



LEED IS BROKEN... *LET'S FIX IT*

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The Sundeck restaurant on top of Aspen Mountain

LEED is Broken...

Let's Fix It

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In the last five years, something exciting has happened in the green building world. Conferences on the topic used to be love-ins, featuring hippies in beads and Birkenstocks, with friends of Dennis Weaver pitching tire-houses. Okay, it wasn't really that bad...but close. Recently, however, the U.S. Green Building Council (USGBC)¹ has given the field a professional sheen, and helped it blossom. The USGBC attracted 8,000 people to its Portland conference last summer. Many were wearing suits, and the whiff of serious money was in the air. The head of China's construction administration—which will be responsible for much of the construction the world will see in the coming decade—was there, and got a standing ovation. There were also product suppliers, architects, consultants, builders, engineers, academics, doctors and scientists—the conferences have become a runaway train of enthusiasm for green buildings.

Much of the excitement results from LEED (Leadership in Energy and Environmental Design), USGBC's flagship program to rate a building's environmental performance. Prior to LEED, "green building" was all in the eye of the claimant: you could, for example, ban smoking and call your restaurant green. Why not? There was no standard, so any claim was as plausible as the next. LEED changed that, tapping a pent-up demand for reliable information with a rigorous rating system and a checklist for going green.

Interest in green building is timely. The impacts of assembling, heating, cooling, and electrifying buildings are rising rapidly. Buildings consume one-quarter of the global wood harvest, one-sixth of its fresh water, and two-fifths of material and energy flows.² In the U.S., buildings account for 65% of electricity consumption and 36% of primary energy use; operating a typical American house produces 26,000 pounds of greenhouse gases each year, enough to fill the Goodyear blimp.³ Since most Americans spend 90% of their lives indoors,⁴ there is growing concern about indoor environmental quality, a contributor to the childhood asthma pandemic and other health problems. In a provocative essay, Ed Mazria recently noted that buildings are "the most long-lived

¹ www.usgbc.org

² Roodman, D.M. and N. Lenssen. 1995. "A Building Revolution: How Ecology and Health Concerns are Transforming Construction," *Worldwatch Paper 124*. Washington, DC. Worldwatch Institute. p. 5.

³ Statistics available online at <http://www.usgbc.org/Docs/Resources/5>. The blimp calculation is based on average household emissions of 26,000 pounds, estimated in "Cool Citizens," Rocky Mountain Institute, <http://www.rmi.org/sitepages/pid173.php>. The Goodyear blimp's volume is 202,000 cubic feet, equivalent to about 23,000 pounds of CO₂. (Calculation: Udall.)

⁴ According to the American Lung Association. http://www.alaw.org/air_quality/indoor_air_quality/

physical artifacts society produces.” Since energy use in buildings is responsible for nearly half of the nation’s greenhouse gas emissions, Mazria believes architects are primarily responsible for resolving the climate challenge.⁵

There are nearly 100 million buildings⁶ in the U.S. Almost all of them are on life support, like patients in intensive care. Recognizing that the conventional approach to construction is brain dead, 10,000 design professionals have trained to become “LEED accredited.” Overnight, LEED has become a dominant brand, like Nike in athletic shoes or Dell in personal computers.

When LEED was launched, the hope was that it would transform the design and construction of commercial buildings. But today, for many reasons, LEED is fast becoming its own worst enemy. The program’s early bloom is fading. Green building has a robust future, but LEED may not.

Within the green building orbit, everyone worth their low-VOC paint has heard about LEED, but the early results have been sorely disappointing. Since 1995, the Energy Star program, for example, has been embraced by office equipment and home appliance manufacturers. It has been so widely adopted that it has, effectively, flipped the market for computers, monitors, printers, copiers, clothes washers, and dishwashers. Over 360,000 of the nation's new homes have earned the Energy Star label, saving homeowners an estimated \$200 million and eliminating approximately 4 billion pounds of greenhouse gas emissions. This sort of market transformation is what LEED aspires to.

Since 2000, however, LEED has certified fewer than 200 buildings, with 1772 projects registered but not certified. Manufactured goods aren’t buildings, obviously, so here’s a more telling comparison: while LEED was ploddingly certifying a few dozen projects each year, the U.S. Department of Energy’s Building America program helped production builders design and erect more than 20,000 new homes. Although interest in green building seems to be exploding—with some municipalities, states, and corporations adopting LEED as a standard—the reality is that LEED is deeply troubled. There is great interest, but there are few certified buildings. If LEED doesn’t change, it will collapse of its own weight, with more and more potential users saying “No thanks,” as some colleges, and many builders, already have.⁷

Between the two authors, we’ve built a passive solar home, designed the world’s first renewable energy mitigation program, participated in the pioneer program that developed LEED 1.0, built two LEED-rated buildings (with half a dozen more planned) and played a consulting role on numerous other green building projects, including a high performance affordable housing project. We’re concerned that LEED has become costly,

⁵ Mazria, E. 2003. “It’s the Architecture, Stupid!” *Solar Today*, May/June, pp. 48-51. Available online at <http://www.mazria.com/publications.html>.

⁶ In 2002, there were more than 76 million residential buildings and more than 5 million commercial buildings according to the U.S. Department of Energy. By 2010 another 38 million are expected to be built.

