of 100 points in the energy-performance category.

"I think there's going to be a lot of gaming involved, based on the way they added the two energy paths," Bryan lamented. "The point structure was very delicately constructed through negotiations, and the technical committee just changed it all."

He also pointed to the addition of [environmental product declarations \(EPDs\)](#) in the new tool—a reporting format that was not widely available in 2010, when the standard was first developed, but which has been gaining ground after being included in LEED v4. While he doesn't necessarily object to all the additions, Bryan ex-

plains, the rating system can no longer claim to be consensus-based since key elements haven't gone through public review. "Obviously, the technical committee did not quite understand that," he said. "You have to dot the i's and make sure you go through the proper protocols." He told *EBN* he'd argued for waiting until the 2015 ANSI renewal process had begun to make major technical changes.

"Nothing untoward"

Despite Bryan's complaints, Shaffer is adamant that the current Green Globes tool upholds the spirit of the original ANSI standard. "Green Globes has always had energy, water, and life-cycle assessment as key components of its tool," she explains, "because those are the factors most impactful on operating costs."

She adds, "If you purchase Green Globes, you will see there are four pathways for energy. Two have always been hallmarks of Green Globes." The carbon-based path, which remains part of the new tool—ANSI/GBA 01-2010 Energy Performance Building CO₂e—is itself an ANSI standard developed by GBI, she points out. "There is nothing untoward, nothing hidden there."

Comparing Energy Performance in GBI/ANSI and Green Globes

	GBI/ANSI 01-2010	Green Globes for New Construction 2013
Path A	Performance Design Option (Building CO2e reduction + energy demand reductions + measurement/verification protocols) 150–300 points	Energy Star Target Finder 0–100 points
Path B	Prescriptive Design Option (Prescriptive envelope, lighting, and HVAC requirements + renewable energy) 100–250 points	ASHRAE 90.1-2010 Appendix G Energy Model 0–100 points
Path C	–	Building CO2e reduction 0–150 points
Path D	–	ASHRAE Building Energy Quotient 0–125 points

Sources: GBI/ANSI 01-2010 and Green Globes for New Construction Technical Reference Manual

A side-by-side comparison of the GBI/ANSI standard with the recently released Green Globes for New Construction Technical Manual reveals significant differences in how energy performance is demonstrated. The new tool no longer has a prescriptive energy path, and benchmarking systems not vetted through the ANSI process could help projects achieve more than 100 points.

Shaffer did not agree with the idea that changes to energy compliance paths created a conflict, and, although the group has been careful in the past not to identify the Green Globes tool as an ANSI standard, a [recent press release](#) supplants that practice, referring to the standard as "ANSI/GBI 01-2010, also known as Green Globes for New Construction."

Mountain or molehill?

A source familiar with both the Green Globes tool and the ANSI standard (who requested anonymity in order to protect ties with various parties) told *EBN* Bryan's complaint was "making a mountain out of a molehill."

The source went on to argue that the new version of Green Globes released in June 2013 is in fact more closely aligned with the ANSI standard than the tool has ever been before. Although the two are "not precisely the same" due to energy performance pathways having a different approach, the source continued, they are *largely* the same, and any slight differences

will be reconciled when the ANSI standard is updated in 2015 (a process that is beginning now). Bryan's letter has done nothing but confuse people, the source suggests. "When I looked at it myself, I just shrugged my shoulders."

The federal government appears to agree, at least for now. "The National Technology Transfer and Advancement Act directs federal agencies to use voluntary consensus standards to carry out their missions," explains Kevin Kampschroer, director of federal high-performance green buildings at the U.S. General Services Administration (GSA). That agency's recent review of rating systems included both the GBI/ANSI standard and the online Green Globes tool—though it didn't compare the two—he says. [A report prepared by Pacific Northwest National Laboratory as part of the review](#) "concluded that Green Globes and LEED are voluntary, consensus-based standards," Kampschroer says, making that a settled issue for the foreseeable future. "As certification systems are updated by their

system owners, GSA will evaluate the newer versions against federal green building requirements just as we did for this latest review."

Might ANSI intervene?

ANSI itself could ultimately decide how important the differences are between the Green Globes tool and the ANSI standard, but only if it receives a complaint.

EBN asked Anne Caldas, ANSI's senior director of procedures and standards administration, what might happen if an ANSI standards developer claimed that something was an ANSI standard if it was not.

Cautioning that her response was not specific to any existing standard or developer, Caldas wrote in an email, "If an ANSI-accredited standards developer (ASD) labels a document as an American National Standard (ANS) or promotes it as such when it has not been approved as an ANS, and this information is brought to ANSI's attention, we will review the facts and take appropriate action, such as requiring that any offending written material be revised or withdrawn."

"They had their own agenda"

In his interview with *EBN*, Bryan elaborated on his view of Green Globes—which originated in Canada and pre-dates GBI—and his former hopes that it would help bring green building "into the mainstream marketplace with a low price point." He contends that hasn't happened.

"Probably the GBI model was a mistake because they had their own agenda, which at one time was very wood-oriented," Bryan claims. "They wanted to develop something that was counter to the wood protocols in LEED." Now the board is "dominated" by the plastics industry, he adds. "GBI has not been the best vehicle to bring this forward."



New Revit Plug-In to "Tally" Building Life-Cycle Impacts

The new tool aims to help architects with whole-building LCA calculations for LEED v4 right along with their BIM process.

By Paula Melton

With demand for [whole-building life-cycle assessment](#) (LCA) increasing, a partnership of architects, LCA experts, and software developers has worked to release Tally—a new tool that allows designers to track environmental impacts in real time while creating models in the popular building information modeling (BIM) software Revit. Created by KieranTimberlake, PE International, and Autodesk (developer of Revit), the tool is currently being offered as a free public beta release.

The developers have touted the application's integrated workflow and robust dataset [in a press release](#).

"By architects, for architects"

"The really exciting thing about this tool is that it was developed by architects, for architects," Heather Gadonneix, director of business development at PE International, told *EBN*. She clarified that the tool is focused on embodied impacts from the entire life cycle of building products and materials—also the focus of the [new LEED v4 credit relating to whole-building LCA](#)—and doesn't cover impacts from construction or operation of the building.

