

Insulation innovation holds promise for true efficiency

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There's something less than ideal about the way new Canadian homes are insulated, and drywallers see it more clearly than most.

The surprising, hidden fact is that if it weren't for Sheetrock, the inside surfaces of exterior walls in many code-compliant houses would be coated in frost and ice during cold, windy winter weather. In fact, many are, though homeowners never see it.

An experienced drywaller I know brings a windshield scraper with him, just so he can brush the ice off the plastic vapour barrier before he puts up wallboard in fully heated houses. This happens in lavish, expensive custom-built projects, too. The energy waste is as dire during summer weather, you just can't see it. So what's going on? How can this possibly be?

New houses are required to have walls with an insulation rating of R-20, yet my own observations suggest something far less. Discrepancies like this put me on a quest for answers, and what I've found raises serious questions about the value of the fibreglass insulation that's routinely used in three-quarters of all new Canadian homes.

Owens Corning developed fibreglass in 1932 and since then, fibreglass batts have become a standard feature of Canadian homes. The design and insulation of wall frames hasn't changed much in many years, so no one questions it. But the fact is, fibreglass is really a rather poor insulator. The open structure and low density of this material allows air to move right through, sapping energy performance enough to foster frosty walls and some pretty scary, real-world energy stats. To discover the discrepancy is between actual thermal performance and theoretical energy ratings of fibreglass, you need to look at two pivotal research studies.

The first comes from the Roof Research Center at the Oak Ridge National Laboratory in Tennessee. Scientists there discovered that fibreglass attic insulation delivers only 50 per cent of its rated thermal performance at -28 C. As cold, dense air makes its way into the vented attic space, it moves down through the fluffy fibreglass in a way that doesn't happen when batts are rated in the lab. And the colder the air gets, the worse fibreglass performs.

Another study is Canadian, conducted by Dr. Tony Shaw at Brock University in St. Catharines. He analyzed the energy consumption of two nearly identical new homes built side-by-side to code standards. The difference between the two structures was the walls. One had 2x6 wall studs insulated with R-19 fibreglass batts; the other had walls with structural insulated panels (SIPs) rated at R-17. Under wintertime field conditions, the walls of the SIPs home delivered their exact rating – R-17. The internal, closed cell foam insulation in these panels isn't subject to air infiltration, so thermal performance remained high and consistent.

The walls of the fibreglass-insulated, stud-frame home, on the other hand, performed at an actual level of only R-4 because of the inevitable air movement within the hollow wall cavities. Hard to believe, but true. You can put all the building wrap and siding you like around the outside of a house, but air still wafts through wall cavities, carrying energy with it. In the Brock study, the code-built, stud wall home lost more than 60 per cent more energy than the SIPs home, while the SIPs structure cost less than 5 per cent more to build.

New building technologies that include closed cell foam insulation instead of fibreglass are code-approved and field proven. Trouble is, few are making it onto home building sites in a big way because most prospective homeowners don't know enough to ask for them. At least not yet, anyway.

We Canadians need to become much better energy stewards than we are right now. To make that happen we need to support builders who use proven homebuilding innovations, while re-examining all building traditions in light of what makes sense today. And who knows? If we do things right, maybe my drywaller friend won't have to bring his ice scraper with him any more when he puts up Sheetrock.