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Passivhaus Crosses the Atlantic

Clearing away misconceptions will improve the dialogue between Passivhaus advocates and American builders

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Triple-glazed doors. Margaret Stanton shows off the south-facing triple-glazed Optiwin doors at her new Passivhaus home on the outskirts of Urbana, Illinois. All of the home's windows and glazed doors were imported from Germany.

Last weekend I attended the Fourth Annual North American Passive House Conference in Champaign-Urbana, Ill. The conference offered a great opportunity to learn more about the Passivhaus standard and to discuss low-energy buildings with an experienced group of architects, engineers, and builders.

Among the most valuable sessions offered at the conference:

- David White provided an introduction to the Passive House Planning Package, the software tool for determining whether a house meets the Passivhaus standard's strict maximum annual heating budget of 15 kWh/square meter.
- Stephen Thwaites explained the differences between the European and American methods for determining a window's U-factor.
- Marc Rosenbaum shared his approach to designing HVAC systems for low-energy buildings.

The Passivhaus advocates I met at the conference are responsible for some of the best new buildings in the country — buildings with extraordinarily low energy budgets. These exemplary buildings can inspire all designers of low-energy buildings to sharpen their pencils.

Unfortunately, the launch of the Passivhaus movement in North America hasn't been particularly smooth. Some Passivhaus advocates have reacted defensively to [legitimate technical questions](#) from knowledgeable American builders. On the other side, the chance for fruitful dialogue has been hampered by a few Passivhaus critics who have adopted an unnecessarily adversarial tone. Fortunately, these bumps are only public relations problems; they shouldn't seriously detract from the great accomplishments that Passivhaus builders have achieved.

Clearing Up Misconceptions

In my opinion, the Passivhaus movement in North America needs to do a better job at disassociating its message from a package of misconceptions. It's important to emphasize the core strength of Passivhaus — namely, the fact that PHPP software provides a sophisticated method for designing and constructing buildings that use very low levels of energy — and to clearly separate this message from a collection of red herrings originating in Europe:

Red herring number one: Very low U-factor windows (U-0.14) are necessary “for the comfort of the occupants.” It's true that occupant comfort is one of the benefits of high-quality triple-glazed windows. It's also true that windows with a very low U-factor may be necessary to meet the Passivhaus goal of 15 kWh/m². But a very high level of occupant comfort isn't “necessary.” An insistence on extremely high levels of comfort has a certain “princess-and-the-pea” quality which, when expressed by Europeans or Americans, probably appears bizarre to Mongolians or Nepalis. We're in a climate crisis here; those of us who live in wealthy countries shouldn't unnecessarily crank up our comfort demands any more than we should unnecessarily crank up our thermostats. This debate is further muddled by the fact that U-0.17 Canadian windows probably perform just as well as some U-0.14 German windows. (For more on this topic, see [“Passivhaus Windows.”](#))

Red herring number two: Passivhaus buildings don't need a heating system. Unfortunately, this false statement is still being repeated by Passivhaus advocates. For example, the keynote speaker at the Illinois conference, Günter Lang of Austria, told us, “If you need a heating or cooling system in your house, you have made a mistake in planning or construction.” Hats off to Marc Rosenbaum and David White, who forthrightly disposed of this red herring when they wrote, “In almost all cases Passive Houses do have heating systems.” Conference presenters described Passivhaus buildings with complicated active HVAC systems including solar hot water systems, air-source heat pumps, and ducted heat-recovery ventilators (HRVs). While similar HVAC components are installed in most Passivhaus buildings, German Passivhaus advocates have painted themselves into an ideological corner by the unfortunate decision to call these superinsulated homes “passive.”