"It's not an energy modeling tool," she explained—so adding two extra inches of insulation will likely increase embodied impacts in Tally, but only an energy model can determine whether better energy performance will offset those increases over the building's life.

Drawing from the massive GaBi LCA database developed by PE, Tally does account for impacts from material resource extraction, manufacturing, transportation to the jobsite, use and

maintenance, and disposal or recycling.

User feedback

"It certainly is a big step towards making LCA more accessible and putting it into a process that we already have," notes Frances Yang, S.E., structure and sustainability specialist with the international engineering firm Arup. "I really like how you're building off what designers have already put work into, and you don't have to re-create the model."

LCA is only as good as the data that informs it, and Yang praised the testing and third-party validation the developers have pursued. However, she adds, "There's still not as much transparency about the data" as some professional LCA practitioners might prefer.

Yang also pointed out that there may be a learning curve for designers because they will need to assign materials and quantities fairly early on in the design process—and possi-

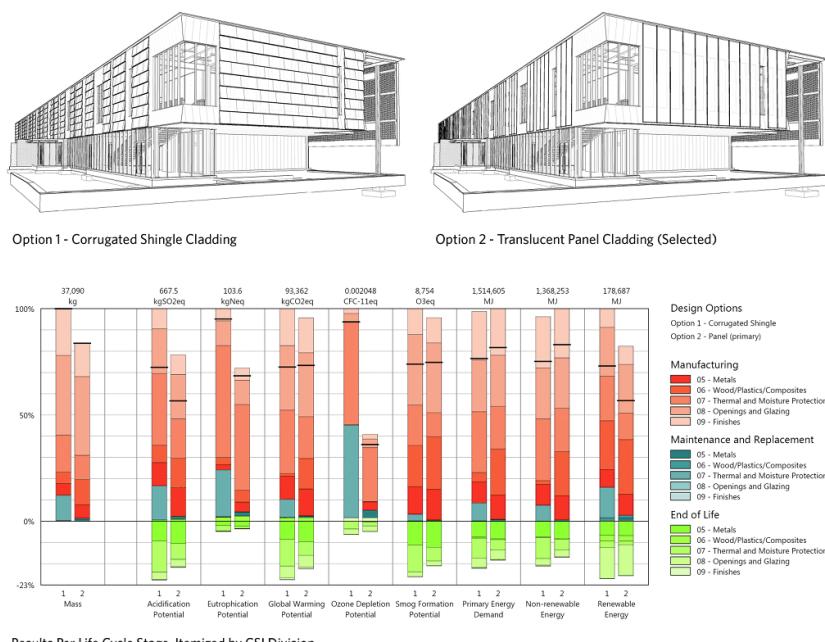
bly with more precision than they're used to. Additionally, "the systems are pretty much decided on by the time you do the model," she said, so if project teams aren't comparing structural systems using life-cycle analysis very early in the design process, they might miss some major opportunities. Although designers can still reduce impacts in a variety of ways after modeling begins, other tools are a better fit for the earliest decision-making, Yang suggests.

Next steps

"Really, we've been seeing kind of a pent-up demand for this type of tool over the past few years," Gadonneix stated. "It's pretty exciting because there are some firms that have in-house specification team members who understand the LCA tools enough to utilize those, but we really wanted to be able to help the architects and designers to understand the environmental footprint by integrating the data in their tool." She hopes the application will "empower them to make smarter purchasing decisions."

Comparing Cladding Choices with Tally

Tally™ can be used to compare design options.



The Tally application permits comparison of building systems and could help project teams pursuing the whole-building LCA credit in LEED v4.

© KIERANTIMBERLAKE

Image: KieranTimberlake

KieranTimberlake is offering [video tutorials](#) of Tally on its website to give designers a preview of how it works.



NEWSBRIEFS

FSC to Use Forensics to Uncover Criminal Forestry Practices

New testing would detect the presence of endangered species or genetically modified organisms in wood products.

By Paula Melton

Is that "birch" plywood cabinetry you specified actually made of an illegally logged rainforest species? A new partnership between the Forest Stewardship Council (FSC) and the Forest Products Laboratory (FPL, a division of the U.S. Department of Agriculture Forest Service) aims to verify environmental claims about forestry products.

The testing will look for impurities in samples of composite wood and paper products, including fibers from endangered species or other illegally logged trees as well as from genetically modified organisms (which are not permitted in products marked "FSC Mixed"). Although there is "no reason

to suspect" that FPL's forensic scientists will find any of these things, says Brad Kahn, communications director for FSC-US, "we want to make sure we are keeping our system as rigorous and credible as possible."

Kahn adds that many larger companies already do their own forensic testing without sharing the results, whereas FSC will be publishing its findings. He notes that the new testing will help ensure that all FSC chain-of-custody certificate holders "are competing on the same level."



Cornell Reports No Revenue Boost for Green Hotels

Eco-certified hotels do not bring in more booking revenue, but researchers say it's safe to go green, if only for the operational benefits.

By Candace Pearson

A report published by the Cornell Center for Hospitality Research has found that sustainability certifications don't allow hotels to charge higher rates or increase bookings—but they also don't hurt. Howard G. Chong and Rohit Verma, authors of the [study](#), say that their findings leave the door open

for hotels to pursue green certifications, even if operational savings are currently the only financial benefit.

Researchers used information from Sabre's Global Distribution System and Travelocity.com websites to compare the average daily rates (ADR) of 6,000 conventional hotels to 3,000 similar hotels flagged as "eco-certified." A small green leaf on these sites marks hotels that have earned at least one of a dozen of international sustainability certifications, including LEED and Energy Star.

On average, this marketing had a neutral effect: the going rates and number of bookings were neither higher nor lower for the eco-certified hotels. Even though the study did not gather data on reduced energy costs, the authors argue that those who have hesitated to implement green programs with demonstrated operational savings should be encouraged by the fact that widely advertised green status isn't hurting booking revenues.

