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52 Broad Street, Boston, MA 02130
617.951.1433
bsa@architects.org
www.architectureboston.com

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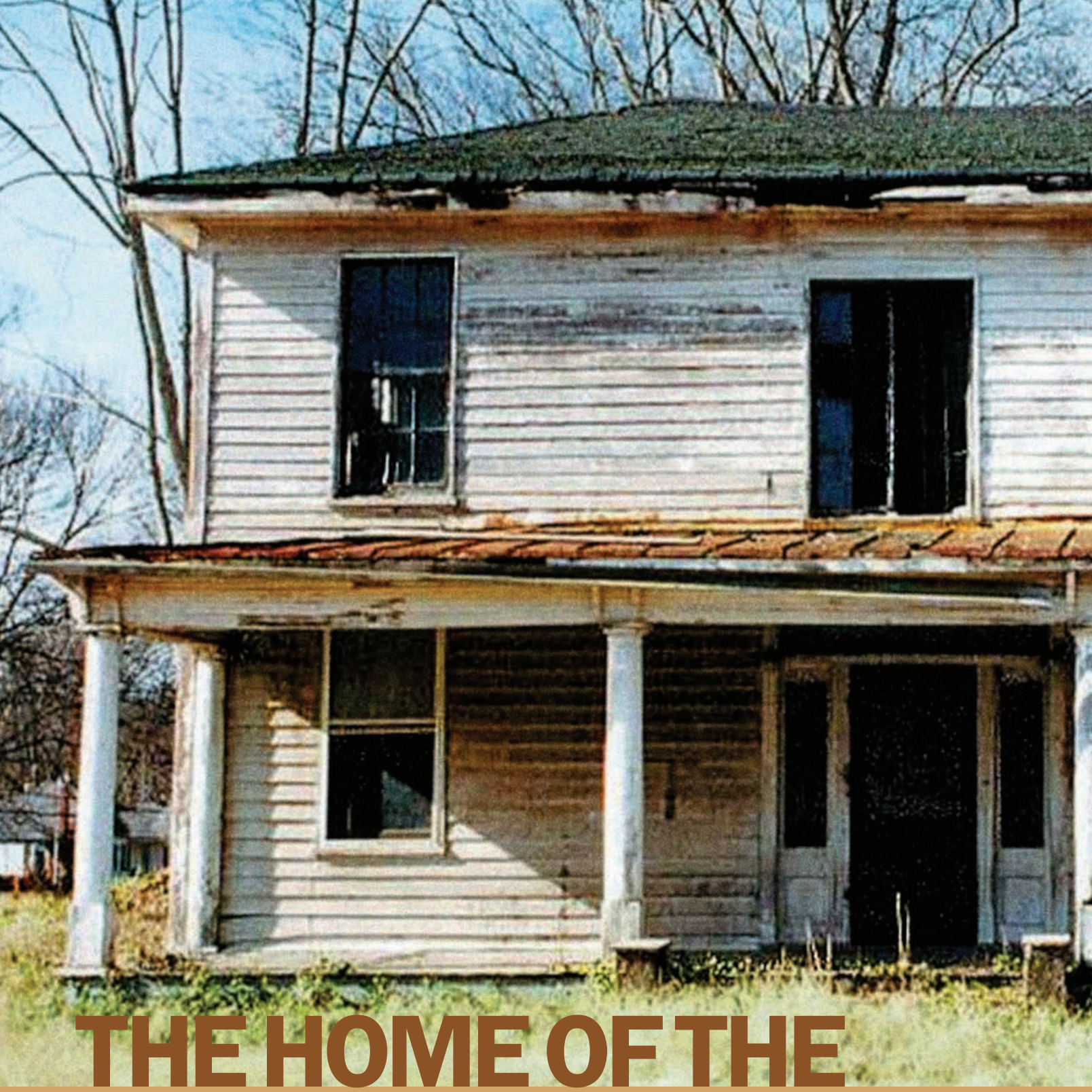

THE HOME OF THE FUTURE?

