Why Don't We Build BETTER Houses?

Although we know how to build healthy, comfortable, durable homes, mostly we don't… but not because it's too expensive

BY KEVIN IRETON

According to Harvard's Joint Center for Housing Studies, there will be around a million-and-a-half housing units built in the United States this year (*unit* includes apartments, condos, and single-family houses). Most of these units will be built to the standard of the applicable building codes. That sounds like a good thing, but remember that the code is a minimum standard, so a house that simply meets code requirements is the worst house you can legally build.

Our building codes, especially those related to energy use, are subject to the vagaries of politics and special interests. They take years to propose and years to adopt, and even then enforcement is spotty. At the time of this writing, only nine states have adopted the latest model energy codes (the 2015 International Energy Conservation Code), a majority of states (31) haven't even adopted the 2012 model energy codes, and 10 states either have no statewide code or their code predates the 2006 IECC.

Meanwhile, a lot of work has been done in the past 20 years to improve the way we build houses. Thanks to the EPA's Energy Star program and the U.S. Department of Energy's Building America program, many of the country's building scientists have developed better roof and wall assemblies, moisture-control strategies, and insulation approaches that greatly improve the efficiency of a house.

Other programs, such as LEED, Passive House, and the Living Building Challenge, set the bar even higher, inspiring architects and builders around the country to run complex energy models, measure with blower doors, study thermal images, and then build each new house better than the last. At the same time, manufacturers have also hired building scientists to do their own research and

Photo: Charles Bickford

develop better products, such as waterproof sheathings, flashing tapes, and air-source heat pumps that work in colder climates.

Increased energy efficiency was the chief driver behind most of this work, but improvements to health, comfort, and durability have resulted, too. Hence, we know how to build houses that go beyond the code requirements for airtightness and insulation; houses that have a good supply of fresh air; houses that are detailed to not get wet, but are designed to dry out if they do; houses with triple-pane windows; houses that are oriented to take advantage of sunshine and breezes; houses with energy requirements so low they can be supplied with photovoltaic panels on the roof.

Not only are such houses healthier and more comfortable to live in, they are also significantly less expensive than a house built to code. At least, they're less expensive once you factor in the operating costs.

So, we know *how* to build better houses—but we're not doing it. Not yet. Not in significant numbers.

Housing is a big industry

Unlike automakers, our nation's homebuilders can't be called to Washington, D.C. and assembled in a room. There are 50,000 to 70,000 of them (the exact number is hard to know). Apart from the building code, there is no formal way of communicating with builders. How can they be told that there's a better way to build a house, let alone be compelled to do it?

Government programs, such as Energy Star for Homes, are good, but voluntary. In 2015, Energy Star's share of the housing market

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– Gene Myers, CEO of Thrive Home Builders

was less than 10%, and it took 20 years to get that far. Only eight states have continuing education requirements for contractor licenses. There's no single magazine, website, tradeshow, or conference that reaches all home builders.

In other industries, companies scramble to roll out innovations ahead of their competitors. But according to studies conducted by the NAHB Research Center, it takes up to 25 years for the housing industry to adopt new technologies.

Builders resist change for good reason. When you build a house, you take responsibility for what will likely be the single most expensive purchase of a person's lifetime. You need confidence in the materials you choose and the ways you assemble them. The surest source of that confidence is your own experience and that of others in the industry. You trust what has worked in the past. It's a fundamentally sound approach, and not at all conducive to innovation.

If builders gamble on a new product or a new construction process that fails, it could ruin their reputations and put them out of business. They are especially wary of new products because there have been some infamous failures, such as early housewraps that disintegrated when in contact with cedar siding, hardboard siding that turned into shredded wheat, synthetic stucco that trapped water, and polybutylene pipes that leaked it. A healthy skepticism makes a certain amount of sense.

According to Sam Rashkin, father of the Energy Star Certified Homes program and currently chief architect of the building technologies office at the U.S. Department of Energy, the problem is a flawed business model. "If I look at virtually every other industry in the country, there'll be anywhere from four to a dozen major manufacturers, and they have resources to invest in research and innovation and to go to scale with applying it. In contrast, housing has about 50,000 providers, and each one has to figure out the product by themselves. … It's an enormous challenge that blocks a lot of change."

For each house, a builder choreographs the work of a dozen or more contractors, handles the delivery of thousands of materials and products, coordinates with the building department, endures the weather, suffers

Photo: Brian McAward

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– Mark LaLiberte, **principal partner at Construction Instruction, Inc.**

the shrinking supply of skilled labor, and pays the rising cost of worker's comp. Any sane builders will do whatever they can to simplify the process. That means limiting themselves to readily available materials with a proven track record and construction techniques they already know.