"Though revenues overall may not have risen, cost savings from sustainability programs are still real benefits to the bottom line," according to the report. "The pragmatist should see this as a green light to continue measured improvements in hotel environmental performance." The report does not address the extent to which hotels realize other financial benefits from green certifications, such as tax or development incentives or increased asset values.



Changes Finalized for 2015 Energy Code

The 2015 IECC applies to historic buildings and offers a performance path based on the HERS Index.

By Candace Pearson

Hearings to settle proposals for the 2015 International Energy Conservation Code (IECC)—the code that serves as the model for states and localities across the country—have



Photo is in the public domain

Proximity Hotel in Greensboro, North Carolina, was the first hotel to achieve LEED Platinum. The green hotel trend doesn't appear to affect revenues directly, according to new research.

ended, finalizing some marked differences from the 2012 version.

One of the biggest changes eliminates the code's blanket exemption of historic buildings. In the latest version, energy standards do apply to both residential and commercial historic buildings, and a report detailing why a provision is detrimental to the historic character of the building is required for exceptions.

Another approved change in the residential code adds a performance path for compliance based on the HERS Index. Instead of basing performance on energy costs—limited to heating, cooling, and water heating—the new path requires that homes achieve a [HERS score](#) between 51 and 55, depending on the climate zone; HERS is already widely used and accounts for energy use from lighting and appliances, too.

Reinstating mechanical equipment tradeoffs, one of this year's [highly controversial proposals](#), was defeated, and a measure requiring builders to dedicate roof space and install chase wiring to ensure that all new homes are "solar-ready" fell short of passage



Photo: Randolph Historic District, New York. License: Doug Kerr CC BY 2.0.

The IECC energy code will have more of an impact on the nation's aging building stock and will realize greater energy savings now that historic buildings are no longer automatically exempted.

by one vote, but may indicate where the code could go next.

The code is updated every three years, but states are just beginning to adopt the 2012 version and, according to [GreenBuildingAdvisor.com](#), the 2015 version is not likely to be published until 2014.



UL, USGBC Team Up to Standardize LCA Rules

The new partnership aims to prevent apples-to-oranges product comparisons under the guise of life-cycle assessment and environmental product declarations.

By Paula Melton

The U.S. Green Building Council (USGBC) and UL Environment have formed a partnership to promote building product transparency. The group's first project, according to UL product manager Paul Firth, will be to improve how building product manufacturers perform life-cycle assessments (LCA) and report their findings in environmental product declarations (EPD).

"We're working on filling in some of the gaps" with the underlying data that informs LCA, Firth told EBN. Although there are rules specifying how to conduct an assessment (see "[The Product Transparency Movement: Peeking Behind the Corporate Veil](#)"), they currently leave too many options open, argues Firth. There's nothing saying that two manufacturers of similar products have to use the same database, for example, so companies end up choosing the data they prefer—which creates the potential for gaming the system. "I don't think there's any wrongdoing," Firth emphasizes, "but we can do

a bit better than this. They do the best they can, but those rules aren't there to help them."

Also, he adds, there are multiple LCA software tools, which all use the chosen data differently. This can lead to sometimes-disparate results: in a recent analysis of biomass emissions, for example, UL found a 30% difference in outputs between two different software programs. "Those inconsistencies have to be known, and they have to be fixed," he said.

According to [the USGBC announcement](#) of the partnership, which coincided with its 2013 Greenbuild conference, the new rules under development will eventually undergird a new disclosure format—a "joint USGBC-UL EPD" designed to help ensure that the environmental impact of multiple products in the same category can be compared reliably.



More Proof That Housecats Are Birds' Biggest Enemy

Bird-safe glass is worthwhile, but keeping cats indoors would prevent far more songbird deaths.

By Candace Pearson

A new study finds an estimated 105–348 million birds in Canada each year are killed by domestic cats, making these pets and their feral compatriots the biggest human-related threat to wild birds—more lethal by far than large office buildings and wind turbines, which sometimes take the blame.

Researchers calculated that collisions with residential and low- to mid-rise buildings account for 24.8 million bird deaths, and tall buildings claim another 64,000—not an insignificant figure, especially when these deaths could be prevented with [shading features or window film](#). Wind turbines were responsible for just 16,700 bird fatalities—about 13 birds a year per turbine in Canada—while the average feral cat there kills 24 to 64 birds annually. Although only about 25% of cats in

Canada are feral, this group likely kills 59% of the birds that succumb to feline predation, suggesting a need to both keep cats indoors and to spay or neuter pets.

The study, published in *Avian Conservation & Ecology* provides firm figures that give more credence to [similar findings by researchers in the United States](#). Although the most recent estimate of birds killed by cats in the U.S. is ten times higher than this estimate in Canada, researchers say this difference is in line with a higher human population and a larger number of feral cats.



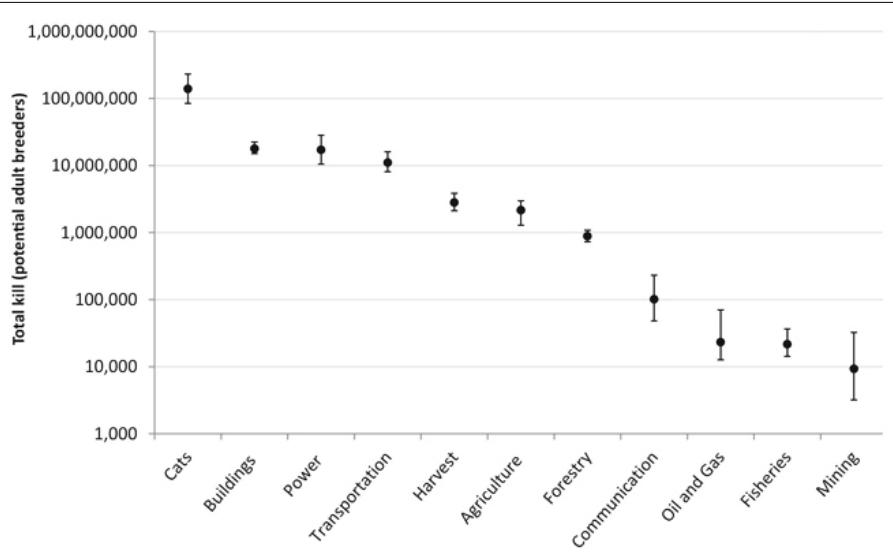
Sefaira Plug-In Integrates Energy Analysis Directly into SketchUp

Sefaira introduces new software that models a building's energy use while architects are still drafting initial designs.

