



Significantly less use of oil, gas and coal, implementation of high energy efficiency combined with renewable energy instead: that is how the existing building stock can become climate-friendly. Photos: (left) new Passive House development in Nidderau, Germany, © Passive House Institute; (right) social housing development to the Passive House standard in Kufstein, Austria. © Neue Heimat Tirol, Härting.

It's good for the climate! And for us!

Passive House Institute points way to climate-friendly buildings – energy efficiency neglected

Darmstadt, Germany. The topic of energy efficiency is often woefully neglected in discussions on climate protection. However, buildings-related emissions can only be significantly reduced by consuming less energy for heating and cooling. The Passive House Institute presents its proposed solutions for a climate-friendly building stock in three “building blocks”: A substantially higher level of energy efficiency of buildings; on-site generation of renewable energy; and a change in the political framework conditions. This also means that mediocre quality of energy efficiency measures should no longer receive funding. In Germany, for example, the government has just decided to **discontinue the subsidy for new builds of mediocre quality of energy efficiency.**



The majority of the existing buildings, in Germany as well as in many other countries, are of a very low energy-relevant standard and in need of urgent and extensive retrofit.

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The Passive House Institute has been carrying out research on highly efficient building construction and renovation for over 25 years. According to the research institute, governments can significantly reduce emissions in the building sector through three **building blocks** the institute proposes. This is the only way in which the climate objectives of the Paris Agreement can be achieved for the building sector. At the United Nations Climate Change Conference in 2015 held in Paris, 197 countries adopted this Agreement to protect the climate and avert a climate disaster.

Don't burn fossils

"Emissions in the building sector are still much too high. We cannot continue to burn fossil fuel such as oil, gas and coal in order to heat our buildings. The building blocks we developed make it possible to implement an existing building stock that will effectively protect the climate and meet the Paris Agreement", explains Dr Jürgen Schnieders of the Passive House Institute.

Building block No. 1: Energy efficiency

#EfficiencyFirst! The Passive House Institute stresses that achieving a **high level of energy efficiency** in new builds and retrofit projects must be a priority. Excellent thermal protection of the building envelope is decisive for this and achievable through a climate-appropriate insulation, among other things. Ventilation systems with heat recovery can further halve the heating demand of these buildings. The hot water demand can be decreased through the use of well-insulated pipes, efficient fittings and heat recovery. The Passive House Institute recommends highly efficient heat pumps for the provision of heating energy and hot water.

Building block No. 2: Efficiency & renewables

The Passive House Institute further explains that for the success of the energy transition, it is necessary to combine the energy efficiency of the building with the on-site production of **renewable energy**. In the case of new buildings and retrofits, a preferably large photovoltaic system should be installed on suitable surfaces. The heat pump can then be operated using this PV system. However, installing a PV system on actively heated buildings with uninsulated roofs, results in a missed opportunity for high energy savings. It also creates a barrier to implementing the energy transition. "Homeowners should therefore insulate their houses first. This is also financially worthwhile", explains Jessica Grove-Smith, co-initiator of the building blocks.

Building block No. 3: Political framework

The **political framework conditions** are also decisive for successful climate protection, continues Grove-Smith. As an example, the Passive House Institute also finds the German building energy act GEG as "incompatible" with the objectives of the Paris Agreement and advocates for more ambitious energy standards. This also makes sense economically. Financial incentives for highly energy efficient new builds and retrofits will increase industry motivation and uptake. "It would be counterproductive if a mediocre level of building efficiency continued to be funded. This also applies for heat generators which are not sustainable", explains Grove-Smith. The Passive House Institute is therefore in favour of ceasing funding for only moderate energy standards. www.passivehouse.com >> [Press](#)>>[Statements](#)

How to attain our climate objectives for the built environment. Take part!

