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FEATURE | GREEN BUILDING

Passive home standards gain traction as costs fall

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The big idea behind the Passive House, is to deliver both heating and cooling via the ventilation system to a super-insulated structure.

Governments in both Canada and the United States are spending research dollars on Net Zero—the idea that a building can be so energy-efficient that it can produce enough electricity to balance any power it buys from the grid. Ideally, such a building might even be able to sell power back to the grid.

Passive House already has a published standard in place and a track record — mostly in Europe—of success. And Katrin Klingenberg, an architect and Passive House advocate in the Chicago area, believes it is possible to get, not only to net zero but beyond that, to “plus-energy homes that zero out the carbon altogether.”

She points to a recent paper published by the United States National Energy Agency, claiming “Passive Houses and Net Zero homes are the only sustainable solution, and they need to be made available on the market within the next 10 to 20 years.” Wolfgang Feist, a German researcher, developed the concept of what he called a Passivhaus, and founded the Passivhaus Institut in Darmstadt, Germany, in 1996. Since then more than 15,000 buildings—single-family homes, apartments and commercial structures—have been built using the Passive House standard.

Most are in Germany and Austria, but the idea has caught on in Sweden and Finland, as well. In Austria, an estimated 17 per cent of new homes meet the standard.



Passive Home standards require thick walls and triple glazing.

There are about a dozen Passive Houses in the United States, and one in Canada, but Klingenberg, through her work with the Passive House Institute U.S. (PHIUS) is trying to increase those numbers.

Passive Houses so far have been custom built, and have been expensive because of the high price of super-efficient windows, the thicker walls, the amount of insulation, and other environmental factors.

But she believes they will eventually be produced almost the way tract housing is today.

“We’re working with a modular homebuilder,” she said in an interview, “and there should be a prototype started in a couple of weeks.”

The builder, she said, has been able to pare costs to the point that there will be a cost premium of about 11 per cent for a Passive House.

The performance-based energy standard for Passive Houses is stringent. It can use no more than 15 kWh/m²/year for heating and no more than 15 kWh/m²/year for cooling.

In addition to the heating and cooling limits, the total primary energy use can be no greater than 120 kWh/m²/year for all energy needs, including water heating, lighting and plug loads.

On-site electricity generation can’t be factored into energy calculations which means passive solar gain and solar thermal can be accounted for, but not photovoltaic generation.

That’s an important difference from net-zero buildings, which almost always rely on photovoltaic systems to achieve their performance goals.

The protocol for measuring interior space is also strict: the thick exterior walls must be deducted as well as interior partition walls and stairwells.

Air leakage is limited to a maximum of 0.6 air changes per hour at a pressure differential of 50 pascals —extremely tight considering that some standards allow as much as seven changes per hour.

Klingenberg said there are “about 30” projects in the pre-certification phase in the U.S., with perhaps 30 more to come.

Of those already in the pipeline, “we have one community centre, two schools, one 70-unit condo building in Boston, and a 150-unit assisted-living project in Atlanta.”

There are also multiple townhouse developments in the New York area, she said, “so the projects are getting considerably larger.”

She said she expects to see a competition next year for a high-rise building in New York City.

For more see passivebuildings.ca or passivehouse.com



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