By Candace Pearson

Sefaira recently unveiled its new [plug-in for SketchUp](#) that provides real-time energy analysis for the conceptual stage of building design; Sefaira claims the tool will allow architects to

Human-Related Causes of Bird Mortality



Source: Environment Canada

Cats kill more birds than road deaths and collisions with tall structures combined. Canadian researchers estimate that 2%-7% of the total bird population in southern Canada is killed by cats each year.

make early performance-enhancing decisions about form, orientation, and façade design without requiring expertise in energy modeling.

After the user selects a location, the extension software uses corresponding weather data to deliver immediate analysis of a design's energy use—broken down by heating, cooling, lighting, and plug loads—and graphically

shows the heat gains and losses of the building. By highlighting the elements of design that are most responsible for poor performance, the program guides architects toward making targeted adjustments from the outset of the design phase, when their impact on building performance can be greatest (See "[Energy Modeling: Early and Often](#)").

The plug-in operates directly within SketchUp so that architects don't have to interrupt their design process to perform scenario comparisons, claims the company, but it utilizes Sefaira's cloud-based engine for real-time analysis. Customers pay a subscription fee to use the tool.

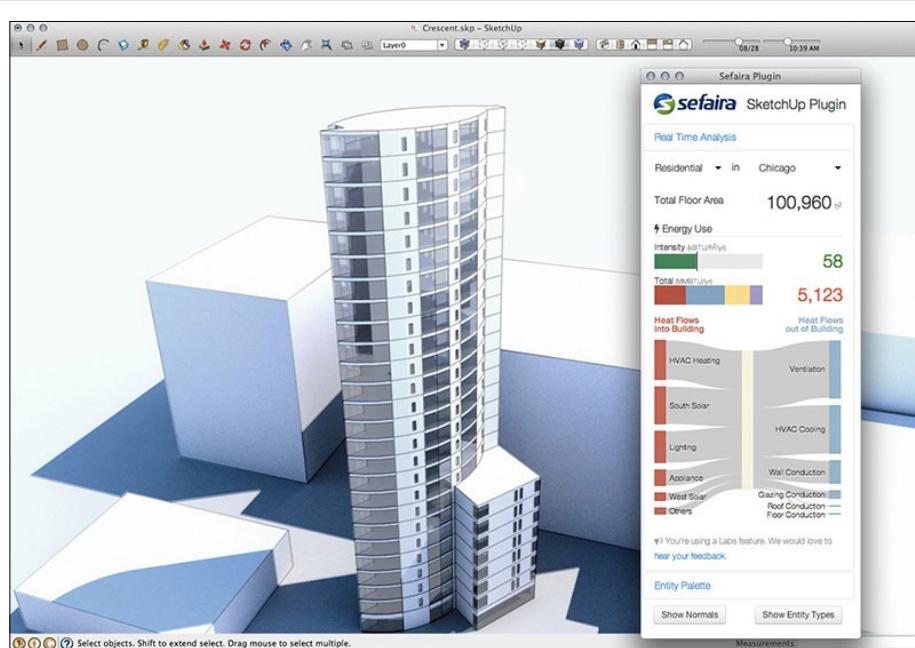


USGBC Names Recipients of 2013 Leadership Awards

This year's winners are recognized for their innovation and commitment in diverse fields—from university president to town mayor.

By Candace Pearson

The U.S. Green Building Council (USGBC) recently announced the recipients of its 2013 Leadership



Sefaira for SketchUp is designed to help architects connect the dots between energy use and building elements without interrupting their familiar design process.

Awards, which honor individuals and groups for their dedication to sustainability in the built environment.

Among those recognized is Joel Ann Todd, chair of the LEED steering committee and a 20-year supporter of sustainable design. "Joel Ann Todd has been a tireless and passionate advocate for quality and meaningful metrics in LEED and other programs around the world," according to Nadav Malin, president of Building-Green, which publishes *EBN*. "Working with her over the years on LEED, Green Building Challenge, and AIA's seminal *Environmental Design Guide* has been an honor and a pleasure, and this award is certainly well deserved."

Bob Dixson, the mayor of [Greensburg, Kansas](#), is also honored for his work rebuilding his town using sustainable design principles and renewable energy after it was devastated by a tornado in 2007. Gerald Hines, founder and chairman of Hines Interest Limited Partnership, will be given the President's Award to honor his commitment to sustainability in the real estate industry; Hines' firm has more than 100 million ft² of LEED-certified space.

Other recipients include Mike McNally, who made a splash earlier this year by [pulling Skanska USA from the Chamber of Commerce](#) to protest anti-LEED lobbying, and two presidents of schools of higher education, Jo Ann Gora and Mary Spilde. Intel Corpora-

tion is also recognized as the largest voluntary producer of green power. The awards will be presented at the Leadership Awards Luncheon during Greenbuild 2013 in Philadelphia.



ASHRAE Standard Revised to Cut Excess Ventilation

ASHRAE's 62.1-2013 standard gives project teams more flexibility to determine appropriate exhaust rates, providing potential energy savings.

By Candace Pearson

The 2013 version of ASHRAE's indoor air quality standard has been published with 10 addenda to the 2010 standard. According to Roger Hedrick, Standard 62.1 committee chair, the updates will allow building designers and operators to reduce energy consumption by cutting "excess ventilation."

Some changes could help projects avoid unneeded prescriptive measures; for example, a performance-based option for exhaust rates is added. Notably, this addendum requires monitoring concentrations of contaminants, unlike the existing performance-based method for setting supply ventilation rates. Ventilation rates for sports spaces (such as spottily occupied school gymnasiums) can also be determined partly on a per-occupant basis, allowing ventilation levels

to be adjusted based on demand. Toilet exhaust air may now be recirculated after appropriate treatment.

