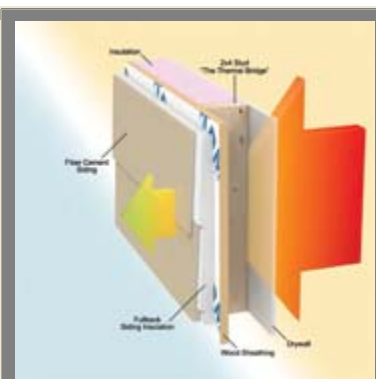




Exterior Insulation: Thinking Outside the Box

Michael Anschel doesn't have any doubts about the importance of exterior insulation. "It's the way we should have been building for the last 60 years," says Anschel, the Minneapolis-based principal of Otogawa-Anschel Design-Build and a noted green building consultant. "It's a significantly superior way to build."

The issue at hand is energy loss from thermal bridging. In typical construction, insulation is concentrated in the wall cavities. But about 25% of the wall area is actually in the framing members, which are good conductors of energy. As a result, about 40% of the energy lost through a traditionally insulated wood-framed wall is through the studs. That means a typical exterior wall with R-13 fiberglass insulation actually has an overall R rating closer to 10.75. The issue is even more pronounced for steel framing.



Putting insulation between the frame and the siding reduces thermal bridging through the studs.

(Illustration courtesy of Progressive Foam)

'A Critical Detail' The Energy Star Qualified Homes program's Thermal Enclosure System Checklist now includes thermal bridging. It's "a critical detail to ensuring that qualified homes consistently deliver a complete thermal enclosure system," EPA says.

Exterior insulation attacks that problem. Under the 2012 International Energy Conservation Code, builders in colder climate zones (6, 7, and 8) will be required to install exterior rigid foam insulation or use some comparable wall insulation strategy.

Much of the emphasis has been placed on new construction, but the homes that stand to benefit the most are older homes in colder climates, says Matt Dobson, code and regulatory director for the Vinyl Siding Institute. "We're studying the retrofitting--that's where the biggest impact can be made on energy efficiency," Dobson says. "Most of the housing stock out there is existing."

The institute is studying the energy savings of insulated vinyl siding. It replaced the siding on four existing homes with insulated siding. Overall, air tightness improved by 12%. "We collected utility bills two years before and will collect them two years after," Dobson says. "We're projecting a 5% to 12% improvement in energy bills."

On the average 2,000-square-foot house, siding insulation will add about 20% to the cost of a siding job, experts estimate. The payback is conservatively between two and 10 years, depending on the house and the climate zone.

Thin vs. Thick For all the benefits, the addition of rigid exterior insulation isn't without its challenges. When the product is an inch thick, installation is fairly simple and falls within the warranties for most exterior claddings. But some recommendations call for the addition of as much as four inches of rigid insulation. That not only presents warranty issues but architectural concerns as well, especially around windows, doors, and corners.

Builders also need to think about wind loads, building height, torsion, fastener sag and pull, negative pressure, and dead loads. The further the cladding product is from the structural member (not the foam insulation), the higher the propensity for fastener sag and pull. The result is a "creeping" or "sagging" of the cladding, causing unsightly unevenness or gapping and possible compression issues. A common solution is to furr out the wall to match the thickness of the exterior insulation.



Examples of insulated vinyl siding.
(Photo courtesy of Vinyl Siding Institute)



Installing siding on a building frame where exterior insulation has been applied takes special care to make sure the cladding gets properly attached to the frame. (Photo courtesy of Progressive Foam)

Then, there's the issue of the fasteners used to attach exterior cladding to the structure. An April 2010 report by the New York State Energy Research and Development Authority looked in detail at the addition of rigid continuous insulation over steel studs. When the insulation exceeds two inches, standard fasteners can't be used to attach cladding to the building. The weight of the siding, along with continuous insulation, changes the forces on the fastener "in addition to the seismic and wind loads that already exist," the report said. The researchers found that a main concern was that some of the longer fasteners are not available from local suppliers. They recommended identifying the proper fasteners ahead of time and ordering them directly from manufacturers.

Another significant issue that contractors mentioned was the ability to maintain production speed. Builders often use nail guns, but the fasteners used in nail guns are limited to 3-1/2 inches in length. If the thickness of the insulation requires fasteners longer than that, nail guns can't be used. As a result, a job that once could be done by one carpenter would require two.