

Explore our newsletters

**New
Scientist**



World's largest office building with 'passive house' design to open

The world's largest example of an office building constructed to passive house standards – using airtight construction and high levels of insulation to cut energy use – is soon to open in Boston, Massachusetts

By [Jeremy Hsu](#)

📅 14 March 2023



▲ **The Winthrop Center is the tall glass building at the back**

On a cold winter's day in February, the drone of a powerful fan filled the cavernous office space on the 17th floor of a new skyscraper in downtown Boston. A group of building developers wearing hard hats and orange safety vests stood around as the fan sucked air from the space. They were conducting a depressurisation test as part of a process to confirm that the space – one of 21 floors of office in the 62-storey building – met new energy-saving standards.

Those design requirements – known as [passive house standards](#) – call for airtight construction and extra insulation to help maintain a comfortable indoor temperature. The idea is to use passive building design elements to minimise reliance on energy-consuming heating or cooling systems. Thousands of passive house buildings already exist in the world, with most being in Europe. But Boston's \$1.35 billion Winthrop Center is set to become the largest office building yet to incorporate passive house standards when completed this summer.

“During the recent extreme cold in Boston, the passive house floors performed extremely well,” says [Brad Mahoney](#), director of sustainable development at Millennium Partners Boston, the development company behind the skyscraper. “We didn't really have a heating system live and it was comfortable on these floors.”

The Winthrop Center's exterior wall includes triple-glazed windows, which have three glass panes with insulating air layers inbetween, and 10-centimetre (4-inch) insulation for sections of opaque glass panel. That design minimises any uncontrolled air exchange or loss of heat, while maximising access to natural sunlight.

Building to the passive house standard doesn't require uncommon building materials so much as making design choices such as using triple-glazed windows instead of just double-pane or single-pane windows, says [Michael O'Donnell](#) at Steven Winter Associates, an engineering consultancy based in New York City that helped develop the Winthrop Center. He compares the passive house approach to a person wearing an insulating sweater beneath an outer jacket that provides an airtight seal.

Each office floor is compartmentalised and insulated from those above and below to reduce uncontrolled air exchange that could lead to heating or cooling energy being lost. Existing Boston buildings that have been constructed to the highest “platinum” standard under the popular LEED rating system for green buildings use 60 per cent more energy than Winthrop Center is expected to, and other typical high-end office buildings use 150 per cent more, says Mahoney.

“They not only bring higher energy performance, but what I think is much more important is they bring an incredible level of comfort to either working or living,” says [Jörg Rügemer](#), a sustainable design architect at the University of Utah, who wasn’t involved in the project.

The depressurisation test in February was one performance check for a certification process overseen by the Passive House Institute in Germany. If the Winthrop Center receives [passive house certification](#), it will become a “landmark project” that could inspire other developers of high-rise office buildings to adopt these standards, says Rügemer.

Read more:

[Eco-friendly exoskeleton cuts apartment building energy use by 60%](#)

He hopes that passive house developments in all types of buildings, including affordable housing projects, will continue to ramp up in the US. “There are about 1 to 2 million new homes being built in the United States every year,” says Rügemer. “So, if these are all real energy hogs, we don’t gain a lot with a few buildings like the Winthrop Center.”

Passive house standards are expected to become more popular as key components such as triple-glazed windows become cheaper and more available in the US – something that has already happened in Europe over the past two decades.

States such as Massachusetts are also updating building energy codes to incorporate elements of the passive house standard – including the air test used to help certify the Winthrop Center’s performance.

Other north-eastern US states, along with west coast states such as California, Oregon and Washington, have also been working to incorporate such performance standards into building energy codes, says Rügemer. In Europe, cities such as Brussels in Belgium have already gone further by adopting the passive house standard as the building code standard.

“Understanding how to apply passive house standards at this scale and typology in an urban setting, a high-rise office, helps not only with future office developments, but also helps with other building types,” says Mahoney.

Topics:

[Carbon](#) / [Buildings](#) / [Energy Efficiency](#)