There are also modified requirements for water used in humidification systems and zone air distribution effectiveness for underfloor air distribution. Air entering wetted cooling coils must be filtered to MERV 8—a more stringent requirement than the previous MERV 6 level—in order to reduce potential for particulate deposit on the coils.

Standard 62.1-2013 can be purchased from ASHRAE's online [bookstore](#).



Maryland May Accept IgCC for Public Buildings Along with LEED

Objections to FSC were a factor in the state's endorsement of multiple frameworks—starting with recommending IgCC as a compliance option for its own buildings.

By Candace Pearson

Maryland may soon authorize an alternative path to its LEED Silver requirement for state-owned buildings.

As Stuart Kaplow reported in the [Green Building Law Update](#), the Maryland Green Building Council (a State agency that is not associated with the U.S. Green Building Council's Maryland chapter), is close to finalizing its version of the International Green Construction Code (IgCC), which it will recommend as an alternate compliance path for green construction in State-owned buildings, including schools. In its [annual report](#), the council says the code ensures comparable building performance at "a potential reduction in cost" and will serve as a model that jurisdictions can choose to adopt or adapt, giving them "the ability to craft a more prescriptive Maryland-focused code."

Tom Liebel, chair of the Maryland Green Building Council, told *EBN*, "The state of Maryland was an early adopter of the LEED rating system,



Photo: Anthony Bailey CC BY 3.0.

While the Greenbelt school was LEED Gold certified in 2012, future public buildings constructed in Maryland may be able to comply with state laws by following the International Green Construction Code.

and we continue to be fully supportive of LEED." Giving multiple options, though, "lets jurisdictions know that the State has done a rigorous review" that leaves choices open to local governments without compromising sustainable design standards. Some localities have expressed concern regarding [LEED's certified wood credit](#), for example, according to Liebel. IgCC not only gives them another option but, as a code, can also be tailored to local principles.

IgCC was [enabled for use by the Maryland Legislature in 2011](#), but no local governments have enacted it to date. However, as LEED v4 is released, Liebel predicts more jurisdictions will begin to explore their options.

Global Coalition for Green Schools Launched at Green-build

Aspiring to build green learning spaces for every child on earth within a generation, the group will share ideas around the globe.

By Paula Melton

Green building councils around the world have come together to form the [Global Coalition for Green Schools](#).

With 29 founding members from Botswana to Brazil and from Singapore to Slovenia, network members will share resources, tools, case studies, and best practices to help one another realize a common vision of "ensuring that every child has the opportunity to learn in a green school within this generation," according to the [Center for Green Schools](#) at the U.S. Green Building Council (USGBC) and the World Green Building Council.

Acknowledging that building practices and communities vary based on climate and culture, Rachel Gutter, director of the Center for Green Schools, says different communities still need to learn from one another. "Our approaches to greening schools may look very different, but what we all desire



Photo: Todd Petrie. License: CC BY 2.0

Land reclamation can be an environmental issue with quarries when they close; some become parks like this one in Marion, Ohio.

is to give our children every possible opportunity to succeed," she said.

The announcement, which follows a dual ["Greenest School on Earth" award](#) given to facilities in Hong Kong and Kenya, came during USGBC's 2013 Greenbuild conference.

NSF Certification Verifies Sustainability of Stone

Calling stone "natural" doesn't cut it anymore: NSC 373 sets a new standard for quarrying, processing, and transporting dimension stone.

By Paula Melton

Although stone has inherently green properties, its life cycle includes many environmental stumbling blocks (see ["Stone, the Original Green Building Material"](#)). A new NSF International standard developed by the Natural Stone Council (NSC)—NSC 373, Sustainability Assessment for Natural Dimension Stone—aims to distinguish products with a lighter environmental footprint.

The program examines such sustainability indicators as transportation energy (the source of stone's greatest environmental impact), water use, site management, chemical and waste management, and health and safety.

An NSC chain-of-custody program, reportedly to be published soon, will supplement the new standard by holding a product's entire distribution network accountable for environmental stewardship as well. "NSC 373 provides a needed standard of excellence in sustainability for the natural stone industry and will serve as the first step of the developing NSC chain-of-custody program," said NSC executive director Duke Pointer in a press release. The two together "will define and help promote more sustainable products within our industry."

For more information, see the [NSC website](#).

PRODUCT REVIEWS

New Polypropylene Pipe Aims at PVC, Copper, and Steel Replacement

Using polypropylene—considered a "cleaner" plastic than PVC—Polystar is a new imported piping being marketed as an alternative in commercial applications.

By Brent Ehrlich

There is a new polypropylene pipe available in North America: Polystar.

Manufactured in Germany by Baenninger, Inc., imported by Watts Water Technologies/Orion, and distributed nationally by [ISCO Industries](#) and other companies, Polystar is the first polypropylene pipe to be introduced in North America since Aquatherm (see "[Fusiotherm Polypropylene Piping from Aquatherm](#)") in 2003. Polystar has performance characteristics similar to those of Aquatherm but is being marketed primarily for commercial and light-industrial applications as a replacement for PVC, copper, and steel pipe.

Benefits of polypropylene pipe

According to Zak Schultz, ISCO's polypropylene manager, "Aquatherm and Polystar are very similar products" and share the same environmental advantages over other pipe systems. Polypropylene is made without halogens used in PVC (chlorine) or the aromatic rings used in PET and PBT, and it does not require the mining and processing of steel or copper. Polypropylene is recyclable (unlike PEX), is inert (so it doesn't react with most chemicals), does not use solvents for fittings, and, when burned, is far less hazardous than other plastics. Polypropylene is easy to install, bonds securely with fittings, does not corrode, and has a smoother inner wall than

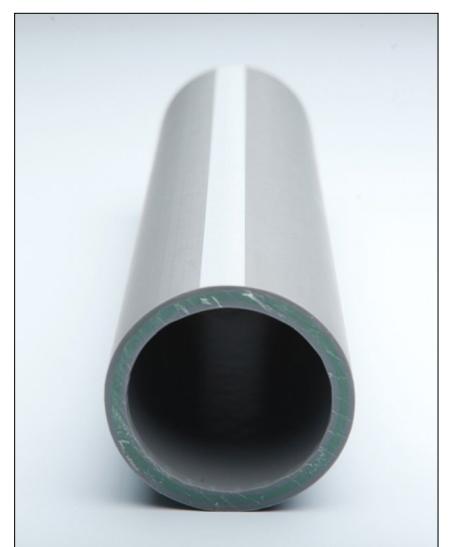


Photo: Steve Jurvetson. License: CC BY 2.0

Polystar CT-White has a white stripe that denotes it is for non-potable applications, such as HVAC, cooling towers, and geothermal systems. It is available in 20-foot lengths and in diameters from 1-1/2 to 24 inches.

copper or steel, reducing pumping energy.