⁷ Duke and Stanford, for example. Based on notes by Jen Seal from the Urban Land Institute conference *Green Buildings and Sustainable Development: Making the Business Case*, August 25th. Aspen Roundtable 2003, in Aspen, CO. This paper later cites other builders who are bailing on LEED certification.

slow, brutal, confusing, and unwieldy, a death march for applicants administered by a soviet-style bureaucracy that makes green building more difficult than it needs to be, yet has everyone genuflecting at the door to prove their credentials. The result: mediocre “green” buildings where certification, not environmental responsibility, is the primary goal; a few super-high level eco-structures built by ultra-motivated (and wealthy) owners that stand like the Taj Mahal as beacons of impossibility; an explosion of LEED-accredited architects and engineers chasing lots of money but designing few buildings; and a discouraged cadre of professionals who want to build green, but can’t afford to certify their buildings.⁸ A growing number of LEED veterans have, or soon will, throw in the towel. LEED is broken. This article explores what went wrong, and begins a discussion of how to fix it.

What is LEED?

LEED is both a certification system and a how-to guide for professionals new to green construction. The LEED checklist prompts designers to reduce impacts in five categories ranging from site planning to energy consumption, water usage, indoor environmental quality, and building materials. Pay a modest fee, satisfy the prerequisites, acquire 26 of 67 possible points, and your building can become “LEED Certified.”⁹

Once a building is completed, a developer submits documentation to the USGBC, where a third-party evaluator determines whether to award a Certified, Silver, Gold, or Platinum rating. It is very difficult to grab the Platinum ring: there are only seven such buildings in the world. Indeed, it’s hard to get a building certified at all. The program began in 2000, and there are now just 167 certified projects in 51 states and 14 countries. That’s 167 projects over four years. Transformative? Hardly.

Between the Idea and the Reality

T.S. Eliot wrote that “between the idea and the reality... falls the shadow.” And for a modern audience, Springsteen sang: “Between our dreams and actions lies this world.” LEED is a design process that should, in theory, produce buildings that conserve resources, reduce operating costs and pollution, help address global warming, improve marketability and durability, preserve the ozone layer, protect occupant health, and improve worker productivity. What works in theory should work in practice, but in practice it sometimes doesn’t. Aspen Skiing Company (ASC), where Auden is the environmental affairs director, built one of the first LEED certified buildings in the United States, the Sundeck Restaurant (rated Bronze) on Aspen Mountain. ASC recently

⁸ Indeed some buildings, although they achieve LEED certification, are hardly green. Instead, the buildings are a compilation of green technologies stacked on a standard building, like putting lipstick on a pig, but more expensive. The Bren School in California, which received a platinum rating, was cited by a well known green design professional/author as an example of this flaw in the process.

⁹ The program’s original focus was commercial construction, but it is expanding into existing buildings, commercial interiors, and core and shell renovations. Competition from pre-existing rating systems has complicated efforts to develop a LEED standard for residential construction, but this is in the works.

certified a second building, the Snowmass Golf Clubhouse, as LEED Silver. This paper uses ASC's experiences as case studies.

What Ails LEED?

Our diagnosis follows, but we encourage readers to seek a second opinion. After describing five problems dogging the program, we suggest possible fixes. It seems to us that cosmetic tweaks are unlikely to do the job, and a major revamp is needed. Indeed, it may be that LEED is terminally ill, that euthanasia should be considered so that it can be replaced with a more effective program.

We don't make these suggestions lightly. We recognize that an enormous amount of time and effort and intelligence has gone into developing the LEED program. In the field of sustainable development, the real heroes are not the theorists in the ivory tower, but the grunts in the trenches, making mistakes and moving the line forward, one bloody yard at a time. The foot soldiers of the USGBC and LEED are doing this, and they deserve our profound gratitude.

Our critique aims to make LEED easier to use and more popular, not a program just for the deluded, committed, wealthy or radical. The USGBC itself is concerned about the criticism it is hearing, and is currently conducting its own internal review. Other substantive critiques are also available. Jay Stein and Rachel Reiss's E Source paper addresses two issues not discussed here—the concern that a LEED rating doesn't necessarily reflect a building's greenness, and that techniques encouraged by LEED are not always the best way to reduce environmental impacts.¹⁰

Before we begin our critique, it's important to note that the USGBC is much more than LEED. This 12-year old nonprofit has done a host of things right. It has created a buzz around green building and formalized, standardized, even Oprah-ized green building, just what the field needed. It has enlisted the eager participation of many thousands of building professionals. Its website has compiled a tremendous amount of information and expertise. In short, the USGBC deserves endless credit for wrestling with the complex question of what makes a building green, and expanding the answer beyond energy to encompass water efficiency, site issues, resource efficiency, and indoor environmental quality.

LEED created a national standard for green buildings where none existed before. If used as a cookbook, it provides a means for novices to create, understand, and certify buildings. LEED made green building understandable—even sexy—to the masses. It has helped reduce the troubling plague of greenwashing.¹¹ For our part, we recognize that it's

¹⁰ Stein, J. and R. Reiss. 2004. "Ensuring the Sustainability of Sustainable Design: What Designers Need to Know about LEED." Esource. Paper AED-04-01. September. That and other resources are available for purchase at <http://greenbuildings.platts.com>.

¹¹ As we point out later, LEED can also foster greenwashing. Its merits, however, regarding greenwashing are described in Schendler, A. 2003. "Greenwashing Construction: LEED Certification Helps Avoid Building Makeovers." Colorado Construction. October. Available online at http://colorado.construction.com/features/archive/2003/0310_feature4.asp Accessed April, 2005.

easier to burn down a barn than to build one, and we wrote this paper reluctantly, but with the hope a frank discussion will help LEED, the green building movement, and the planet. For that discussion to prosper, let's check our emotions at the door. An informal survey of LEED critics suggests that the U.S. Green Building Council has been less than receptive to criticism. Some authors have been greeted with rage from LEED proponents, which only emphasizes the program's near cult-like nature. What's needed is a rational discussion, not a war.