The home of the future may be older than you'd guess

BY JAMES HADLEY AIA

Ask American architects what the home of the future will be and chances are you will hear about energy and resource conservation, healthy materials, recycling and waste-stream control, and perhaps a bit about neighborhood design. Who can blame them, after all, for architects are reminded every day that their work is a substantial cause of the build-up of carbon in the atmosphere and that they damn well better do something about it, and quickly. It is unlikely that style, hominess, or a sense of tradition will come up in such a conversation, even though these are the things that most non-architects talk about when home is mentioned. It seems that Le Corbusier's *machine á habiter* (machine for living) is making a comeback, via the

green-design movement, sweeping aside passé ideas of *gemütlichkeit* and the charged imagery associated with the past.

To illustrate this point, Donovan Rypkema, a preservation economist, cited the following example in a 2006 article in *Forum Journal:*

Over a year ago in Boulder [Colorado], a homeowner in a local historic district applied to paint his window sash and trim, and approval was given the same day. Two weeks later, the landmarks commission learned that the historic windows had all been removed — a clear violation of the local ordinance — and had been replaced with new windows. This was done by a contractor who claims to specialize in "ecologically sound methods" and bills himself as "Boulder's greenest contractor."

The landmarks commission sent a letter directing that the original windows be retained and their condition documented. The contractor responded saying that the greater energy efficiency of the new windows should outweigh the regulations that apply to houses within the historic district. A subsequent commission hearing upheld the staff position and a city council hearing supported the commission's ruling.

Here's the next chapter — a reporter for the local alternative newspaper decided to take matters into his own hands. He went to the house, picked up the historic windows, took a sledgehammer to them, hauled them to the dump, and arranged to have a bulldozer run over them.

But the truth is, as Rypkema points out, preservationists and environmentalists have more to agree on than to fight about these days, and as global warming continues to cook both groups indiscriminately, they are likely to become closer, rather than farther apart. A major reason is the value of the "embodied energy" (see definition below) tied up in the built environment: those old windows took energy to construct, energy to remove, and energy to destroy — all of which was lost after replacement. (As Rypkema shows, the diesel that powered the bulldozer alone consumed more fossil fuel than would be saved over the lifetime of the replacement windows.) Preservationists and environmentalists would also agree about resource conservation. The windows were made of old-growth lumber, as irreplaceable as an ancient tree at this point. Preservation, it turns out, is a green strategy.

A 1998 study by the University of Michigan compared the total energy consumption of a typical new 2,300-square-foot house in Michigan to another, hypothetical house that incorporated energy-saving strategies in the design. The comparison assumed a 50-year lifecycle for the houses. The study found that the energy-efficient house consumed only 37 percent of the energy consumed by the standard house, a savings of 1,598 barrels of oil over its lifetime.

But even more interesting are the implications of the relative percentage of embodied energy (which the study called the "pre-use phase") in the two houses, a concept that becomes important once we start to evaluate structures in terms of their lifetime energy consumption. As we might expect, the construction of the two houses required approximately equal amounts of embodied energy — about 900–950 GJ (gigajoules). But because the total, 50-year energy use of the energy-efficient house was so much less, its embodied energy amounted to a much greater percentage of its lifecycle total — 16 percent versus 6 percent in the standard house. This suggests that even with lower consumption once the house is occupied, there is still an opportunity for substantial energy savings by reducing the structure's embodied energy. And one easy way to achieve that goal is to remodel an old house rather than build a new one.

Put another way, Americans tend to move in cycles far shorter than 50 years as family size, income, job location, or lifestyle changes; this cycling creates our housing market. In fact, the lifetime of a typical home mortgage is about 7½ years. Interpolating from the Michigan study, the embodied energy in an energy-efficient house built in 2007 will amount to about 60 percent of its total energy consumption by the time its owner is likely to move in 2014 (the percentage of embodied energy is highest in the first year and decreases over the lifecycle). In 20 years, it will still be a third of the total. Clearly, we can't keep tearing down and rebuilding and call ourselves environmentalists.