Polystar offers a new twist

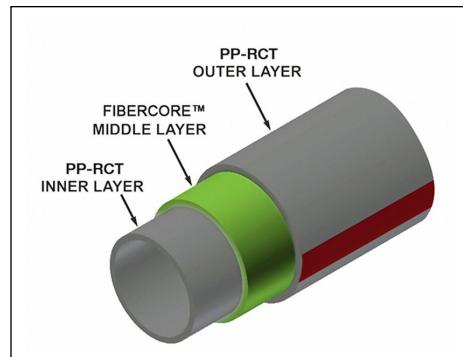
Polystar is made from polypropylene copolymer random (PP-R). "The strands are different lengths," says Schultz (that's where the "random" part of the name comes from), adding that this quality gives Polystar "a little bit of flexibility and a lot of rigidity." But Polystar's chemistry is different than that of PP-R in that it includes beta nuclei along with the alpha nuclei (found in PP-R), resulting in what Schultz calls a "higher crystalline factor. At elevated temperatures, [pipes made from] PP-RCT resin can handle 50% greater pressure than PP-R," he claims.

Because of the upgraded resin, "our inside diameter pipe is going to be smaller [than Aquatherm's] because it has a thinner wall, and it can handle greater flow rates," Schultz claimed. "We can outperform their SDR 11 with an SDR 17 that is a whole DR thicker." This lower standard dimension ratio (SDR)—the ratio of the outer diameter of the pipe to the wall thickness—offers greater performance, all other things being equal.

Polystar also offers injection-molded fittings to 24", which could provide another advantage. These fittings do not impact the pressure rating of the system the way segmented or mitered fittings could (a process known as "de-rating").

Used in HVAC and more

Though Polystar can be used like other PP-R polypropylene pipe in residential or commercial applications, ISCO works primarily with commercial and industrial piping. "Our competition is copper and steel," Schultz said. ISCO has not worked in the residential market, so that is not necessarily a good fit for the company, according to Schultz, which is instead focusing primarily on the HVAC market. "It can be used for residential, but the primary application we are going for is light, medium, and heavy commercial as well as industrial." Polystar can be used for



Source: ISCO Industries, Inc.

Polystar CT-White and CT-Red contain an inner layer of fiberglass for added strength and insulation. The CT-Blue product has no inner layer, costs less, and is for use in ambient temperatures.

heating and cooling systems, hot and cold potable water, glycol systems, compressed air, water reclamation, sprinklers, domestic drinking-water systems, and other uses.

Options for different performance levels

Polystar is gray, to blend in with buildings, but has a colored stripe to denote its performance level:

- CT-Red for high-temperature applications such as hot potable water; has the highest pressure rating. Available in ½"–12" diameters.
- CT-White for non-potable applications, such as HVAC heating and cooling. Available in ½"–24" diameters.
- CT-Blue for ambient-temperature applications, such as cold potable water. Available in ½"–24" diameters.

The CT-Red and CT-White come with a reinforcing fiberglass middle layer that adds strength and some insulation (while reducing recyclability); CT-Blue does not contain fiberglass. Polystar does not contain UV inhibitors, so it should be protected during storage (and during use, as necessary).

Polystar was introduced to North America in October 2013, but the full line of products may not be available until early in 2014, according to Rich McNally, senior sales manager for Watts Water. He says they are expect-

ing Polystar to have its NSF listing for potable water sometime in February.

Expected performance

Polystar pipe is joined together using heat; after two pipe sections meld together, they form a single seamless pipe with no opportunity for leaks, so if a pipe is damaged, it can be easily cut out and replaced. This pipe is also light, unlike steel, so it is easy to handle and can be cut precisely as a modular system before installation. So although the material cost of Polystar is likely to be more than that of PVC, steel, or copper, its ease of installation could save significantly on labor costs, and it has the potential to reduce maintenance headaches. Mark Lincoln, the facilities manager at Lifeline Data Centers, is currently using it to expand his company's chilled-water cooling system.

Lincoln installed a PP-R polypropylene pipe system in 2009 and has been very happy with it, and based on the performance data, he expects as good or better performance from Polystar PP-R. "Once you put it in, you never have to worry about it," he said. The lack of leaks and ease of installation continue to be selling points for him, but there is an added bonus.

"If I pressure-test this and send in my paper work, they (ISCO) cover us with an insurance policy for all my equipment—and you will never get that from U.S. Steel." Overall, he has been very impressed by polypropylene pipe systems. "It is a shame more people don't know about them."



BuildingGreen Selects Top-10 Products for 2014

Solving key design and environmental problems cost-effectively was the focus of this year's selection by BuildingGreen's editors of its top building products.

BuildingGreen, publisher of *EBN*, has announced its Top-10 Green Building Products for 2014. The twelfth annual



Photo: Structurlam Products Ltd.

The Elkford Community Conference Center in Elkford, British Columbia, was one of the first commercial applications of cross-laminated timber panels in North America.

awards are our editors' picks of the most innovative green building products that we've seen in the course of the continuous product research and review processes that inform GreenSpec and *EBN*.

Earth Measure from Coldspring

[Earth Measure](#), a collaboration between Coldspring and Jason McLenan, is a dimension stone product that takes waste from stone manufacturing and arranges it in patterns that mimic elements of the natural world—like seashells, drying mud, and reptile skin—to [provide a connection with nature](#). Earth Measure can be used for both exterior and interior applications, such as pavers, flooring, or walls, and the stone can be provided from regional quarries, depending on project location.

