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## The Green Housing Boom

By [Linda Tischler](#)

**"How do you inspire a revolution?"** It's a question that obsesses Matthew Berman. A 36-year-old New York architect with short hair and a starched blue shirt, he doesn't, frankly, look like much of a rebel. "There's this grumbling," he continues. "It grows, it brings things to the center, and then you get this explosion."

Berman and his partner, Andrew Kotchen, 35, boast high-profile clients such as CNN's Anderson Cooper, but they think of themselves as guerrilla fighters in a global cause: reducing the impact of housing on the environment. When it comes to trashing the planet, gas-guzzling automobiles and belching factories get most of the blame. Yet the primary offenders are actually closer to home. Here are the shocking numbers: The construction and operation of buildings generate half of all greenhouse-gas emissions in the country, according to estimates based on data from the U.S. Energy Information Administration. Residential buildings alone account for 21% of national energy consumption -- nearly as much as transportation (27%).

Read the morning papers, and it's hard not to feel that the American housing industry is on the brink of the apocalypse. Home prices are plummeting, in some areas as much as 40%. However, it's exactly the gravity of the situation that some housing analysts see as the opportunity of a lifetime -- the chance to jolt us into embracing green housing.

The eco-revolutionary grumbling that Berman hears is spreading from communities such as California's Marin County, which now insists that all large houses meet the energy budget of a 3,500-square-foot home, to Aspen, Colorado, and surrounding Pitkin County, where any new home larger than 5,000 square feet faces special renewable-energy requirements. The latest report from McGraw-Hill Construction, cosponsored by the National Association of Home Builders, predicts that the market for green housing will grow to from as little as \$12 billion this year to between \$40 billion and \$70 billion by 2012.

Even some large commercial home builders -- forced into hibernation by the real-estate bust -- have begun sketching plans for a decidedly different generation of American houses. "Until recently, the publicly traded home builders saw green building as a niche market best taken up by smaller players," says David Wood, director of the Boston College Institute for Responsible Investing. "But with the down market, this could be a good time for them to differentiate themselves from competitors."

Jeffrey Mezger, president and CEO of Los Angeles -- based KB Home, which built 23,743 houses last year, is among those considering the green implications -- largely for economic reasons. Two years ago, he says, the average KB Home in Southern California for a couple with two kids was 3,000 to 3,200 square feet. Today, it's 2,200 to 2,500 square feet. "Heating and cooling bills in a 3,000-square-foot home are more painful in tougher economic times," Mezger explains. In May, when Wood's BC group and Calvert Investments ranked the 13 major home builders on their environmental practices, KB ended up in the top spot.

Not everyone has gotten with the program. "When people walk into Toll Brothers, they want the luxury that Toll Brothers offers," says Matt Wilkinson, senior project manager for the high-end builder in Bucks County, near the company's Horsham, Pennsylvania, headquarters. "If people want a smaller house, they can purchase in a different community." (Toll Brothers ranked ninth on the BC/Calvert list.)

Will we, a nation that equates bigger with better, ever be able to downscale our housing ambitions? We are consumed with fixing up, showing off, and estimating the value of our property. It's the most visible manifestation of our style, our wealth, and our status. Can creative designers find a solution that allows us to enjoy luxury and shrink our footprint at the same time? If not, what will be the cost?

**Back in 2002, Santa Fe architect** Edward Mazria was preparing a talk for his office's regular Friday-afternoon beer-and-chips bull session when he happened to reread the 1972 book *The Limits to Growth*, which discussed the rate of growth of CO<sub>2</sub> in the atmosphere and its implications for the future. Mazria wondered how that rate was being affected by the building sector 30 years later and challenged the young associates in his firm to find out.

What they discovered "practically knocked me off my feet," Mazria recalls. They crunched the data for U.S. energy consumption and added in the "embodied energy" of buildings (what's required to produce and deliver materials, and construct the building). Their conclusion: 50% of all greenhouse-gas emissions -- which closely track energy use -- are building-related. "We have a crisis on our hands like no other in historical records," Mazria says, "and architects are the main players."

Mazria, a 6-foot -- 6-inch gentle giant, was no newcomer to the green-design movement. In 1979, he published *The Passive Solar Energy Book*, which has sold more than half a million copies. But catalyzed by his firm's findings, he vowed to ramp up his efforts to get out the message. Like an Al Gore for the building trades, he began traveling the country with a multimedia presentation and a white paper entitled "It's the Architecture, Stupid!" It lays out, in urgent prose, the case for the building sector's culpability in climate change.