The Passive House Institute in Germany is an independent research institute that has been carrying out research on highly efficient building construction and renovation for over 25 years. Based on our years of experience with new construction, retrofits of existing building stock and the latest research findings, we have developed the following "building blocks". These building blocks are a recommendation for a climate-friendly built environment and they can be applied anywhere to contribute to climate protection.

The Passive House and EnerPHit standards provide a clear and proven pathway to meeting our climate goals. Implementing the building blocks described here will not only lead to climate protection but also provide numerous other advantages.

We are available to answer any queries you may have.

1. The focus of sustainable new builds and retrofits must be on energy efficiency. Reducing energy needs is indispensable for achieving climate objectives. That is why retrofitting and new construction should be built to future-proof energy efficiency levels.

- Achieving an excellent standard of thermal protection for the building envelope is crucial.
- Installing ventilation systems with heat recovery can further halve the heating demand of a building that already has very good thermal insulation.
- The hot water heating demand can also be more than halved, for example through well-insulated pipes, efficient fittings, and heat recovery.
- Highly efficient heat pumps are the recommended technology to provide effective space heating and hot water.

2. For the energy transition to be successful, energy efficiency must be combined with the generation of renewable energy.

- If a retrofit or a new construction is being planned, installing a photovoltaic system on suitable surfaces and combining this with a heat pump is highly effective for an energy-efficient building. The PV system can also charge an electric car during the daytime.
- Installing a PV system on actively heated buildings with uninsulated roofs, however, is a missed opportunity for high energy savings and hinders the energy transition.
- Insulation appropriate for the local climate should be installed at the same time as installing a PV system, providing a pay-off in financial and environmental terms.

3. Political framework conditions are decisive for successful climate protection.

- Most building codes are not compatible with national climate objectives. Ambitious approaches for implementing high-performance buildings are urgently needed.
- This makes sense in economic and environmental terms.
- Financial incentives for highly energy-efficient new builds and retrofits will increase industry motivation and uptake.
- In contrast, subsidies for moderate improvement measures and unsustainable heat generators will slow down necessary adaptation measures and prove harmful for the climate.
- Proven building standards and calculation methods, such as the Passive House standard, which are already available and meet the climate protection requirements should be appropriately recognized and implemented at scale.
- Comprehensive training and further education for industry professionals is needed in order to support uptake.
- Targeted campaigns help inform people of the benefit of highly efficient buildings for their health, wallets and future.
- Fair allocation of the burden and gains from retrofitting measures (e.g. on landlords and tenants) will facilitate better acceptance.

Example: Energy consumption of the building under test (space heating and hot water)

Year	Energy consumption (kWh/m²)
2005	100
2010	70
2015	40
2020	10

The building requirements are not relaxing. The key to achieving climate goals is to implement the highest level of energy efficiency whenever a retrofit measure is carried out. Ambitious planning must lead to high costs and are difficult to implement in practice.

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The **building blocks** of the Passive House Institute for climate-friendly existing building stock: 1. efficiency, 2. renewable energy, 3. a change in the political framework conditions. © Passive House Institute

No *accelerated* retrofitting campaign

At the 25th International Passive House Conference in September this year, the Passive House Institute explained that for retrofits, the most economical solution with regard to total costs was to implement the ambitious EnerPHit standard. The EnerPHit standard was developed by the Passive House Institute for the retrofitting of existing buildings. If the renewal of building components is already planned, then these must be brought up to a future-proof, sustainable standard. By contrast, an *accelerated* retrofitting campaign with faster renewal cycles would be considerably more expensive. What is even more important is that in realistic terms, the designers and tradespeople required to implement this so-called 'wave' at short notice are simply not available, says Dr Jürgen Schnieders. The **30-minute presentation** on the topic is available on YouTube (in German).