CrossLam Cross-Laminated Timber from Structurlam Products

More companies are supplying sustainable wood materials to meet renewed demand for [timber structures](#) in North America. CrossLam is a cross-laminated timber (CLT) structural panel made by gluing layers of softwood boards one on top of the next at right angles to each other (the product uses a no-added-formalde-

hyde polyurethane adhesive). The resulting panels are light and dimensionally stable in all directions and can be used for floors, walls, and roofing. CLT is typically made from less-desirable wood, including beetle-kill pine, but higher-quality wood can be used if it will be exposed to view. Structurlam can provide Forest Stewardship Council-certified material upon request.

ComfortBoard Insulation from Roxul

Roxul manufactures rigid and semi-rigid mineral wool board insulation favored by designers seeking to avoid the use of plastics and associated flame retardants (see "[Can We Replace Foam Insulation?](#)"). ComfortBoard (installed over exterior sheathing) is produced in the Milton, Ontario, plant with a minimum of 75% pre-consumer recycled content (mostly iron ore slag) and comes in commercial (CIS) and residential (IS) versions. With respective densities of 11 pcf and 8.0 pcf, ComfortBoard is rigid enough to be used as exterior insulation, and it provides an inherently fire-resistant alternative to the plastic foams typically used. It can be used in rainscreen details, and the company claims moisture does not affect R-values.



Photo: Schüco

Schüco's ERC 50 Modernization Façade system can be used to add insulation, high-performance windows, and new cladding to aging, poorly insulated commercial buildings.

ERC 50 Modernization Façade from Schüco

The [ERC 50 Modernization Façade](#) from Schüco is a retrofit façade and rainscreen system that can be installed on older, inefficient commercial buildings to improve energy efficiency, occupant comfort, and aesthetics. The ERC 50 incorporates an aluminum load-bearing framework, Schüco's high-performance aluminum windows, rigid mineral wool insulation, and a variety of cladding options into a system that can be installed with minimal disturbance to building occupants. The ERC 50 is modular and uses EPDM gaskets rather than caulk, so it is relatively easy to replace damaged components. Schüco's building-integrated photovoltaic panels can also be used.

PoE Access-Control Locks from Assa Abloy

Security in dormitories, hotels, and other restricted-access buildings comes at a price, with each key-card lock drawing constant energy. Sargent and Corbin Russwin, brands under Assa Abloy, offer [power-over-ethernet electronic access-control locks](#) that can save more than 150 kWh per lock per year. Ethernet data cables carry

low-voltage electricity to power the lock as well as transmitting data to and from the devices using a facility's existing wired and wireless local area network. Power loads are low enough that a modest uninterruptable power supply may be able to maintain electronic-access functionality in case of a power outage.

Kinetex Textile Composite Flooring from J+J Flooring Group

[Just don't call it carpet](#). Kinetex is a soft-surface, woven floor covering intended for use in place of vinyl composite tiles and similar hard surfaces. These semi-rigid tiles are engineered with a wear layer that resists staining or bleaching and is woven for abrasion resistance and durability. Kinetex is made from 60% recycled content (50% post-consumer PET sourced primarily from water and soda bottles) and, unlike carpet, can be ground and processed into new backing in one step. [Like most carpet](#), Kinetex is treated with perfluorinated compounds to resist dirt and improve its lifespan, but these chemicals persist in the environment and may have long-term environmental impacts.

Earth Flow Composting System from Green Mountain Technologies

Earth Flow is a medium-size [in-vessel composting system](#) for commercial kitchens. With walls that are insulated to R-18 and a greenhouse top, the vessel is sealed against pests and leakage. Units can accept 300–3,000 pounds of organic waste per day; a motorized traveling auger aerates the compost, and a biofilter and fan minimize odors. A unique biofiltration system using wood chips can be part of the planted landscaping for some projects, and this system can be hooked directly to a commercial pulper system for greater convenience.

Mayekawa Heat Pumps with CO₂ Refrigerant

[Mayekawa heat pumps with CO₂ refrigerant](#) use carbon dioxide instead of industry-standard hydrofluorocarbons

(HFCs), which contribute to global warming; this leads to a number of unique performance advantages. The EcoCute model is a water-to-water heat pump that provides both water heating (up to 194°F) and cooling from any water source; this makes it feasible as an alternative to fossil-fuel-fired boilers. The Unimo air-to-water heat-pump water heater produces similar output temperatures using the outdoor air as the heat source, while the Sirocco water-to-air heat pump also offers high-temperature water heating. Key markets include hotels, food processing, and thermal energy storage.

Sunny Boy Inverters from SMA America

The vast majority of photovoltaic systems today are grid-connected. [If the grid goes down](#), these systems not only leave houses dark at night but also won't deliver electricity when the sun is shining. Sunny Boy transformerless inverters provide daytime power to a single outlet even in the event of a grid outage. While it may not be enough power for major household loads, it can provide critical charging of devices and other daytime needs, without the need for an expensive and environmentally burdening battery backup system.

Vivid MR16 LED from Soraa

LEDs are known for their efficiency, but light quality remains a challenge. [Soraa Vivid MR-16 LED luminaires](#) are ideal for use where light quality is critical, such as in art galleries or for retail displays. Unlike other LEDs, which typically use gallium nitride (GaN) crystals grown on a sapphire or silicon carbide base, Soraa uses GaN grown on a GaN base so the crystals, according to the company, have fewer imperfections. Though less efficacious than some LEDs, Soraa MR-16s produce higher-intensity, "full-spectrum" light that rivals that of halogen bulbs while operating at lower temperatures. They are available in 14-, 25-, and 36-degree beam angles.



Buffering Humidity with Interior Finishes

The relative humidity of indoor air often fluctuates. Interior finishes can help moderate those changes, improving comfort and IAQ as well as saving energy.

As our buildings get tighter, the need to manage relative humidity increases—and energy use from ventilation and dehumidification may increase as well. Just as thermal mass can be used in [passive design](#) to redistribute heat, it is possible to use certain interior finishes to redistribute moisture—a strategy known as *moisture buffering* or *humidity buffering*.