Every time an architect designs a building, Mazria explains, his decisions about orientation, materials, windows, and heating and air-conditioning systems affect energy consumption and greenhouse-gas emissions for 50 to 100 years.

And size counts. The average new U.S. home now measures around 2,400 square feet, up from less than 1,000 in 1950, a 140% increase. The average new house in Canada is only 1,800 square feet; in Japan, 1,000; in Britain, 815. "It's a one-to-one ratio," Mazria says. "If you're living in 4,000 square feet instead of 1,000 square feet, you're using four times as much" of everything from wallboard to flooring and furniture.

Mazria eventually left his practice to found Architecture 2030, a nonprofit organization that has challenged the building industry to reduce emissions by 50% by 2010 and be carbon-neutral in new construction and major renovations by 2030. The American Institute of Architects, the U.S. Conference of Mayors, the U.S. Green Building Council (USGBC), and even the federal government have signed on to his goals.

With a little imagination and a few billion bucks, Mazria now contends, the government could address both the struggling housing industry and the bigger problem of global warming. Speaking to the Good Jobs, Green Jobs conference in Pittsburgh in March, he argued that a one-year investment of \$21.6 billion targeted to increasing energy efficiency in the building sector would produce 216,000 permanent jobs, trim CO<sub>2</sub> emissions by 86.7 million metric tons (MMT) annually, and save consumers \$8.5 billion in energy bills. Extend that level of investment for five years, he says, and we'd create more than 1 million permanent jobs and save 433.5 MMT annually.

"The economic and global-warming crises are the motivation we need as a nation to retool our thinking," Mazria says. "If we're smart enough to jump on this opportunity, we will not only solve global warming, we will set up the U.S. for unprecedented economic success."

**The house where Steve Glenn** lives in Santa Monica is about as close as it gets to green-housing nirvana. Designed by noted California modernist architect Ray Kappe, it's a showplace that also produces its own

energy, uses gray water to irrigate the lawn, and produces little waste and near-zero greenhouse-gas emissions. It's the first home in the country to be certified Platinum according to the USGBC's Leadership in Energy and Environmental Design (LEED) standards.

One of the original partners in the tech incubator Idealab, a founder of enterprise-software company PeopleLink, and the director of an AIDS project in Mozambique for the Clinton Foundation, Glenn says he once wanted to be an architect, but by college had determined he had neither the talent nor the temperament for the profession. Later, he had an epiphany: "I realized that developers, not architects, control what gets created in the built environment." He confesses that he still finds his adopted industry, well, frustrating. "This development business doesn't scale as elegantly as technology," he says. "The clock speed is different."

Glenn's extreme-green house is both his own residence and something of a prototype for a line of homes he's now rolling out with Philadelphia architectural firm KieranTimberlake, already an industry leader in sustainable design. The venture is an ambitious attempt to make green and cool coexist. The biggest challenge, Glenn says, is not environmental features or high design. It's cost. At a pricey \$250 per square foot for 2,500 square feet, plus another \$40,000 for the foundation, his house cost more than \$765,000 to build. And that doesn't include the price of the land.

His solution: prefabricated construction. It may have a bad rep with many consumers, but architects are increasingly enthusiastic. "Prefab allows you to build a house with smaller thresholds for tolerance," Glenn says, "and a tighter energy envelope." It also allows the high up-front R&D expenses for green components to be amortized across many homes and mitigates one of the biggest environmental offenses of conventional home building: the rubble left behind. Construction waste makes up 30% of landfills.

In March, Glenn and KieranTimberlake announced the LivingHomes Building System, which combines modules for kitchens, baths, and utility cores with prefab "Smart Panels" that contain the house's mechanical ducting, electrical, and plumbing systems. The units are designed with software that allows buyers to customize their homes and to expand them over time, from a modest 900-square-foot house to a 2,160-square-foot, four-bedroom place. Initial costs are \$215 a square foot (excluding foundation and delivery of materials), but Glenn expects the price to drop to \$155 a square foot as volume increases. All the homes meet LEED Silver standards.

The advantages -- in terms of both economics and design -- of prefab housing are the subject of an exhibition at New York's Museum of Modern Art this summer, "Home Delivery: Fabricating the Modern Dwelling." Five cutting-edge factory-built houses designed by leading architects will be erected on a lot adjacent to the museum, and 58 more projects will be featured inside.

"For most people," says Barry Bergdoll, the curator of architecture at MoMA, "prefab means mobile homes and things that are upside down after the next hurricane in Florida." That's a particularly American stigma we should get over, he asserts. "Each house can be different, in a much richer way than Nike can personalize your sneakers," from a contemporary design like Glenn's to a Colonial. "Many houses in Japan are prefab," Bergdoll says, "and if you walk down the street, you'd never know it."