With regard to the overall life cycle, highly energy-efficient buildings are more cost-effective than less efficient buildings. A view of the largest Passive House district in Europe, the Bahnstadt Heidelberg, Germany. © PHI

Already existing solutions

Scientifically proven building standards are already available, such as the Passive House standard and the EnerPHit standard, as well as reliable tools for energy balances. In addition, they are consistent with the climate objectives as the research Institute in Darmstadt clarifies. "It is a fact that highly energy efficient buildings protect the climate. At the same time, they offer significantly improved thermal comfort and a healthy living environment. Seen over the entire life cycle, these buildings are also more cost-effective than less efficient buildings.

We simply need to implement highly energy efficient buildings on a wide scale", says Schnieders.

Subsidies to end

In Germany, for example, the government has just decided to discontinue the subsidy for new builds of mediocre quality of energy efficiency: The subsidies for new constructions in the category "Effizienzhaus 55" will cease in February 2022. The German government now wishes to promote primarily those measures which generate the maximum possible CO₂ savings and will increasingly provide funding for energy-relevant retrofitting measures. "Now we must ensure also here that only highly energy efficient standards are applied. Otherwise, an opportunity for climate protection will be missed for decades to come", comments Jessica Grove-Smith of the Passive House Institute on this announcement by the government.

General Information

Passive House buildings

With the Passive House concept the heat loss that typically takes place in buildings through the walls, roof and windows is drastically reduced. This is achieved through high-quality thermal insulation, windows with triple glazing, avoidance of thermal bridges, an airtight building envelope, and a ventilation system with heat recovery. This ensures that Passive House buildings can manage without a *traditional* building heating system. They are called "passive houses" because a major part of their heating demand is met through "passive" sources such as solar radiation or the heat emitted by occupants and technical appliances.

Advantages of Passive House buildings

In a Passive House building the heat is retained for a very long time since it escapes very slowly. For this reason, active heating is needed only during extremely cold days. A very small amount of energy is required in total for providing this remaining heating. In the summer (and also in hot climates), a Passive House building also offers advantages: among other things, the excellent level of insulation ensures that the heat stays outside, therefore active cooling usually isn't necessary in residential buildings. Due to the low energy costs in Passive House buildings, the utility costs are foreseeable - a fundamental principle for affordable homes and social housing. Depending on the condition of the existing building, a Passive House building consumes up to 90 percent less heating energy compared to them and about 75 percent less than an average new construction.

Pioneer project

The first Passive House in the world was built in Darmstadt, Germany, 30 years ago by four private homeowners. Prof Wolfgang Feist was one of them. Ever since the homeowners moved in with their families in 1991, these terraced houses have been regarded as a pioneer project for the Passive House standard. With its newly installed photovoltaic system, this flagship Passive House now utilises renewable energy and received the Passive House Plus certificate for this reason.

Passive House buildings and renewable energy

The Passive House standard and generation of renewable energy directly on-site or near the building is a good combination. The building classes "Passive House Plus" and "Passive House Premium" are available for this supply concept.

Functions of Passive House buildings

Passive Houses buildings for all types of uses now exist everywhere. In addition to residential and office buildings there are also kindergartens and schools, sports halls, swimming pools and factories built as Passive House buildings. The first Passive House hospital in the world is currently being built in Frankfurt am Main, Germany.

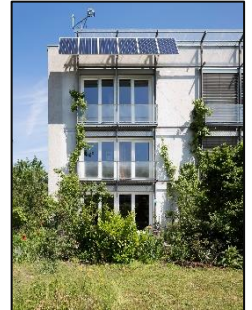
Passive House Institute

The Passive House Institute with its headquarters in Darmstadt (Germany) is an independent research institute for highly efficient use of energy in buildings. The Institute was founded by Wolfgang Feist 25 years ago in 1996. It holds a leading position internationally with regard to research and development in the field of energy efficient construction. Among other things, Prof Wolfgang Feist was awarded the DBU Environmental Prize in 2001 for developing the Passive House concept.

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The world's first Passive House building in Darmstadt, Germany celebrated its 30th anniversary in 2021! © Peter Cook



Professor Wolfgang Feist © Peter Cook