All porous building materials have *hygric capacity*; they can take on and

release moisture. Gypsum wallboard, conventional plaster, and clay finishes, although they have very different vapor permeabilities and absorption properties, have relatively high hygric capacities. Conversely, many coatings significantly reduce moisture-buffering potential. Researchers are just starting to learn more about the suitability of different materials for passive moisture management.

One study of an average 1500 ft² home found that the drywall alone on walls and ceilings had the ability to store about 17 pounds of water, while special moisture-storage coatings on all walls and ceilings yielded nearly 60 pounds of water storage. These capacities can easily be enough to move daytime interior relative humidity from an uncomfortable 60% range to an acceptable 40% range. The moisture-storage capacity of earthen plasters can make them excellent humidity

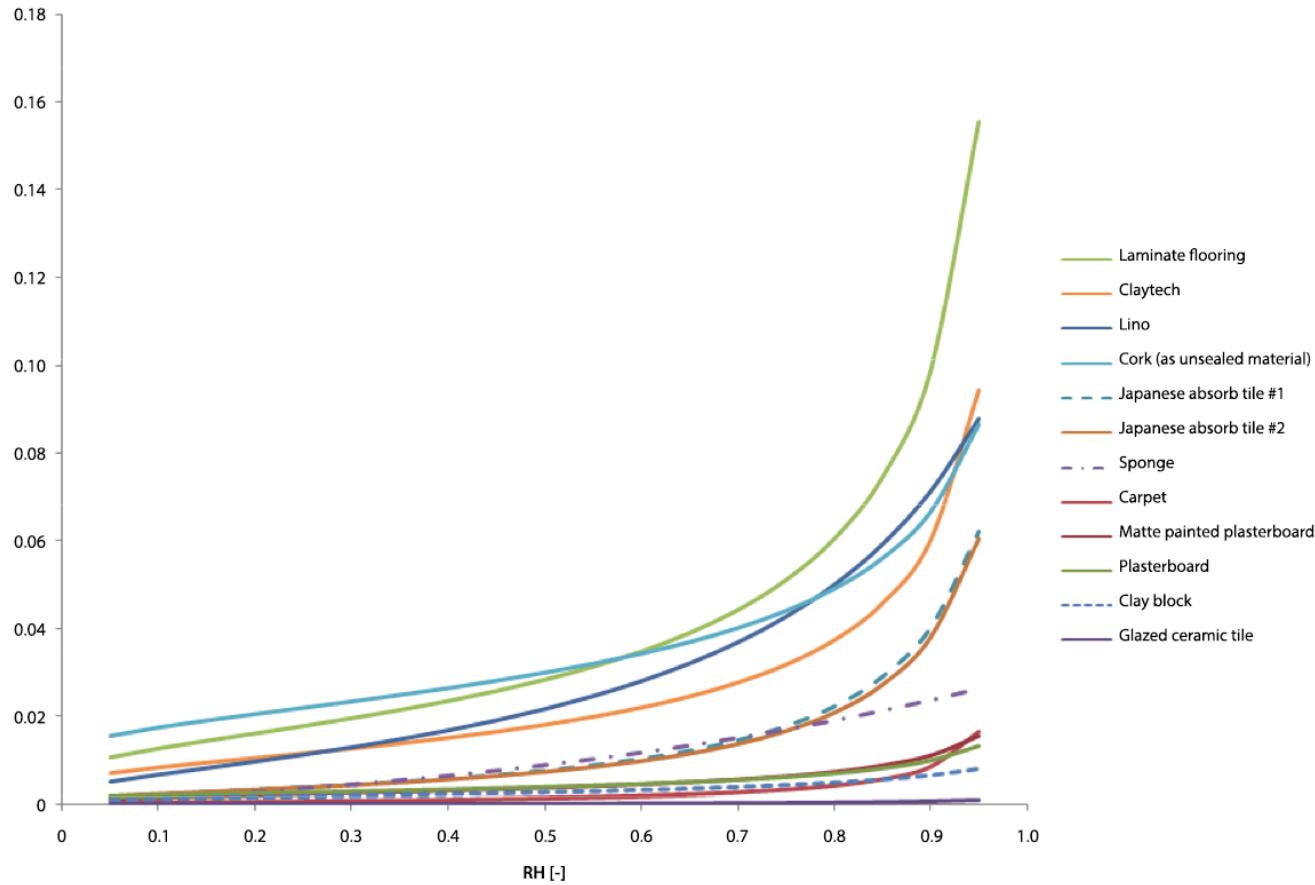
buffers as well, with some research showing the ability of clay finishes to accomplish daily cycling between 75% and 33% indoor relative humidity.

Do we really want to introduce pounds and pounds of moisture into our building enclosures, though? Could we be flirting with mold problems?

Certainly both indoor and outdoor climates and the [vapor profiles](#) of the building's exterior assemblies are important to consider with this strategy. It's important as well that the material release moisture as readily as it absorbs it and that moisture cycling be limited to the finish so that it is less likely to involve the rest of assembly.

Additionally, there may be sufficient interior surfaces that are not part of the exterior enclosure (interior wall partitions and ceilings), and targeting these surfaces with increased varie-

Absorption Properties of Common Interior Finishes



Source: Paul Baker and Chris Sanders

Interior finishes can help buffer moisture in much the same way that concrete buffers temperature fluctuations, but quantifying the effects is an emerging area of inquiry.

gation and surface area may provide enough capacity that exterior wall and ceiling assemblies aren't involved.

Interior finishes that take up moisture and decrease interior relative humidity can have significant comfort and energy implications. They can increase daytime comfort by storing moisture during the day and, when tied to nighttime cooling and active dehumidification, make it cheaper to

deal with that load overnight (during non-peak periods). In the first study mentioned above, the moisture-storage finishes worked well in a nine-hour cycle.

In recent research at the University of Bath, Fionn McGregor and Andrew Heath have been studying moisture buffering in very airtight homes with interior clay finishes, shifting moisture generation of daytime activities such

as cooking and bathing to nighttime redistribution.

There is still considerable work before we can quantify the moisture-buffering capacity of different materials in a standardized way. Further testing and modeling will increase the practical guidance available to building professionals.