**It's a long way from** the tony precinct of MoMA to New Orleans's devastated Lower Ninth Ward, but the housing going up in the Holy Cross neighborhood there would not be out of place in the museum's show. In August 2006, Berman and Kotchen's architecture firm, Workshop/apd, won a competition sponsored by environmental activist group Global Green USA and actor Brad Pitt to design a zero-energy affordable-housing development in the most ravaged part of the city.

Workshop/apd's "GREEN.O.LA," which is currently under construction, will include five single-family houses and 18 apartments, powered by solar panels and equipped with rainwater-collection systems. The buildings are sited for maximum cross ventilation and rigged with louvers to minimize heat and capture breezes. Trellises will help keep the interiors cool.

Much of the project will be prefabricated off-site, with sustainable materials. But the feature that most animates the designers is Lucid Design Group's Building Dashboard, a digital meter installed by the front

door of the model home that uses sensors to provide a continuous digital readout of the energy being used. It can even translate the cost of that energy into real-world terms -- to show how the number of kilowatt-hours of electricity used, for example, translates into gallons of gas or hair-dryer hours. "So you leave the AC cranked up while you're gone, and it will show you that it cost you the equivalent of gas for two weeks," Kotchen says.

Berman and Kotchen also design custom homes for the well-heeled. Their role, they say, is to transform the way these clients think about the space they inhabit and to provide them with the most efficient platform -- which usually means smaller is better. "Good design is inherently more efficient and uses less materials," says Kotchen.

"We struggle with our own clients, to educate them," he continues. "We tell them they don't need a family room, a living room, and a media room, because all those spaces essentially perform the same."

"If we can un-name the rooms, and step back and look instead at how they're used, we can give you more opportunity in less space," Berman chimes in. "Then you can start layering on the other things -- orientation, power consumption, material use."

They've had some success. One client who came in wanting a 3,000-square-foot house now is content with a mere 1,900. But they don't always win. "We now have one very flexible couple," Kotchen says, "but we cannot get them to give up the media room."

**Wilfried Wang** thinks that if builders really want to help save the planet, they should stop building altogether. That's an odd thing for an architecture professor to suggest, but then Wang is unusual among his peers in his disregard for the things that normally set architects' CAD-CAM programs aquiver. "As long as we attach importance to housing starts as a statistic, we will continue to see the development of single-family freestanding houses as a positive contribution to the economy. That in itself leaves aside the issue of ecology," says Wang, who holds a chair in architecture at the University of Texas at Austin. Wang would have architects and builders focus their attention on retrofitting existing buildings to be energy efficient, rather than razing them and building anew. "If we're honest," he goes on, "we're in no way going toward a building industry capable of producing housing in a sustainable way."

There are also those who argue that density is essential -- that cities and apartment buildings are the best route to greener housing. But, barring a dramatic sociological shift, the environmental impact of the single-family houses that are part of the American dream will have to be addressed. There are some signs that could happen when construction picks up. The McGraw-Hill Construction study estimates that by 2010 as many as 10% of all housing starts in the United States will include some eco-friendly features such as energy-saving appliances, low-flush toilets, and more-efficient heating and cooling systems, up from 2% of starts in 2005. KB Home's Mezger says his company's "My Home. My Earth" program, in which KB designers educate buyers on greener choices, is gaining momentum even in the face of the downturn. "Less than 2% of customers a few years ago were asking about energy-efficient options," Mezger says. "Since we introduced My Earth in April 2007, it's gone up to 75%."

Even in hard-hit Northern California, where Grupe Co. has virtually shut down its green development, Carsten Crossings, there are indications that there will be a market for houses with a more modest footprint. "Prices have fallen so low here that we have completely stopped building," says Mark Fischer, senior vice president of operations. "If we build a house, green or otherwise, we lose money." Yet before the bubble burst, the LEED-certified homes in Carsten Crossings were outselling their competitors' two to one, and buyers were boasting online of monthly energy bills of \$5 to \$10.

What of the primal instinct behind our love affair with big homes? We don't really need massive family rooms or kitchens grand enough to cater a meeting of the Intergovernmental Panel on Climate Change. It's more about our human desire to embody in bricks and mortar our sense of ourselves and our place in the community. But perhaps, come the revolution, sustainability will replace opulence as the new status marker.

As Wang puts it, "Sustainability is a cultural problem, embedded in unsustainable lifestyles. The radical restart has to begin with each one of us."