Finally, our proposals for reform are incomplete. Others are encouraged to weigh in on what's right and wrong. Throughout this paper, we've referenced some of the excellent research that has been done so far.

Problem # 1: LEED Costs Too Much

An avalanche of reports insist that green building—and LEED certification in particular—doesn't cost more than conventional building. These reports are wrong. The second you start a green building project, it costs more than conventional construction. But the word on the street still seems to be that LEED is cheap, and green building pays for itself. Last summer, for example, a report compared the costs of LEED and non-LEED buildings and found “no statistically significant difference.”¹² It is true that other factors have more influence on building cost than whether one chooses to pursue LEED. But the fact remains that LEED certification costs extra.

Too many consultants, think tanks, and architects are pitching this “no-pain, no gain” line to sell their services. Some of the studies they cite are reminiscent of the Bush Administration's “sound-science,” “Healthy Forests,” and “Clear Skies” initiatives. For example, a well-publicized study done for the U.S. General Services Administration (which requires LEED certification for its new buildings) failed to account for the costs associated with commissioning, which is a LEED prerequisite. That's like getting a new car price quote without the engine. (This study also didn't account for the cost of obtaining three other expensive credits, discounted because they were already required by the GSA.) In the real world, LEED certification typically adds 1% to 5% to the budget. A nonprofit group in our valley recently figured their added costs at \$50,000 to certify a 10,000 square foot building.

The myth that going green costs nothing is damaging to clients who discover the reality deep in the process. Instead of using fuzzy math to show that green building doesn't add costs, let's acknowledge that these buildings cost more and are worth it. There are many reasons for added expense. First, green building is a deviation from business as usual. When you ask a builder to modify his tried-and-true, or ask an architect to design past code, you are mounting an expedition into a thorny new landscape, requiring extra meetings, added design time, and inevitably, the mistakes and backtracking that come

¹² L. F. Matthiessen and P. Moris. 2004. “Costing Green: A Comprehensive Cost Database and Budgeting Methodology.” Published by Davis Langedon Adamson. Available online at <http://www.dladamson.com/Attachment%20Files/Research/costinggreen.pdf>

from doing something new.¹³ To plow through this tangle you need a sharp machete, a fat wallet, and a calm acceptance of brain damage. The fiscal injuries one suffers on the cutting edge are sometimes called “soft” costs, perhaps to suggest you should eat them.

Green design substitutes intelligence and ingenuity for energy. But brainpower isn't free; we routinely pay \$125 to \$200 an hour for it. LEED pancakes additional costs on the consultant fees. First, properly commissioning a new building to make sure its mechanical systems are performing as designed, a LEED requirement, costs on the order of \$25,000... for a small building. Granted, commissioning *should* be part of business as usual, but it is not. Second, to get LEED's energy points you have to computer model your building's performance. For something under 20,000 square feet, \$15,000 would be a steal. Next, there's a LEED registration and certification cost of \$2,250 plus USGBC membership of \$1,200, the latter not required but politically expedient. Adding the sophisticated energy management controls you may need can be \$5,000 or more.

Next, you've got to gather and collate the information you'll need to prove your case to the USGBC. Having done this twice, we've begun to think it would be easier to prepare a Supreme Court brief.¹⁴ If you outsource the documentation, only a saint or a fool would do it for less than \$20,000. So you're already in the hole \$68,450 for a small building. Then, near the project end, when you realize you are a few credits short of a full LEED load, come the unanticipated expenses of upgrading the air handlers or eliminating HCFCs from the chillers or purchasing green power from your local utility. At the conclusion of Aspen Skiing Company's most recent LEED Odyssey, we were hemorrhaging cash. Our V.P. of Real Estate Development was frustrated to the point of sarcasm: "I spent extra to bring in certified wood but it was certified by the wrong agency so I didn't get credits for it. We thought our energy modeling would give us the points we needed, but that didn't work out either, so we spent a lot of money to not get Gold, but it was the right thing to do."¹⁵

The danger is that LEED certification will cannibalize funds that otherwise could be used to improve the building. At today's price point, developers face a choice: pursue LEED—or purchase a photovoltaic system, daylighting, or efficiency upgrades. Chris Field, who teaches biology at Stanford, says “We decided we would rather take money required for LEED certification and spend it on sustainability features.” Field was uncertain what that cost would have been but called it “Substantial. Investing in LEED certification would have meant that we wouldn't have been able to invest in heat rejecting windows...”¹⁶ In

¹³ For details on these sorts of mistakes see Schendler, A. 2001. “The Rough Road to Sustainability in Aspen: How Failure Can be the Next Great Tool in Sustainable Business.” Elsevier Science, Inc. *Corporate Environmental Strategy*, Vol. 8 No. 4, pp. 293-299.

¹⁴ Documentation usually consists of a stack of three ring binders, filled with product cut sheets, spec sheets, photos, affidavits, testimonials, etc. ASC's last submission was a foot tall and weighed 20 pounds, submitted in duplicate.

¹⁵ Personal communication with ASC V.P. of Real Estate Development Don Schuster, March, 2005.

¹⁶ Muto, S. 2004. “Building Owners Forgo Being Certifiably ‘Green.’” *Real Estate Journal: The Wall Street Journal Guide to Property*. April 14. Available online at http://www.realestatejournal.com/columnists_com/bricks/20040414-bricks.html

his day job, Field directs the Department of Global Ecology at Carnegie Mellon University. If a global ecologist doesn't find value in LEED, will Donald Trump?