A better house is too risky

Over the past 20 years, we've thrown around various terms for the better houses I'm talking about here. We've called them *green* and *sustainable*. Now the phrase *high-performance* seems to be gaining ground. I like it. It suggests that houses really are machines for living and invokes the critical question of how they perform over time.

Among other things, high-performance building focuses on air-sealing and increased levels of insulation. Some builders balk at this, because it leads to a higher risk of trapped moisture, rot, and mold.

In an article on the DOE's website, Eric Werling, program coordinator for Building America, explains the problem this way: "If done wrong, extra insulation and vapor barriers in the wrong place can cause all sorts of nasty moisture problems. This is why it's so hard for builders to try innovative envelope solutions. This fear of doing it wrong."

Rather than accept the challenge of getting the critical details right, it's easier for many builders to dismiss high-performance building with the familiar assertion that we're "building them too tight" and "houses need to breathe." But this is just another way of saying that ventilation is important. And if ventilation is important, then we ought to control it carefully, rather than rely on random leaks in unknown areas.

A better house is too expensive

"No one will pay for it." That's what building-science educator Mark LaLiberte hears all the time. LaLiberte preaches the gospel of high performance to builders all over the country, and says, "The greatest misconception our industry faces is the perception that to build a higher-performance house, or to net zero, is off-the-charts expensive."

The most common way to consider the cost of building a high-performance house is to think about the additional direct costs that a builder pays for labor and materials to improve a home's performance, costs that are passed on to the buyer. Whether it's adding 2 in. of rigid foam to the outside of the sheathing, which complicates the installation and flashing of doors and windows, or buying and installing a heat-recovery ventilator, these costs are real. But the answer to how much more this costs than building a house strictly to the code requirements is complicated.

Some builders are selling high-performance and even net-zero homes for little additional cost. Carter Scott of Transformations, Inc. in Townsend, Massachusetts is one example (I wrote about Carter in *FHB* #235). It's a matter of tradeoffs—add insulation and improve the building envelope in exchange for simpler finishes and a smaller HVAC system.

A 2016 study conducted by the EPA compared the cost of houses built according to the 2009 ICC codes with Energy Star–certified homes (version 3). The houses were 2,400 sq. ft. and spread over 7 climate zones. The additional cost of the Energy Star homes ranged from $1,463 to $2,117. (The corresponding monthly energy savings ranged from $23 to $86.)

The learning curve is also a factor in high-performance building. When a builder first tries some of these techniques—rainscreen siding or insulation over the sheathing—he will undoubtedly slow the process and add cost. But with experience comes efficiency, which is why production builders have an advantage here over custom builders. Economies of scale allow production builders to reduce the costs of high-performance building more easily. Unfortunately, that doesn't mean they're doing it.

"Some of the production builders are going to fight tooth and nail to build the cheapest square footage they can," I was told by C.R. Herro. "Those builders are going to tell you the buyer doesn't care." Herro is the vice president of environmental affairs for Meritage Homes, one of the 20 biggest home builders in the country. He said that when the recession hit, Meritage experienced "the pain of being seen as a commodity," and hired him specifically to help them differentiate themselves by building high-performance homes. "We kind of drank the KoolAid in terms of *better* is a smart business strategy."

First costs versus operating costs

When I began writing this article, everyone said I should talk to Gene Myers. "He's the poster child for better houses," one person claimed. So I called Myers and asked, "Does it cost more to build a better house?"

"Yes," he said, without hesitation.

"How much more?"

"Thirty-five thousand dollars."

Myers's company, Thrive Home Builders, has three-bedroom, 2,000-sq.-ft. homes for sale in the Stapleton redevelopment area outside of Denver. They're highly efficient, with HERS scores in the low 40s. Myers calls them his *standard* houses, but most experts would consider these to be better houses. At $480,000, they're priced competitively for Denver. In the same development, Thrive offers similarly sized homes, arrayed with photovoltaic panels to achieve net-zero energy. For Myers, *better* means net zero, and those houses cost $35,000 more than his standard house.

But Myers explains to his customers that a better house is only more expensive when you look at the initial cost. Considering operating costs changes the equation dramatically.

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about we start doing that in the first month of homeownership, and then let's do it every month for as long as you own the home."

A net savings of $200 a month over the 30-year life of a mortgage is a lot. That much money, Myers notes, could be life changing.

But aside from the housing industry's fixation on lowest initial cost, there's another problem with that additional $35,000 that Myers' customers have to pay: Most banks won't loan it to them.

