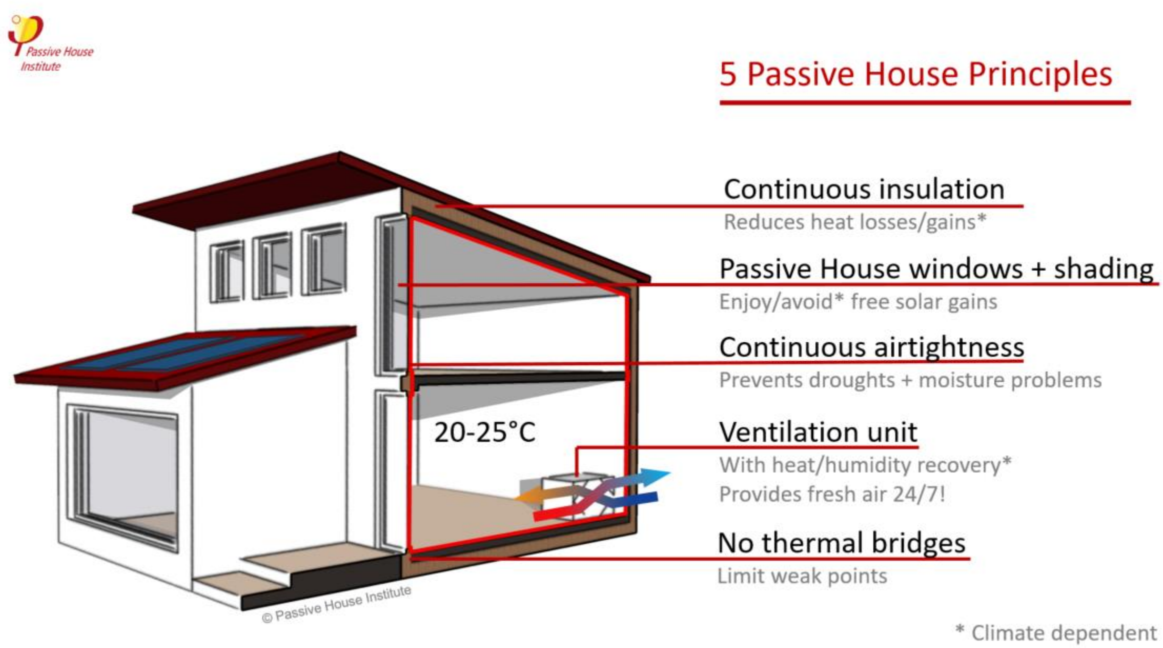
Passive House for India

What is a Passive House building?

The Passive House standard is an international standard for high performance buildings. It is mostly famous for drastically reducing the energy demand: such buildings consume up to 90% less heating and up to 80% less cooling energy than existing buildings, depending on climate. At the same time, they provide better living and working conditions to their occupants (comfortable temperatures, no droughts or mold, good indoor air quality). In addition these buildings are also future-proof, because they won't need a deep retrofit already in the next decade and people will be able to afford their low operation costs.

To achieve these goals, Passive House buildings basically keep the heat inside in cold climates and the heat outside in warm climates thanks to the following principles (beside a good orientation):



There are currently more than 65 000 Passive House units worldwide, with different shapes, materials, scales and functions. Whether it is an autarchic house in Spain, an office in China or a skyscraper in New York, you will find various inspiring examples on the Passive House Database.
What do all these buildings have in common? Their energy balance has been calculated in line with physical principles with the Passive House Planning Package (PHPP) to ensure they fulfill the international Passive House building criteria.

Passive House worldwide

The Passive House standard first spread in Europe. Over the last decade it also got implemented in some parts of America and Asia, and there is a growing interest for pilot projects in hot and humid climates as well as emerging economies. The Passive House standard is based on the laws of physics and thus, applicable worldwide. That being said, different solutions are needed for different contexts: A Passive House in Germany will look different than a Passive House in a hot and humid climate, like in Dubai. There are also additional challenges for emerging economies, regarding the level of detailing during the planning and construction phase, the availability of some components and the lack of awareness concerning the advantages of such buildings. But the main challenge is usually quality assurance from design phase to construction and commissioning as well as keeping costs down. Both aims benefit greatly from straightforward approaches and proper education of all stakeholders.