Milwaukee's new Urban Ecology Center is one of the greenest buildings in the upper Midwest. Certified? No, "because it could have added as much as \$75,000 to the cost, just for the paperwork..." says Executive Director Ken Leinbach.¹⁷

In "The Cost of Green: A Closer Look at State of California Sustainable Building Claims,"¹⁸ the authors note that "Our review indicates many developers are leery of the costs of adopting the LEED standard." Eric Roberts, one of the developers interviewed for the report, says, "People are starting to think that it's enough to use the LEED checklist as guidance because actual certification is too expensive and time consuming." Roberts built the first LEED registered office project in San Francisco, but never bothered to finish the application process. It is not good for the USGBC when a LEED-built structure doesn't get certified because it's too expensive. This must change, and we discuss some possible solutions to this problem at the end of section four.

Problem # 2: Point Mongering and LEED Brain

"I'm sick of the hype. I'm sick of meetings where you spend endless hours debating a LEED point instead of focusing on good design."

—respondent to the Green Building Alliance Survey¹⁹

Point mongering is what happens when the design team becomes obsessively focused on getting credits, regardless of whether they add environmental value. Why does this happen? Because there is prestige in getting a high LEED rating; it can make your reputation as a green company. Since LEED certification is costly and time consuming, gaming a final few credits can be worth its weight in LEED Gold.

¹⁷ Blume, Ed. 2005. "Urban Eco Center Taps Nature's Bounty," Wisconsin Renewable Quarterly, Winter.

¹⁸ Greenspirit Strategies, Ltd. 2004. "The Cost of Green: A Closer Look at State of California Sustainable Building Claims." Available online at

http://www.apawood.org/level_b.cfm?content=pub_ewj_0402_green. Accessed March, 2005.

¹⁹ Green Building Alliance. 2004. "LEED-NC: The First Five Years." Report on the Greater Pittsburgh region's experience using Leadership in Energy and Environmental Design for New Construction. Green Building Alliance, 64 S. 14th Street, Pittsburgh, PA, 15203. www.gbapgh.org. p.4.

Guilty as charged. On one project we considered installing a reflective roof. LEED encourages this because black roofs contribute to the “heat island” effect that raises urban air conditioning bills. Reflective roofs and parking surfaces address this problem, saving energy. But at 8,000 feet in the Rockies, heat islands are not an issue. Still, if we can get the credit, we’d have a better shot at a higher LEED rating, so why not try? Disingenuous? Absolutely. Fair? Not to anyone, and here’s why. If we point out that we don’t really need the high albedo roof, we’d lose our shot at the credit, shrinking the pool of possible points we can get. If we go for the credit knowing it’s irrelevant, we’re corrupt. Do you play the game, or not?

“LEED brain” is a term for what happens when the potential PR benefits of certification begin driving the design process. LEED can be a way to facilitate regulatory approvals, appease the public, and get free press. There’s also a powerful incentive for mechanical engineers, architects and contractors to gain LEED expertise. It labels their firm as “green,” increasingly a prerequisite on requests for proposals. Unfortunately, if you know how to scam LEED points, you can get the PR benefits without doing much of anything for the environment. A system developed to address greenwashing runs the risk of becoming greenwash itself!

A perfect example of LEED brain comes from Boulder, Colorado, where a recreation center received one point for installing an electric vehicle recharging station. Only problem: there are about six electric vehicles in Boulder that could be charged at that site, and the charging station gets used less than once a year.²⁰

The dirty little secret is that you can certify a building without doing much at all (other than mountains of paperwork) to make it green. Consider our Sundeck restaurant. It was one of the first LEED buildings constructed, but other than commissioning (which was required) it’s essentially built to code, with a few modest upgrades.

In *Animal Farm*, George Orwell notes that “some animals are more equal than others.” In LEED, though, all credits are equal, even though some credits have greater environmental benefits than others. Because you only need 26 points (of 67 possible), we’ve heard LEED consultants remark that you can “certify a building without getting *any* energy points.” Maybe so, but why bother? A respondent to the Green Building Alliance Survey said it best: “We received one point for spending an extra \$1,300,000 for a heat recovery system that will save about \$500,000 in energy costs per year. We also got one point for installing a \$395 bike rack. This must be corrected.” While this is an extreme case, it points to a real problem. Why install new HVAC equipment for a few extra points when you could get the same points by changing the color of your shingles at

²⁰ Stein, J. and R. Reiss. 2004. [10] p.7

²¹ Personal communication, April 1, 2005.

no cost? Machiavellian? Sure, but builders are businesspeople, and financial pressures are real.

In truth, LEED is based less on scientific analysis than on committee consensus. In hindsight, some of the USGBC's early programming decisions seem arbitrary. Grounding LEED more deeply in science would help address point inequality issues, a topic discussed in more detail by Stein and Reiss. One solution is to make more critical credits mandatory, the way commissioning currently is. That way, credit mongering would be played with the cheap cards like low-VOC paints or sealants, not the face cards like energy and water conservation and sustainably harvested wood.

To its credit, LEED encourages energy upgrades by making ten points available for increased energy performance. The problem is, getting the energy credits is tough. You have to do extensive computer modeling, which adds cost, time, and confusion. For these reasons, at the Sundeck, we blew off the modeling. But energy efficiency is arguably the most critical aspect of green building. The USGBC could make at least four energy credits mandatory, thus requiring LEED buildings to be 30% better than code. Wouldn't this make LEED certification still harder to obtain? Perhaps, but LEED is difficult not so much due to its requirements, but rather due to its bureaucratic process. Fix that, and we'll see an increase in LEED buildings, even with more stringent standards.