Banks and appraisers don't value high performance

Perhaps the most confounding roadblock to building better houses is that most banks, lending institutions, and real-estate appraisers assign no value to extra insulation or photovoltaic panels on the roof. Zero. None.

Myers is lucky to work with some forward-thinking banks in Denver, but in most of the country, anyone considering an extra $35,000 for a net-zero home would have to come up with that money as part of a down payment. That's because the appraised value of the house won't reflect the additional $35,000.

Sandy Adomatis has been a real-estate appraiser for 35 years. She lectures on how to value high-performance houses and has written a book on the topic called *Residential Green Valuation Tools*. She says most appraisers don't have the specialized knowledge to understand high-performance features or renewable energy. The basic education required for an appraiser's license does not cover it. So appraisers would have to volunteer extra time and money to pursue that training, for a type of house they rarely see.

Adomatis also points out that appraisers depend on a sales comparison approach to value a property. A house is assigned value based on the sales price of comparable houses (comps) in the same area. Today, it's pretty hard in most places to find a comp for a high-performance or net-zero house. Adomatis says that some of the appraisers she teaches "come in with an attitude that if you don't have a comp, you can't give it value." She thinks this is crazy, especially since it seems to apply to PV panels but not three-car garages.

Even if an appraiser assigns a higher value to a house based on a low HERS score or PV panels on the roof, the appraisal may still be rejected or the loan amount reduced. "We have underwriters reviewing our appraisals," Adomatis says, "and they have no clue what a high-performance house is and really don't want to be bothered."

As the number of high-performance and net-zero houses slowly increases, this situation will improve. In the meantime, Adomatis offers two bits of advice. The first is to make sure that banks and appraisers know in advance when they're dealing with a high-performance house. Provide documentation whenever possible, especially if there's a HERS rating. The other tip is to insist on an appraiser who understands high-performance building. According to Adomatis, "lenders are required by their industry guidelines to hire a competent appraiser with requisite knowledge in that property type." Most builders don't know they have this right.

But even with an accurate appraisal, mortgage loan calculations have to show that a buyer can afford the monthly cost of owning a home. Those calculations are based on four factors, known in the industry as PITI—principal, interest, taxes, and insurance. According to Steve Baden, executive director of RESNET, "There's a factor that's more expensive than insurance, more expensive than taxes, and that's energy costs. And that's just totally missed in the whole transaction process, which means it's not rational."

When I asked C.R. Herro what he would change to make the way easier for better houses, he said the answer was "so damn easy it's scary … the mortgage needs to recognize total operating costs and the differences in operating costs when they underwrite the loan. … There's no benefit given [to] a home that consumes ⅓ less energy. … That one thing changes the world."

In 2013, Senators Isakson (R-Ga.) and Bennet (D-Colo.) introduced legislation to correct this problem. It's called the Sensible Accounting to Value Energy (SAVE) Act. And I honestly don't know which is a greater indication of our troubles—that an act of Congress should be required for a bank to see value in a high-performance house, or that after four years the legislation still hasn't passed.

Buyers care more about location, size, and granite counters

The simplest answer to why we don't build better houses comes from Herro: "Because consumers haven't asked us to," he says. "Buyers are currently unsophisticated, and they make decisions that hurt them. … Efficient homes, with solar, that achieve zero energy are actually the best, most cost-effective homes that any buyer can buy. And the only thing preventing us moving there is buyer awareness. If consumers demanded it, the whole industry would flip overnight."

