

# dwell

## Super Green Affordable Housing Introduces Passive Design to the Masses

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Multifamily housing projects that meet Passive House standards are bringing European-style energy efficiency to a new demographic in the United States.



In North Philadelphia, the Belfield Avenue Townhomes were built to Passive House standards, making the project much more energy-efficient than a conventional building. It is one of several multifamily structures that are being built in cities across the country for moderate-income families.

Image Courtesy of Sam Oberter

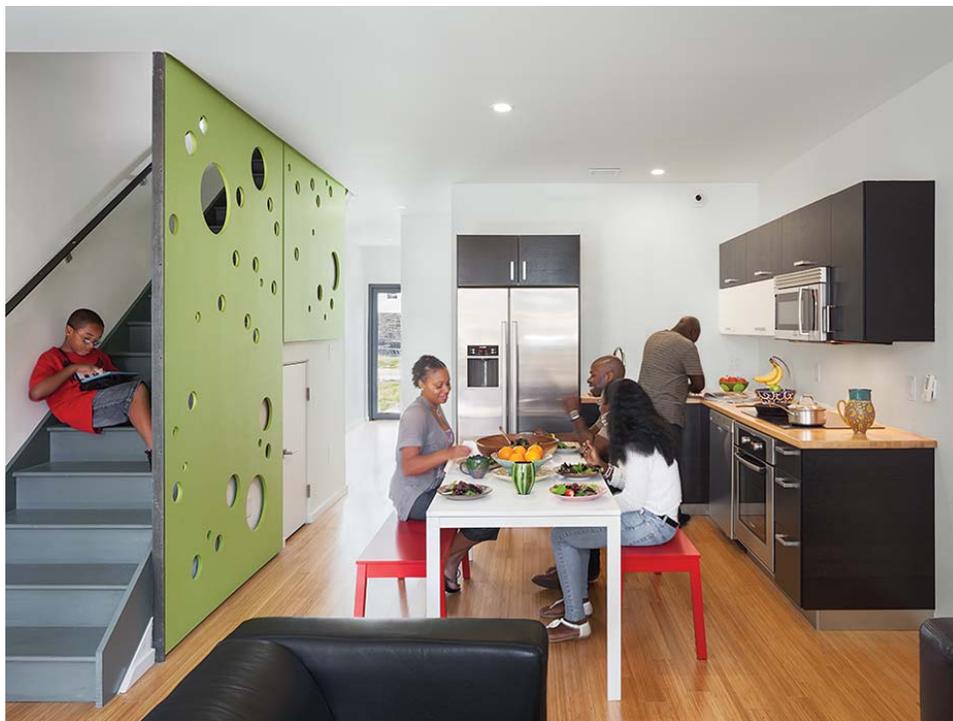
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From the street, there is nothing about the Belfield Avenue Townhomes in North Philadelphia that gives the development away as a subsidized housing project. The modular edifice has a white-and-mint-green facade and solar arrays on the roof, and each of its three town houses features bamboo floors, stainless-steel [Bosch](#) appliances, and recessed lighting. But the development, commissioned by the nonprofit Raise of Hope, not only represents an attractive, comfortable housing option for moderate-income families, it's also a certified [Passive House](#). Built to a strict set of design standards, it is so well insulated and airtight that each unit is expected to consume just a quarter of the energy of a traditional house.

Tim McDonald, a partner at the Philadelphia firm Onion Flats and a certified Passive House consultant, had a limited budget and an even more limited time frame in which to design and build the Belfield Avenue project, but he was unwilling to take an easier, less-energy-efficient route. "Once you learn about Passive House, you can't go back," he says.

Like most Passive Houses, Belfield Avenue incorporates supercharged wall insulation (in this case, nearly eight inches of densely packed cellulose and Polyiso, a type of rigid foam board), triple-pane windows, and an energy-recovery ventilator, which draws fresh air into the house while expelling kitchen and bathroom exhaust. In the winter, the ventilator transfers heat from the interior exhaust to the fresh air being pulled in from the exterior. (The process is reversed in the summer, with the cooler, drier inside air pretreating the hot, humid air coming in from the outside.) Certified by the [Passivhaus Institut](#) in Germany, the complex is also capable of achieving [net-zero energy status](#). As long as the residents don't excessively use heat, air-conditioning, hot water, or appliances, each unit can produce as much energy as it uses, with help from those rooftop solar panels.