The next section describes some of the problems associated with modeling. E Source's Jay Stein points out that "Modeling is prohibitively expensive for smaller buildings because so much of the work involved doesn't vary with building size. Perhaps what's needed are prescriptive measures for smaller buildings, leaving the complex and expensive modeling work for larger ones."²¹

Problem #3: Energy Modeling is Fiendishly Complicated

At the Golf Clubhouse in Snowmass, we thought we had a LEED Gold building nailed. Early on, we hired one of the best engineers in the country. He encouraged us to install a geothermal system that would capture heat and coolth from a pond on the course. Slick. We assumed we'd get eight to ten energy credits, and breeze in for Gold. In the end, we only got four points, good only for Silver, and our reputation was tarnished.²²

What happened? Due to some bizarre assumptions in the modeling protocol, it initially appeared that we couldn't get credit for the huge improvement the geothermal offered. When we first modeled the geothermal system we compared its energy consumption to that of a code compliant building we could otherwise build. We soon learned, however, that the American Society of Heating, Refrigeration and Air Conditioning Engineers (ASHRAE) required us to model our innovative heating system against a "like system." In other words, although our proposed geothermal solution was far superior to a gas-fired boiler, ASHRAE forced us to compare it to *another geothermal system*. Confused? So

²² Discussions between our engineer and the LEED engineer later revealed that we should have received six energy credits. Since two more points wouldn't get us Gold, and since we were never awarded them even after this discussion, we dropped the issue.

were we. Here's an automotive analogy: Shopping for a new car, you might consider a Toyota Prius rather than a SUV. If you bought the Prius, however, LEED would evaluate its performance against a Honda hybrid not the guzzler alternative.

LEED, like pig Latin, can be arcane. In this case, connections to the green mafia uncovered an architect fluent in LEED credit interpretations. Our contact described an exemption to this "like system" rule for cooling loads less than 150 tons. We felt like we had received a dispensation from the Vatican. But we instantly hit another computer modeling pothole. In order to achieve any of the energy credits, you have to measure building performance following ASHRAE guidelines, *except as modified* by LEED's protocols. As our engineer pointed out, "You have ASHRAE 90.1 dog-eared on one side of the desk, and the LEED book open on the other side, and you're trying to follow both procedures, and it's extremely complicated."

The crux is selecting your budget system, which is a confusing matrix with exceptions and caveats involving single vs. multizone buildings, and other obscure requirements. On the Clubhouse, we had multiple single zone systems—so was it multizone or single zone? You don't need to follow the lingo to know things were out of control. We love engineers, even if they are an odd breed. Some engineers are idiot savants, some are graceless in social situations, but all of them are valuable assets.²³ That both our engineers *and* the USGBC engineers were confused is telling.

We went back and forth with the USGBC on how to define our building systems. Ultimately, we were told to model the building in a certain way. Months later, during the final review, we found that the papal dictate had changed. To appeal the ruling would have cost \$2,000. Over budget and under fire for the costs of LEED certification, we folded, ending up with half the energy points we'd strived for, killing Gold. Our long-suffering engineer had the final word: "The more work I do with LEED, the more distasteful it becomes."

The LEED process treats computer modeling as a way to gain energy points. But modeling is most valuable as a design tool, a verity that too often gets lost in the fog. Intelligent modeling, early in the design process, can save lots of energy, money, and pollution. But the costs of modeling don't scale with building size, and all modeling risks becoming an exercise of GIGO: garbage in, garbage out.

No Credit for Butchering the Energy Hog

Sometimes getting LEED points is too easy, other times too hard or simply impossible. At the Clubhouse we couldn't get credit for two innovative efficiency solutions because LEED excludes electrical plug loads from its analysis. We spent enormous time and effort to install a variable speed drive in the kitchen hood vent after our modeling

²³ The difference between a shy and an outgoing engineer? The outgoing engineer will look at *your* shoes when conversing at a cocktail party.

suggested it would otherwise be an energy hog. The VSD will save lots of money and tens of thousands of pounds of greenhouse gases. The garage, meanwhile, was designed to house electric golf carts, whose batteries emit explosive hydrogen gas. Instead of inefficiently venting heated air 24-7, we installed multiple, redundant hydrogen sensors creating radical energy savings while safely venting the garage. It was a green design coup. But since neither the garage nor the kitchen hood ventilation systems were “regulated loads,” we got no credit for our innovative work, because we’d already used up all four of LEED’s innovation credits.²⁴

From an operating cost and climate impact perspective, building energy performance is critical. That's why hardwired "plug loads" like the ventilation fans described above matter. In all its energy calculations, LEED relies heavily on ASHRAE 90.1. But the 1999 version of this standard fails to provide credit for a number of critical strategies, including: building orientation and shape, efficient fan systems, low energy pumping systems, low energy office equipment, efficient exterior lighting, water cooled chillers, daylight controls, demand controlled ventilation (using CO₂ sensors), and high thermal mass. Some, but not all, of these problems are addressed in ASHRAE’s 2001 version. These shortcomings are thoroughly described in a must-read article by Jason McLennan and Peter Rumsey.²⁵

Problem # 4: Crippling Bureaucracy

“How long will I have to wait before I can go in to see the major?”— “Just until he goes out to lunch,” Sergeant Towser replied. — “But he won't be there then, will he?” — “No, sir. Major Major won't be back until after lunch.”

—Joseph Heller, *Catch-22*

Energy points weren’t the only ones we lost due to LEED’s *Catch-22* like rules. When we built our first LEED building high above the city of Aspen at 11,000 feet, we took extreme measures to reduce nighttime light pollution, and received an innovation credit for our labors. This light pollution credit was later incorporated into LEED 2.0.