Red herring number three: One of the best things about Passivhaus buildings is their fresh-air ventilation systems. Actually, you don't need a Passivhaus to get fresh air. For example, here in Vermont, builders of superinsulated homes have been installing HRVs with dedicated ductwork more than 20 years. Moreover, every Building America home includes an HVAC system capable of providing ventilation that meets the ASHRAE 62.2 standard. Good ventilation systems have long been considered to be an essential component of energy-efficient American homes, even by builders who have never heard of the Passivhaus standard. What Passivhaus offers is lower energy bills, not fresher air.

Red herring number four: In a Passivhaus building, space heat should be delivered through ventilation ducts. Although this statement is often repeated in Europe, anyone who digs deeper soon learns that the Passivhaus standard is agnostic about heat delivery methods. Again, hats off to Rosenbaum and White, who wrote that “it is not a requirement” under the Passivhaus standard for heat to be delivered through ventilation ducts.

Red herring number five: The mechanical equipment installed in a Passivhaus building costs less than the equipment installed in an ordinary building. An example of this oft-repeated claim can be found in [an account](#) of a presentation made last year in Britain by Dr. Wolfgang Feist, the founder of the Passivhaus Institut in Darmstadt: “Dr. Feist showed a famous Passivhaus graph that demonstrates how a little extra money spent on achieving the 15 kWh figure makes it possible to save money by leaving out all this space heating kit.” While this statement may be true in Europe, it isn’t in the U.S., where inexpensive furnaces and space heaters are widely available and easily installed. Many of the Passivhaus projects described at the Illinois conference include \$8,000 solar thermal systems, and Zehnder, a German manufacturer of \$7,500 HRVs, was attracting a crowd on the trade-show floor. The Passivhaus builders I spoke to haven’t managed to eke out any HVAC equipment savings.

To be fair, these red herrings originated in Europe and are rarely promulgated by North American Passivhaus advocates. But unless a clear line is drawn, separating the North American approach to Passivhaus from its European roots, these misunderstandings will continue to confuse North American builders.

Any movement benefits from honesty and the banishment of exaggerations. Admitting that Passivhaus buildings need heating systems and cost significantly more to build than run-of-the-mill houses won’t necessarily scare away builders, as long as the true strength of these buildings — their very low levels of energy use — is emphasized.

Legitimate Questions

Once the misleading statements have been cleared away, Passivhaus adherents need to forthrightly address a few legitimate questions raised by U.S. builders. These questions include:

- Is there any way to reconcile the zero-energy-home approach — a design method that stops making envelope improvements when software has determined that a photovoltaic (PV) array would meet the home’s energy needs more cheaply than adding additional insulation — with the Passivhaus approach, which avoids any cost-effectiveness comparison between envelope measures and PV? After all, few American designers are likely to adopt the Passivhaus approach if it calls for insulation specifications that cost more and yield lower energy savings than a PV system.
- Why has the Passivhaus movement in the U.S. decided to ignore an important element of the Passivhaus standard — namely, the maximum house size limit of 50 square meters per person? This requirement is enforced in Germany but ignored in the U.S. A per-person energy budget is a fairer way to address the world’s climate crisis than a per-square-meter energy budget, so the house size issue cannot be avoided for long. Logically, it makes sense to build a very small house, even if the house fails to meet the per-square-meter budget of the Passivhaus standard — as long as the house uses less energy per person than the per-square-meter approach.

I’d like to end on a positive note by emphasizing a few important points:

- By all accounts, the PHPP software is a subtle, accurate, and incredibly useful design tool.
- In a wide variety of climates, Passivhaus builders have succeeded in reducing energy consumption to a level that many builders doubted was possible.
- Even those who don’t adopt the Passivhaus standard should acknowledge the accomplishments of Passivhaus builders and extend them a helping hand. All of us who believe in building energy-efficient homes are working toward the same goal.

About the Author: Martin Holladay has worked as a plumbing wholesale counterperson, roofer, remodeler, and builder. He built his first passive solar house in northern Vermont in 1974, and has lived off the grid since 1975. In 1980, Holladay bought his first [photovoltaic](#) module, which is still producing electricity after 29 years of service.