Passive House buildings, while common in Europe, have not caught on as quickly in the United States, where the earliest models have tended to be single-family dwellings commissioned by wealthy clients. In Europe, however, the ultra-energy-efficient standard has been used in public housing for decades—and cities like Antwerp, Belgium, and Cologne and Frankfurt, in Germany, have even made the Passivhaus standards part of their building codes. The pace of this construction is expected to quicken by 2020, when a European Union directive on the energy performance of buildings will allow only "nearly zero-energy" buildings to be built in its member countries.



Each of the Belfield Avenue residences is outfitted with carbonized bamboo floors and [Bosch](#) appliances, including an induction cooktop. Onion Flats designed the medium-density fiberboard screen, whose round perforations serve as a filter for sunlight and a playful surface for children.

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Of the 121 certified or pre-certified Passive House buildings in the United States, 100 are private homes, according to Katrin Klingenberg, who launched the Chicago-based Passive House Institute U.S. in 2007. (The Passivhaus Institut in Germany severed ties with its American counterpart in 2011, alleging that the U.S. institute had certified buildings without proper documentation. Today, the two operate independently; American architects can choose which certification to pursue.) Affordable-housing developers and architects like McDonald are starting to change the paradigm in this country by championing the benefits of Passive House design for low-income projects.

“Transportation, utilities, and rent make up the largest part of an individual’s monthly budget,” says Laura J. Recko, director of fundraising and public relations at REACH CDC, an affordable-housing nonprofit in Portland, Oregon. “Our focus is helping tenants reduce those costs.” In that vein, REACH developed the Orchards at Orenco, a 57-unit building for low-income residents, in the Portland suburb of Hillsboro. The building, which broke ground in the summer of 2014, represents the first phase of a three-phase project and will sport the Passive trifecta of a highly insulated building envelope, low-emissivity windows, and a ventilator. “We do a super-fastidious job of air-sealing all the windows and doors,” says Michael Bonn of Portland’s Ankrom Moisan Architects, which designed the project in collaboration with William Wilson Architects.

A hundred miles to the south in Eugene, Oregon, architect Sara Bergsund of Bergsund DeLaney Architecture and Planning was wondering whether the Passive House concept would work “for people who haven’t drunk the Kool-Aid.” Bergsund and a client, the nonprofit human-services organization St. Vincent de Paul, undertook an experiment with Stellar Apartments, a 54-unit affordable-housing complex west of downtown Eugene; they built one of the complex’s 12 buildings to Passive House standards and the others to the less-rigorous Earth Advantage standard. Graduate students from the University of Oregon who will be monitoring the Passive House building and one of its neighbors over the course of two years have already shown that the former uses 36 percent less energy.

Back East, two 24-unit housing projects in Bushwick, [Brooklyn](#), designed by Chris Benedict of Architecture and Energy Ltd., include a couple of unusual Passive House features. Placing the boilers on the roof eliminated the need for the chimneys that conventional buildings use to pull drafts of air to the basement to cool the boilers between cycles, leaking energy along the way. “We estimate that putting them on the roof saves about 30 percent of gas for the building over the course of the year,” Benedict says. And in place of interior insulation, the design team opted for foam and stucco on the exterior of the masonry wall—“an economical way to insulate the building continuously on the outside,” Benedict says. The large wedges of foam also shade the windows.

Fortunately, Klingenberg, of the Passive House Institute U.S., says city and state housing authorities across the country are starting to take an interest in Passive House standards. San Francisco announced in March 2014 that it would expedite planning approval for all Passive House projects, and, in 2015, the Pennsylvania Housing Finance Agency began awarding more points to developers who submit applications for pre-certified Passive Houses, increasing their chances of getting funding. “Slowly but surely,” Klingenberg says, “we’re turning this big tanker around.”



Knickerbocker Commons is one of two 24-unit buildings that architect Chris Benedict has designed to Passive House standards in Bushwick, Brooklyn. Along with the Mennonite, which was built just a mile and a half away, it is open to disabled and low-income tenants, who will pay \$600 to \$1,110 per month. Putting foam and [stucco](#) on the facade proved an economical way to insulate the structure.