We assumed that achieving the same credit at the Golf Clubhouse a few years later would be a no-brainer. But despite the fact that we used the same lighting designer who helped

²⁴ At an adjacent, non-LEED building, we ran into a similar ventilation issue. According to ASHRAE, garages should be vented at 1.5 cubic feet per square foot per minute. This means using fans to vent air you just paid to heat. Our engineer found an ASHRAE paper that updated ventilation rates based on cleaner cars (the old rates were based on ‘65 Mustangs.) That cut the ventilation rate in half. Then he specified CO monitors, which brought the ventilation rate down even further, saving both fan and heating energy. In LEED, however, this elegant solution would not be eligible for energy credits.

²⁵ McLennan, J. and P. Rumsey. 2004. “Green Edge: It’s Time To Give Credit Where (Energy) Credit Is Due,” *Environmental Building News*. May. Available online at http://www.edcmag.com/CDA/ArticleInformation/features/BNP_Features_Item/0,4120,124654,00.html. McLennan and Rumsey: “The USGBC should “move decisively and quickly to utilize this new energy standard and help architects and designers get credit where credit is due.”

us achieve our Sundeck credit, we didn't get it. Why? In part because the form our lighting designer used was outdated. LEED certification takes a long time. It took us two years to ready all the information for submission. By the time we submitted, the form we had used was obsolete, a new credit interpretation rule had been issued, and our lighting guy had switched firms. As they say in Pac-Man, *Game Over*. We had not minimized exterior lighting at the Golf Clubhouse, we had *eliminated* it, but we still couldn't get a point we had *invented*.²⁶

Reform the Review

The best green buildings don't just have fresh air and daylight, they have heart, soul, humanity: palpable qualities you can feel. In contrast, interactions with the LEED rating system tend to be rigid and soulless, as stark and clinical as a colonoscopy.

The review process is too onerous. A respondent to the Green Building Alliance survey noted: "The review process is heavy-handed. It's as if the USGBC contractors are trying to impress the home office with their thoroughness and nitpicking... Review comments are brief and impersonal, without the slightest hint of support—and always by email of course."²⁷ Read closely, this hints of the applicant's existential angst: "Does anyone at the USGBC give a damn about me, this building, the process I have gone through?"

LEED reviews feel like Navy SEAL boot camp, where the goal is to fail as many applicants as possible. Credit reviews are humorless, severe, even confrontational. Green building is hard, and the USGBC should be aiding and abetting green projects, not crushing them with a faceless technocracy. Credit interpretations should be constructive, not infer that the applicant is a criminal violating parole.

Better yet, instead of our Fed-Exing 30 pounds of old-growth to Washington, D.C., then enduring months of electronic quibbling and water torture, why don't the LEED evaluators come out and spend a few days looking at the Clubhouse themselves? They can personally verify the dual-flush toilets, examine the HVAC controls, meet our design team, down a sustainably-brewed Fat Tire, maybe even play a round of golf. (No mulligans allowed—that might be considered bribery.) If there are questions, let's resolve them on the spot.

The LEED specifications are fast taking on the complexity of the federal tax code. Why not give reviewers more discretion, some latitude for subjective decision? This would add a level of humanity to credit review and interpretation. *Catch-22* is a funny book, but the blind adherence to nonsensical orders Joseph Heller satirized was, and remains, a real problem in military bureaucracy, and, it seems, at the USGBC.

²⁶ We could have submitted the new form for credit, along with a \$500 resubmittal fee. But since we had already thrown a lot of money at LEED and weren't going to get Gold anyway, my bosses weren't keen to pay more money for a credit we clearly should have received.

²⁷ Green Building Alliance, 2004. [18] p.35-36.

Members of the Delta Force are given wide decision-making ability in the field. They are much more effective than the average G.I., precisely because they don't have to clear every decision with a superior. USGBC consulting engineers are as well trained and should be given broader latitude. Eliminate LEED's confusing Credit Interpretation Request program, and give more power to the reviewer.

Enough didactic quibbling. Decisions about what's green should be based on human (not Vulcan) logic. Does the application meet the spirit of the credit? If so, allocate the point. For example, LEED awards one point for providing employees in non-perimeter areas an ability to control temperature, airflow, and lighting. We did one better at the Clubhouse, designing it so that there were *no* non-perimeter workspaces, thus providing every employee with access to views, daylight, and fresh air. But by eliminating non-perimeter workspaces, we didn't get extra credit, we lost our shot at the credit entirely. Ouch!²⁸

And please, stop the nitpicking! After submitting a huge binder full of documentation for the Clubhouse, ASC was asked to resubmit follow-up information for 31 out of 44 credits. A reviewer noted that a letter from our wind energy provider had "been dated six months prior to the estimated project completion date. Please clarify." Sweet baby Jesus! ASC had done one of the first ten LEED buildings in the world. What must the newbies experience? The review process needs to be dramatically streamlined, and injected with a serious dose of humility and humanity.

Built Green Colorado, a residential green building certification program, has a different method. Like LEED, Built Green asks contractors to follow a checklist during construction, compiling documentation as they go. At the end of the building process, an auditor makes a site visit, checks the documentation, and makes immediate decisions about the legitimacy of backup information. Perhaps a reasonable—and cost-effective—compromise exists between the rigor of LEED documentation and the autonomy enjoyed by Built Green auditors.

²⁸ The point-mongering solution would have been simple: create a space for an employee in a non-perimeter space—perhaps locate a sales kiosk in the middle of the building, solely to capture the credit. But even we're not that cynical.