But Herro is sympathetic toward homebuyers. He points out that people don't buy

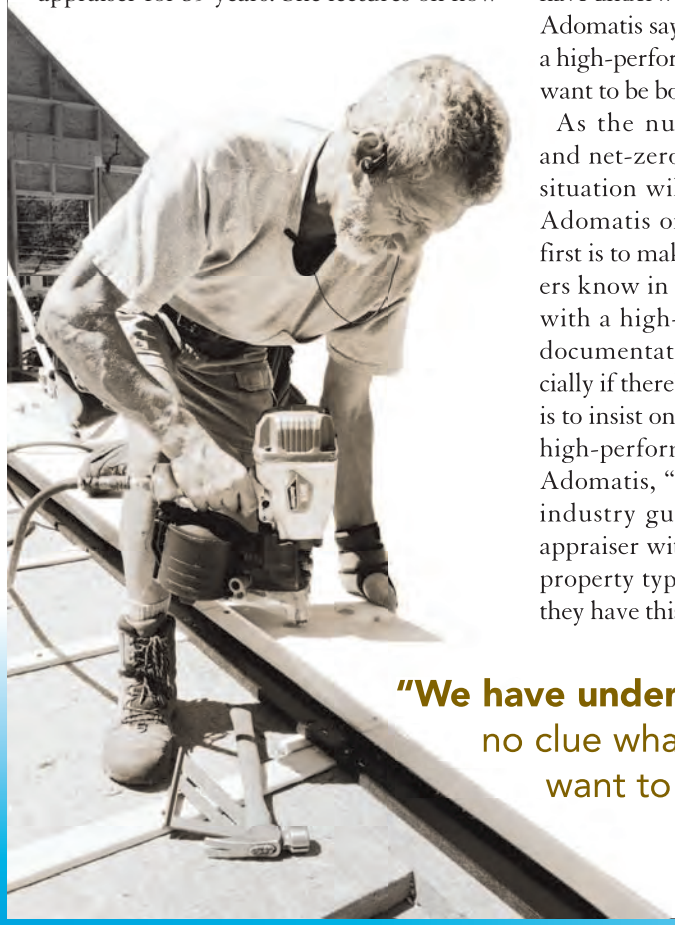

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Photo: this page, Brian McAward; facing page, Justin Fink

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- C.R. Herro, VP of environmental affairs for Meritage Homes

homes very often, and when they do, it's an intimidating, stressful process, usually triggered by other stressful events—marriage, new job, baby on the way. People quickly default to the familiar: location, square footage, design.

According to Rashkin, it's not that buyers don't value high-performance features, we're just not selling them correctly. "Being in a home where you manage surface temperatures is transformative," he says. "The same thing with health. If I'm able to throw away my kid's inhaler living in one house, and it's still the same old problem every day with inhalers in another house, that's a transformative experience."

In his book *Retooling the U.S. Housing Industry*, Rashkin argues that the current approach to selling houses evolved in the last century when developers, builders, and realtors were first trying to convince buyers to move to the suburbs. "The most effective path toward this goal was to ratchet up the emotion-driven process so buyers would accept longer commutes and the growing pains of newly developed communities. The easy emotion to tap was to increase house size and feature new design trends." Today he says, "The housing industry is ill-prepared to sell quality and performance benefits that you cannot see."

Houses reflect the people (and companies) who build them

In the end, three things determine what kinds of houses get built. The first two are regulations (mostly building codes, but also banking) and the market (we build what sells). The third is the builder.

Houses are a reflection of the people and the companies who build them: the standards of workmanship that builders hold themselves to; their financial goals; their commitment to improving their skills, education, and quality; their concern for social and environmental issues; and their ethics in general. For the big publicly traded companies, the equation is complicated by pressure to serve the short-term interests of shareholders.

When I asked Myers why he builds high-performance houses, he said it was complicated, but that it starts "fundamentally in your values. You decide it's the right thing to do and therefore you do it. There's still a little bit of a crusader, a little bit of idealism, packed away under my 65 years of hard knocks and scars, and I just believe we should leave the world a better place. But what you learn very quickly in business," he adds, "is that unless your customers share that, you don't get to do it very often."

Myers's company built 200 houses last year, so he found at least that many customers who shared his vision. And while he doesn't claim to be doing better than his competitors, Myers admits to driving a nice car and to putting his kids through college.

Are we near a tipping point?

"American homeowners have come to accept poor performance as the norm," Rashkin says. "But this will change once a critical mass of new home buyers experience the substantial advantages of high-performance homes and realize they come at lower ownership costs."

We may be near a tipping point. I'm not sure you can tell about such things until they actually tip. The number of houses being rated with a HERS score has been growing steadily. Last year it was over 200,000 houses, nearly 20% of new houses built in 2016. And the average score of those houses is going down, which means the houses are getting better (the lower the score on the HERS index, the more efficient the house). People don't generally hire a HERS rater unless they're trying to build a better house and want to see how well they succeeded.

When you build a new house, you lock in features that are unlikely to change for 50 to 100 years and that are difficult and expensive to add later. You have a chance to air-seal, add insulation, and do other things that optimize the building enclosure. With a few fundamental moves, you can reduce the energy load of the house so that it's basically *zero ready*, just waiting on PV panels (which are easy enough to add later). Sure, this work will likely add some cost to the house, but far less than many fear. And you know that doing this additional work will result in a house that's more comfortable to live in and dramatically less expensive to operate. So the question facing most builders today is this: When are we going to start building better houses?

"As builders, we have the power, we have the technology, we have the tools, we have the gifts," Myers says. "And to me, if you have that and you fail to use it for the benefit of your customers, shame on you, because that's what we're here for. It just almost seems unethical to build any other way." □

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