

The House That Could Save the World

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In July, when Portland was sweltering at upwards of 100 degrees, the tenants of The Orchards wondered if they had air conditioning. The temperature in their apartments never rose above 70.

They had all just moved into the newly opened affordable housing project in Hillsboro, a Portland suburb that over the last decade replaced thousands of fruit trees with silicon chip factories. Some of the tenants were workers in those factories. Others were clerks at Costco and nearby supermarkets. As they knew all too well, affordable housing didn't come with air conditioning. So why were their new homes so comfortable?

The Orchards is an L-shaped building with bare bone apartments that overlook the light rail station. Its lobby is small with two striking features: a glassed display of tree trunks, cross sections of those cut down from those eponymous orchards and marked by fruit typology (Orengo apple, Green Gage plum, Royal apricot) and a five-foot TV screen prominently mounted, with a readout that monitors the minutiae of each apartment's energy consumption, alerting tenants to the nuances of their neighbors' electric budgets.

But it's what you don't see that makes it so unique. The Orchards is a "Passive House," currently the largest one in North America. It's a high performing energy-efficient complex whose 57 apartments stay cool on the hottest days and can be comfortably heated with a hand-held hair dryer on the coldest. Its windows are triple-paned. Its walls and floors are stuffed 11 inches deep with insulation. The ventilation system in the attic acts as the building's lungs—continually pulling exhaust from every kitchen and bathroom, sucking stale air through a heat exchanger before carrying it to the outside and returning with fresh air.

"Every day I find a new reason to love it," gushes Georgye Hamlin, whose one-bedroom apartment is as noiseless as a recording studio. "It's cool, it's quiet, and I don't even hear the train. During the heat wave, my girlfriend came over to sleep because it was so cool. Yay for German engineering!"

Passivhaus, a building method developed in Germany in the early 1990s, relies on an airtight envelope—the roof, exterior walls and floors, literally, the physical barrier that separates *in* from *out*—to create a building that consumes 80 percent less energy than a standard house.

As translated into English, the term is almost a misnomer. It implies single-family housing, when in fact the approach can be applied to any size building. In Europe, supermarkets, schools, churches, factories and hospitals have been built to passive house standards. The number of certified buildings there exceeds 25,000.

Resident Georgye Hamlin stands in the front doorway of her passive apartment in The Orchards in Hillsboro, Oregon. | Mark Peterson for Politico Magazine/Redux Pictures

The American market is tiny by comparison. There are about 150 certified houses nationwide and most people, on hearing the term, assume it refers to solar panels. That is now starting to change, along with concern about climate change and a growing understanding that, according to the U.S. Energy Information Administration, houses and other buildings account for 40 percent of all energy consumption and a third of carbon emissions nationally. Widely applied, passive construction could fundamentally alter the world's carbon balance, but only if it can get over the internecine fights that have torn the concept's European and North American backers apart.

With the virtuous equation in mind, hundreds of passive houses are now going up around the country—from bland, boxy cubes (like those at The Orchards) to elegant condos and Victorian retrofits. Volunteers for Habitat for Humanity have constructed passive townhouses in Washington, D.C. An ambulance dispatch center in Brooklyn was last year retrofitted to passive standards. An affordable housing project, built for youths aging out of foster care, just opened in Pittsburgh.

Last September, New York Mayor Bill De Blasio released a 35-year plan, *One City: Built To Last*, for reducing greenhouse gas emissions from the city's buildings. The report named Passive House construction as a pathway for achieving the city's goal of 80 percent reduction. It was the only building standard specifically identified in the report, a fact that made architects, builders and public policy experts take notice. In Europe, where all new construction must comply with "Nearly Zero-Energy Buildings" by 2020, passive building is a best building practice.

Then came the news that ground was being broken for the world's biggest passive house—a 350-unit apartment house, owned by Cornell University on Roosevelt Island in New York City, to be completed by 2017. "This is going to open people's eyes about what's possible," says Ken Levenson, a Brooklyn-based architect who will be working on the Cornell project. "It's a huge building and it's significant in terms of its breaking out of a stereotypical low-rise building. And it's a blue chip customer, with all the associations of Cornell University—plus the fact that it's being embraced by New York City and the mayor's office. It changes the conversation in a big way."

Despite all the talk of "r factors," kBTUs and "air changes per hour" that breaks out whenever Passive House engineers and designers assemble, the approach's appeal is its simplicity: Orient a building to take advantage of solar heating; install plenty of insulation and topnotch windows and doors to seal out the drafts; let the structure's energy draw upon heat from appliances and human bodies.

It's like *feng shui* for geeks, a way of engineering that turns a house into a fine tuned machine—and with performance-based data to back it up. The technology is in the design. The actual equipment—the heating and cooling units—consists of nothing more than two fans and a radiator.

Image

OPTICS: The Passive Houses of Portland. From high-end townhouses to affordable apartments to converted Victorians, passive houses dot the Portland landscape. [Click here](#) to explore the neighborhoods and homeowners who are leading an urban environmental revolution. | Mark Peterson for Politico Magazine/Redux Pictures.

“You know how people buy Priuses because they’re efficient and good for the environment?” says Graham Irwin, a San Francisco architect who was the consultant for the first certified passive house in California five years ago. “And then, because there’s a readout on the screen it encourages them to get as good mileage as they can. There’s a similar effect for Passive House. People move in, see how little energy they’re using, and they turn the gas off. They try to dial it in as much as they can.”

* * *

If the Pacific Northwest is a hotbed of the passive house movement, then Portland, with its temperate climate and

progressive mindset, is North America's Ground Zero. With a comparable climate to Germany—warm, dry summers and cold, rainy winters—it is relatively easy to build according to rigorous passive standards. The city has more Passive Houses than anywhere else in the country—100, according to one count—and more certified consultants.

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