Problem # 5: Overblown Claims of Green Building Benefits Are Misleading²⁹

Since the 1994 publication of Joe Romm’s and Bill Browning’s “Greening the Building and the Bottom Line,” our industry has been rife with endlessly repeated claims of worker productivity, reduced personnel churn rates, and lower absenteeism.³⁰ (You know the argument: energy bills are a few percent of operating costs. Your big expense is labor. So if green building improves worker productivity or reduces absenteeism, those benefits will dwarf the energy savings.) It’s not that these studies aren’t seminal, or that the claims aren’t true. The point is that they are difficult to quantify and vary according to building type. Different sorts of developers will value them, or not, depending on their perspective and investment horizon. Furthermore, these benefits *don’t* impact first costs, and they *don’t* help builders meet budget, two real-world barriers that often severely hamper green building.

A synopsis of Greg Kats’ widely cited study—“The Costs and Financial Benefits of Green Buildings”³¹—notes that “Many of the financial benefits estimated in this report are general financial benefits, rather than benefits that accrue to a specific building tenant or owner. While a government entity should care about the benefits its buildings may have for society, a private commercial entity may not. Private-sector building owners, for example, are less likely to care about health and environmental impacts, and hence might perceive significantly lower financial benefits.”

²⁹ This final problem predates LEED and thus isn’t really LEED’s fault. It is, however, a major impediment to green building, and since both LEED and USGBC enable its continuance, we’ve included this discussion here.

³⁰ J. Romm and Browning, W.D. 1994. “Greening the Building and the Bottom Line.” Rocky Mountain Institute, Available online at <http://www.getf.org/file/toolmanager/O16F8527.pdf>. Accessed February, 2005. Vivian Loftness at Carnegie Mellon University has also published research on this topic.

³¹ Kats, G. “The Costs and Financial Benefits of Green Building.” Summary in *The Pittsburgh Papers: Best of Greenbuild 2003*. BuildingGreen, Inc. p. 7. The full paper is: Kats, G. 2003. *The Costs and Financial Benefits of Green Building*. Prepared by Capital E for the California Sustainable Building Task Force. October, Available online at www.usgbc.org/Docs/news/news477.pdf. Accessed February, 2005.

In short, societal gains don't profit builders on a budget, unless that builder happens to be Gandhi.³² It's time to throttle back our touting of worker productivity to justify green building. Yes, kids and postal workers do better in daylit spaces, but it's better to note than to blivate about these benefits.³³

A Clumsy Tool?

Many things stand in the way of green building—ignorance, stupidity, sloth, institutional inertia, a dearth of experienced architects and mechanical engineers, first-cost concerns, and short-term profit motives, to mention a few. To its credit, LEED has helped demolish some of these barriers. In the final analysis, however, LEED is just a tool. The most useful tools—think of a carpenter's speed square or chalk box—are designed to be easy to use, while improving accuracy and productivity.

Building will always be difficult, that's why good tools are cherished on the jobsite. The danger is that LEED's arcane rules and confrontational nature make it more trouble than it's worth, less like a speed square, more like a clumsy jig advertised in the back pages of *Fine Homebuilding*. In its current iteration, LEED is an awkward and frustrating tool that is difficult to master. The program's fatal flaw is that it lacks a learning curve.

If wrestling with LEED once meant that future projects would be simpler, the initial cost in money, time, and brain damage might be acceptable. But certifying one building doesn't make it any cheaper, easier, and quicker to certify the next one. For this reason, LEED, rather than launching a green design revolution, may soon fade to irrelevance, or worse become the emperor without clothes, king of the green building land, devoid of credibility.

Searching for Solutions

The USGBC has been enormously successful at publicizing the need for, and benefits of, greener buildings. Thanks to the USGBC and LEED, we now have momentum, media attention, broad understanding of green building, and motivated clients. Next, we need to make sure we're using the best possible tool for the job.

We've described numerous problems with LEED: its cost, focus on points instead of green design, the complexity of energy modeling, the crippling bureaucracy, the misleading hype about the benefits of green building. Others have outlined specific

³² It's particularly not a win-win for speculative builders who don't intend to own their projects, and thus won't benefit from energy savings.

³³ For the same reason, at Aspen Skiing Company we justify lighting retrofits based solely on energy savings—ignoring the eventual labor savings from longer bulb replacement cycles.

³⁴ For example, the Pittsburgh Green Building Alliance report cited above. Also see the American Forest and Paper Association, online at <http://www.awc.org/pdf/TheImpactofLEED.pdf>

problems with individual credits.³⁴ Today, there is a buzz in the green building world, internally at the USGBC, and particularly at LEED conferences themselves, that suggests a major rethinking of LEED is underway.

There are many ways to improve LEED: make more of the key points mandatory to reduce point mongering and encourage integrated design, simplify the energy modeling protocols, substitute onsite ratings for paper shuffling at a distance, as well as the numerous suggestions from articles cited in this paper. Ultimately, LEED is too committee driven. In the quest for accuracy and precision, credit interpretations and definitions have become obfuscation, gibberish fogging the windshield, distracting us from the noble goal. We need to cut the clutter, and remember that a committee never painted a Picasso or designed a Porsche.

It's not clear to us that LEED can be fixed with tweaks and tinkering. A complete revamp may be in order. Perhaps the world doesn't need a green building certification as much as it needs a green building *specification*. Instead of a wild goose chase for points ("Should we specify our recycled content at 5% post-consumer + 50% post-industrial or go higher? What is the IPMVP and is there an English edition?"), maybe LEED certification should require getting 26 points, 20 of which are mandatory. If a building is required to beat ASHRAE 90.1 by 30% or 40%, it's probably got an integrated design. Cut water use similarly, throw in some certified wood, and you are a long way to the goal. Keep it simple, stupid.