The US Green Building Council (USGBC) is the group that has assumed leadership of the environmental movement within the building trades in this country. The LEED (Leadership in Energy and Environmental Design) rating system that the USGBC has put together is the gold standard for environmentally responsible buildings today. Preservationists like to complain that the LEED ratings are unfair to preservation as a green strategy —

EMBODIED ENERGY

A building's embodied energy is the energy used in its production and, eventually, demolition. This includes the energy required to extract, process, manufacture, transport, and assemble materials, as well as the energy required for related equipment, services, and administration. Materials associated with high embodied energy include aluminum, copper, plastics, and glass. Those with relatively low embodied energy include wood, gypsum, fiberglass, and natural materials such as stone.

an inconsistency acknowledged by Max Zahniser, the USGBC's LEED certification manager, who indicates that upcoming revisions in LEED 3 will correct some of this imbalance. (Preservationists can and should participate in the comment process.)

Why does preservation need LEED? The simple answer is that in a society that demolishes 200,000 buildings a year — generating 124 million tons of debris, enough to construct a wall 30 feet high and 30 feet thick around the entire coastline — preservation needs all the help it can get, and can't afford to choose where it comes from. Not all demolitions in the US target important historic buildings, but enough historic structures are lost to make "tear down" a pejorative term in most communities. Tear-downs threaten even those towns that value their history. The Cape Cod town of Chatham, for example, has witnessed eight demolitions of historic houses a year over the last several years, despite an active historic commission opposing those demolitions and invoking the demolition delay by-law.

The truth is that the bulk of Americans don't care to live in either LEED-rated houses or historic ones. (It helps to know that *Better Homes and Gardens* magazine has a circulation about 25 times that of *Dwell*, a popular publication that frequently features LEED-rated houses, and over 40 times that of *Old House Journal*.)

It is only by affecting the choices that drive the enormous housing market that progress can be made in saving either history or energy.

The basic American home is a stage set where predictable events occur, not a machine for saving energy. It is an evocation of history, but seldom history itself. Unfortunately, it is only by affecting the choices that drive the enormous housing market that progress can be made in saving either history or energy. Both need saving, in the interest of our well-being and of our cultural sanity.

It is possible that the best hope for affecting housing choice in the American market remains government action — incentives for preservation and energy conservation, disincentives for demolition and wasting energy. Carrots and sticks, however, seem unlikely to work when the choice of a house in an affluent society is a "want to," not an "ought to" or even "need to" decision. But what if we could offer housing with the emotional comforts of the past and with cutting-edge, low-energy technology? The incentive for the conservationist is the possibility of getting close to a real zero-energy house; for the preservationist, it is the hope that more buildings will be saved. For an increasingly Internet-savvy public on the lookout for the latest thing in housing, something old might just be the answer. ■

James Hadley AIA is a partner with his wife Patricia Crow, a landscape architect, in Hadley Crow Studio in Orleans, Massachusetts, specializing in preservation and environmental planning. His recent work includes a recycling center for Caribbean resorts and a preservation plan for a church meetinghouse.

PHOTOS: PREVIOUS SPREAD, ASSOCIATED PRESS. THIS PAGE, COURTESY GEORGE TERRIEN AIA.

On a street in Rockland, Maine, architect George Terrien AIA is renovating a house for himself and his wife, the painter Connie Hayes. A former president of the Boston Architectural Center (now Boston Architectural College), George has been a techie as long as I have known him; one of his first projects incorporated a rock-bed thermal storage system. His Rockland house comes as close as anything I know to the ideal blend of preservation and energy efficiency that might appeal to today's homebuyers.

First, the work has followed the Secretary of the Interior's Standards for the rehabilitation of historic properties. Historic wood windows were retained or duplicated, plaster walls repaired, trim and woodwork was stripped and refinished, and the floor plan and use patterns remain largely the same.

Second, the house represents cutting-edge thinking about energy use. It is heated and cooled by a large geothermal system that has been seamlessly installed into the house; George assembled and supervised the design and installation team, and commissioned the system, including the sophisticated controls. The electrical energy that powers the house comes from renewable sources, a choice available to homeowners in that part of Maine.

Finally, the house makes use of the infrastructure of an older community and therefore requires little energy to obtain its necessary services. So the house has reused the embodied energy both in the structure and in the community to the maximum extent possible. Alas, since George and Connie like to cook, they chose gas appliances, so some carbon dioxide escapes now and then when exterior doors are opened. Still, this is user-friendly, zero-energy design as it might be practiced throughout the US. Will Americans buy the concept? Perhaps — but only if they have the chance to see more examples of it across the country.