LAIF project: First Passive House prototypes, Morelia, Mexico
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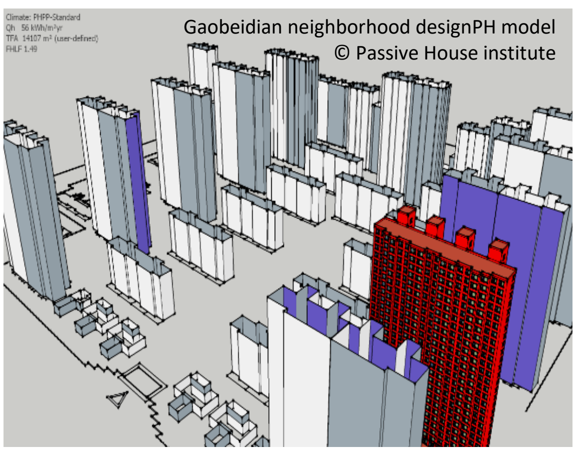
To progressively overcome these challenges, a NAMA study was first realized for Mexico (see NAMA for Sustainable New Housing with Technical Annex p68). This helped to determine which components and additional investments would be needed to build three common social building types to the Passive House standard in the various climate zones of Mexico.

As part of the project "LAIF Component from the Ecocasa Program", some Passive House pilot buildings are currently under construction.


Gaobeidian neighborhood designPH model
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In China, a few pilot projects were first successfully built and monitored before a study on "Passive Houses in Chinese Climates" was published. Interest quickly rose afterwards, and there are currently several big buildings and 4 neighborhoods in planning or construction. More than 75 local Passive House certified components are available in China, as well as many Chinese Passive House designers. In addition, better buildings like Passive Houses are incentivized and in some provinces (Hebei, Shandong), some Passive House targets or close ones are currently used to define the local energy efficient building standard.

Other cities like Vancouver are making Passive House more attractive by adapting their regulations on density, height and setbacks, as well as recognizing PHPP as an energy modeling tool for new homes.

Next steps for India

First of all, local studies and pilot projects will be beneficial to foster Passive House buildings in India. Pilot projects will help to raise awareness, observe how the inhabitants effectively use the building and its technical equipment, as well as prove the concept objectively thanks to post occupancy monitoring. Challenges related to affordability and quantity may be overcome much faster with the support of local governments and institutions: thanks to adequate (non/) financial incentives, local building professionals can get trained and components developed locally, which will progressively reduce the investment costs. The key to success will lay in the collaboration of all parties involved.

These ideas were presented during the 10th GRIHA Summit, as part of the Conference on “Building Energy Efficiency Transformation". It was a great opportunity to meet several building professionals and discuss their expectations/concerns. Most people were curious about the airtight layer and the ventilation with humidity recovery, as these features are quite new in India. However, some international examples are proving that thanks to a close collaboration between the design team and the manufacturer, great airtightness results can be achieved, like in Mexico. The availability of a ventilation unit with humidity recovery in Delhi may also help the uptake of such technologies. This unit was used in the retrofit of a clothing factory in Sri Lanka to prevent too much heat and humidity from entering the building through the fresh air flow and thus reduces the need for active cooling while ensuring higher comfort and air quality in tropical climates.

How far we should push the quality of the envelope was another topic of discussion, as India has a big interest in solar renewable energy. It is hard to predict what will be the price ratio between renewable energy and energy efficiency technologies in the future, but it will certainly be easier to reach a 100% renewable supply scenario with buildings that consume as little energy as possible. In addition, comfort, good air quality and long lasting buildings are very important as well - this can be reached with insulation, better airtightness, adequate ventilation, less thermal bridges - renewable energy won’t be able to compensate for building envelope lacking in that sense. For instance if a building is not very airtight, outside air pollutants can get inside, street noise is less effectively kept out, there is a higher risk of mold issues etc.

To finish with, potential candidates for pilot projects were discussed. High-end residential houses, commercial or governmental buildings would be ideal targets, because as soon as people can afford to have split units in their buildings and to use them regularly, it makes sense to go for Passive House buildings.

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