At the moment, much of the USGBC's brain power is being devoted to rolling out a confusing litany of new standards (including "EB, CS, CI, H, and ND" for "existing buildings," "core and shell," "commercial interiors," "homes," and "neighborhood development," respectively). Instead, why not a dramatic simplification? For smaller buildings, why not "LEED EZ," like form 1040 EZ for taxpayers? For small buildings, a prescriptive energy code is sufficient, covering building envelope specifications, heating system efficiency, and other key essentials. That way, you'd be done, drinking at the bar come quitting time out of satisfaction, not frustration.

The U.S. Department of Energy's Building America program offers valuable lessons for revamping LEED. During a period when LEED certified just 167 buildings, Building America yielded more than 20,000 new houses, with a minimum of 30% reduction in energy for heating, cooling, and hot water at no net cost. Why the striking difference in results? There are a number of reasons. First, Building America is a collaborative rather than confrontational process. It provides production builders access to teams of consultants, whose fees are paid by the DOE. Lessons learned by one builder are rapidly shared with other builders throughout the Building America community. In this way, success breeds success, reinvention is kept to a minimum, and building performance improves at no added cost. The production builders who have used Building America are enthusiastic in their embrace. Building America is ten years old, and has already revolutionized the production building industry.

Second, the program is based less on “green hype” and more on science. “Green building should be a no bullshit zone,” says Betsy Pettit, a principal at Building Science Corporation, one of DOE’s Building America teams. “We search for the scientific truth about how buildings work, and how we can make them work better. This shall set us free.”³⁵

Third, Building America, unlike LEED, is less a PR label than a precisely calibrated specification that covers resource efficiency, energy performance, indoor environmental quality, durability, and utility bill savings. LEED was designed to give architects and developers flexibility. But maybe flexibility isn’t everything it’s cracked up to be. The building process is a daunting gauntlet of decision-making; why add another confusing layer upfront? Like early-80s computer manuals which presumed that everyone was dying to learn DOS, the LEED checklist has a nerdy arrogance, assuming that every green aspirant has the desire and time to winnow through points in pursuit of an imprimatur. Architects and engineers and contractors are swamped already; no one’s brain power is unlimited. Currently, LEED is performance-based—fine for devotees. For the mass market we need something more prescriptive—LEED for Dummies. Tell my designers what to do, we’ll do it. The world is hungry for a green building specification. Indeed, seemingly unaware that LEED’s checklist approach doesn’t guarantee energy performance, a number of local, state and federal agencies have begun using LEED in just this way, as a specification.³⁶

Finally, Building America consultant teams strive to reduce friction, unnecessary work, and duplication of effort. Unlike LEED, there’s no misallocation of resources. “Having consultants check up on other consultants instead of collaborating to come up with more creative solutions wastes money and time,” says Pettit. In LEED, much of the certification process, the point scamming, the contentious judging is just sand in the bearings.^{37 38}

³⁵ Personal communication, March 24, 2004.

³⁶ Stein, J. and R. Reiss. 2004. “LEED Scores Early Successes but Faces Big Challenges.” E Source. Paper ER-04-03 Tech. March. p. 1. That and other resources are available for purchase at <http://greenbuildings.platts.com>.

³⁷ Personal communication, March 24, 2004.

³⁸ LEED is most often discussed as a certification program, but it really seeks to be a “label.” One very successful labeling program in recent years has been Energy Star, which has worked in part because its objectives are achievable; the program is collaborative. http://www.energystar.gov/index.cfm?c=about.ab_index
If the label or imprimatur is LEED's value, it makes sense for the USGBC to nit pick applications, since each new certification, in a sense, deflates the value of those coming before. But the best labeling programs see themselves as change agents. Looking ahead, will anyone give a fig about, say, the 3,228th building to receive LEED certification? Sooner or later, this won't even merit press attention. LEED's overarching goal should be to transform the entire market, not certify or label individual buildings. Think of the label as a means to an end, not the end itself.

Where To From Here?

In 1927 when Charles Lindberg completed his solo flight across the Atlantic, F. Scott Fitzgerald wrote: "...Something bright flashed across the sky...and for a moment people set down their glasses in country clubs and speakeasies and thought of their old best dreams."

New things—from airplanes to word processors—take time to get right. Costs and logistics for early adopters tend to be daunting. That's to be expected. But not all innovations prosper. The bad ones fail, and some of the good ones do, too. The idea behind LEED is laudable. The execution, so far, has been disappointing. According to E Source, "the costs and benefits associated with LEED certification remain undocumented and uncertain," the system "is not a roadmap to the optimal cost-effective, energy-efficient building," and "it doesn't necessarily encourage integrated building design."³⁹

In the final analysis, the world needs green buildings a lot more than green buildings need LEED certification. The first is essential and inevitable. The second is optional. If LEED continues to cost too much in dollars, time, and effort, we are not going to stop building green projects, we'll just stop certifying them. The way things are, sometimes the LEED plaque isn't worth the flack, and that's not O.K. We need green building to triumph, to take over our culture like computers did. We need LEED—or something like it—to accelerate that transition. We need it for our future, for our children, and for our planet.

Let's roll up our sleeves, get to work, and reinvent LEED so that it is as inspirational, as hopeful, and as shimmering as one of our best dreams.

³⁹ Stein, J. and R. Reiss. 2004. [10] p.1

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Both authors welcome emails on this paper, and encourage the green building world to begin broad discussions-possibly at the next USGBC conference-on the subject of fixing LEED.

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