BY TED CUSHMAN

Photos: Flywheel Development

This high-performance townhouse project, although precertified as a Passive House building, didn't comply with Maryland's prescriptive energy code because some of the windows, chosen for a winter solar heating contribution, exceeded the state's maximum Solar Heat Gain Coefficient (SHGC).

A New Way to Meet the Energy Code

Ever since the Home Energy Rating System (HERS) index was introduced by the Residential Energy Services Network (RESNET), people have been talking about whether builders should be able to use HERS as a way to comply with the building code. In some states, that's starting to happen. The International Code Council (ICC) voted in 2013 to create an Energy Rating Index (ERI) pathway to code compliance, based on the HERS index. To allow its inclusion in the code, RESNET has also converted the formerly proprietary HERS index to a consensus standard maintained under the open stakeholder procedures of the American National Standards Institute (ANSI).

A permissive option rather than a requirement, the ERI pathway lets builders use a HERS rating to comply with the 2015 International Energy Conservation Code (IECC) if they wish, and so far 10 states have adopted versions of the IECC that include the ERI. If you work in a jurisdiction that has adopted the 2015 edition of the IECC, you can get a new house approved by obtaining a HERS rating that meets the ERI threshold for your climate zone, specified in a table in the code.

For help understanding the options, *JLC* turned to an expert: Joe Nebbia, a code consultant with Newport Partners, based in Davidsonville, Md. Nebbia, who teaches comprehensive energy-code education sessions for builders, has been participating in a multistate Department of Energy (DOE) study to assess whether education outreach can boost the industry's compliance levels and improve the performance of houses. Maryland was one of the first states in the nation to adopt the 2015 IECC, and it does offer the ERI pathway to builders. Nebbia walked us through the various options for code compliance under the 2015 IECC, starting with the basic "prescriptive pathway."

"In Chapter 4 of the residential code," said Nebbia, "you will see a whole lot of requirements that are basically a checklist. You put in this much insulation or more, you use windows with this rating or better, you use this much efficient lighting—that sort of thing." If you follow the prescription, you pass.

But if you know what you're doing—or if you have expert help—you can choose to follow the "simulated performance alternative" pathway to compliance, which has existed in Section 405 of the IECC for many years. To take that pathway, you have to model your proposed building using appropriate software and compare the model of your plan against the model of a "twin home" specced out to comply with all the mandatory requirements and prescriptive measures in the base code. If the model says your proposed building will have energy costs equivalent to (or lower than) the prescriptively compliant baseline house, then your proposal will be approved—but at inspection time, your local inspector will want to verify that you actually built what you drew.

FLEXIBILITY WITHIN LIMITS

The performance pathway offers trade-offs, but only in certain defined areas. Many parts of the prescriptive code are also "mandatory"—meaning that even if you follow the simulated performance alternative, you can't get out of those requirements. So, for example, Nebbia explained, the band joist of a wood-framed floor system always has to be insulated to the code-required minimum, and air-sealed as specified in the code—that's mandatory. On the other hand, slab perimeter insulation is prescriptive, but it isn't mandatory—so if you follow the prescription, you will pass, but if you don't follow it, you might still pass. Suppose it's impractical for some reason to install rigid foam insulation on the edge of the slab up to the top of the concrete, as prescribed in the code. With the simulated performance alternative, you may be able to omit the slab edge insulation from your design, as long as the modeling substantiates that your house will perform as well as a baseline house.

The simulated performance alternative is more flexible than the prescriptive pathway, but it is still limited and constrained, Nebbia explained. Ever since the 2009 edition of the IECC, for example, the code has not allowed builders to trade off equipment efficiency against envelope requirements. "So let's say I plan to install a super-efficient ground source heat pump or something like that," said Nebbia. "Well, the building that I'm being compared against also gets a super-efficient ground source heat pump. I don't get any credit."

THE RATINGS GAME

Enter the ERI. Written into the 2015 IECC, the ERI "was mainly a change that was requested by the larger production builders," said Nebbia, "because so many of them were already getting an energy rating done on their homes. The goal was to have a path that uses that same energy rating system to show code compliance."

Like the simulated performance alternative, the ERI pathway does not get a builder off the hook for mandatory items in the code. But it does expand the available trade-offs, said Nebbia, including HVAC: "Unlike section 405, you can use heating, cooling, and water heating—basically any load in the building—and take credit for that efficiency." There are backstops, though: You can't go below the minimum insulation requirements from the 2009 IECC.

So far, builders have been slow to take up the ERI option. One reason, said energy rater Gary Boyer of EDGE Energy in Beltsville, Md., is that most advanced builders can already pass code easily using simpler methods. Instead of using advanced software such as REM/*Rate* to model their buildings (which requires time-consuming data entry), builders can show compliance using the much more rudimentary RES*check* app (a free download from the DOE). Another reason, Nebbia suggested, is that the HERS rating thresholds set by the ERI are quite a bit more stringent than the rating a house would earn just by complying with prescriptive code. In the 2018 edition of the energy code, he said, the step up won't be so sharp.

THE FREEDOM TO BEAT CODE

So far, Gary Boyer said, he has been asked only once to help a builder use the ERI option—for the townhome project shown on page 29, built by developers Jessica Pitts and John Miller of Flywheel Development, based in Washington, D.C. "They built these super-cool modular net-zero row houses," said Boyer. "The walls were like R-50—it was way over the top. But RES*check* was penalizing them because the windows didn't meet what it wanted. So I had to model it for them with REM/*Rate*."

Pitts and Miller described the problem to *JLC* in a phone call. The building, it turns out, was precertified as a Passive House and designed using the Passive House Planning Package (PHPP) to meet the stringent airtightness and energy-conservation specifications of the Passive House program. Clearly, the building exceeded code.

"But we had a challenge around the Solar Heat Gain Coefficient (SHGC) factor for the windows," Miller explained. "Our south-facing glass is designed to be oriented in such a way that it does admit light in the winter to help warm the house. That's what the Passive House Planning Package expected us to do, so we went with that because we needed that solar heat gain in the wintertime for heating. And it was not code compliant because it didn't meet the minimum SHGC factor for the code."

In the design, most of the south-facing glass is sheltered under front porch roofs that will block summer sun, but allow low-angle winter sun in—a smart passive-solar technique. But RES*check* couldn't capture that benefit, and the prescriptive pathway in the code wouldn't allow the trade-off.

Maryland has an industrial and modular building program that regulates plan review and inspections of modular projects, Miller said, and Flywheel is using a modular manufacturer that works directly with a third-party plan reviewer. "They needed to see something in their package that checked the right box, and we couldn't check that box," Miller said. "So we needed the REM/*Rate* model."

Passive House buildings use far less energy than average code-compliant houses. But you don't have to be that far beyond code to get value from the ERI compliance pathway. Joe Nebbia said he expects to see more mainstream builders picking up the approach. "It's not here to save the builder who has no understanding of energy performance and can't meet the prescriptive code," Nebbia said. "It is going to be used by a lot of big builders who have a standard product where they know where that HERS rating is going to be coming in, and they know that they can get efficiencies by trading it off, but they are much better than code minimum. It also might be used by builders who are doing a lot of above-code programs like Energy Star, because they know that they've got an efficient product, and this just simplifies their code compliance."

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