

Emulation highly recommended

Successful SINFONIA deep retrofits in Innsbruck and Bozen – Certificates presented

Darmstadt, Germany / Innsbruck, Austria. The EU-funded project SINFONIA has enabled comprehensive energy retrofits to be carried out in Innsbruck in Austria and Bozen in Italy. The heating energy savings are substantial, with an average of 77 per cent saved in the projects in Innsbruck. At the same time, the building retrofits now offer significantly greater thermal comfort. SINFONIA has thus provided proof of the enormous potential of deep retrofits for saving energy and protecting the climate. These insights will be transferred to other cities in Europe. The Passive House Institute presented 13 certificates in Innsbruck confirming the high level of energy efficiency of the retrofitted projects.

SINFONIA funded the energy retrofits of around 100,000 square metres of living area in the cities of Innsbruck and Bozen. The objective was to achieve the highly energy efficient EnerPHit standard, the Passive House standard for building retrofits. The optimisation of the electricity grid and solutions for district heating and cooling were also integrated. Within the framework of the SINFONIA project, 33 buildings with a total living area of approximately 66,000 square metres were retrofitted in Innsbruck alone, including a district with 16 buildings and three schools. The existing buildings were built between 1940 and 1960. The Passive House Institute, with its offices in Darmstadt as well as Innsbruck, provided support for these retrofitting projects and, among other things, carried out the quality assurance relating to their energy performance. In Innsbruck, the energy demand projected using the PHPP energy calculation tool in the planning phase was very consistent with the low consumption values measured later in the retrofitted buildings ([SINFONIA Research Report](#)). Other SINFONIA partners managed the projects in Bozen in Italy.



This apartment building in Innsbruck received not only good thermal insulation but also an extension as part of the SINFONIA refurbishment (view below before refurbishment).
© Passive House Institute



SINFONIA demonstrates that complex buildings and city districts can be modernised to a high standard of energy efficiency in a step-by-step process. In Innsbruck (Austria), the EU-project has funded the deep retrofits of 33 buildings between 2014 and 2020. © Passive House Institute

The solution already exists!

"We don't have to invent anything new, we just have to apply the available concepts consistently: the Passive House concept is a tried and tested solution for substantially reducing the energy demand in buildings and protecting the climate. SINFONIA has shown that large-scale deep retrofits of a high energy efficiency quality work well. Measurements have confirmed their success," explains Laszlo Lepp of the Passive House Institute in Innsbruck. Lepp supervised the SINFONIA projects in Innsbruck and presented the 13 certificates to the housing association "Wohnbaugesellschaft Neue Heimat Tirol" (NHT) and the real estate association "Innsbrucker Immobiliengesellschaft" (IIG). The Passive House Institute had already presented four certificates prior to this. With certification, the property developers have the certainty that the planned energy standard will actually be achieved and that in addition to a low energy demand, the buildings also offer the desired high level of thermal comfort for residents and users.

Retrofitted while inhabited

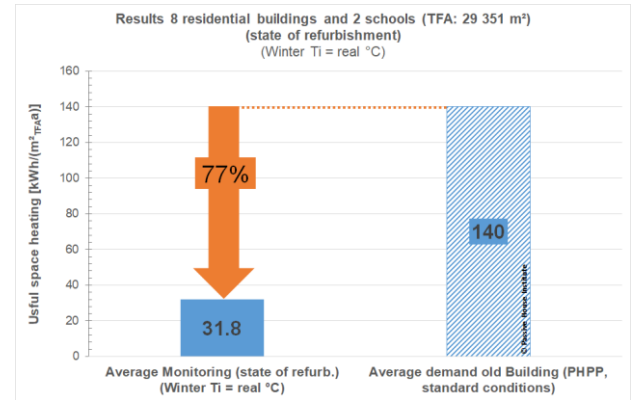
The staged retrofits in Innsbruck were carried out while the buildings were inhabited. Excellent thermal protection, windows with triple low-e glazing and heat recovery ventilation systems were installed, among other things. Significant thermal bridges due to continuous balcony slabs have now been eliminated by installing new front-mounted balconies. The majority of the 716 residential units were modernised during the SINFONIA project's duration from 2014 to 2020. In those units where the windows could not yet be replaced or ventilation systems could not yet be installed since there was no consent from the tenants, the pre-planned steps will be implemented after a change of tenants or with consent granted later.



Innsbruck, Austria: Laszlo Lepp of the Passive House Institute (centre, behind) presented the 13 certificates for the building retrofits. Also in the picture: Franz Danler (left) of the Innsbrucker Immobiliengesellschaft, Mayor Georg Willi (second on the left), Markus Pollo (fourth on the right) of Neue Heimat Tirol and Wolfgang Streicher (fifth on the left) and Rainer Pfluger (right) of the University of Innsbruck. © Passive House Institute

More is still possible!

For this reason, the certificates presented by the Passive House Institute for the residential buildings in Innsbruck are pre-certificates for the time being. The EnerPHit certificate will be issued when all apartments have finally been retrofitted. Unlike the residential buildings, the three schools in Innsbruck have been completed all in one go and have therefore already received the EnerPHit certificate. Monitoring for a large part of the apartments has demonstrated the success of the retrofitting measures: measurements carried out by the University of Innsbruck and evaluation by Søren Peper of the Passive House Institute in Darmstadt show that the heating demand of the retrofitted buildings has already been reduced by around 77 percent. "Once all the apartments have been retrofitted, savings up to 85 percent will be possible," says Peper.



The energy demand of the retrofitted buildings in Innsbruck has already been reduced by 77 percent. Savings of up to 85 percent will be possible when all of the apartments have been completely retrofitted. © Passive House Institute



In this building's modernisation, the supply air and extract air ducts for the ventilation system were integrated into the façade. This reduced the amount of work necessary in the apartments, resulting in more tenants giving their consent for this energy retrofit in Innsbruck. © Passive House Institute

High level EnerPHit

"Retrofits in which only an average standard of energy efficiency is realised, are a missed opportunity for better climate protection," says Søren Peper. "For economic reasons, the retrofitted building's components won't be renewed in the next few decades. Thus, a mediocre quality retrofit level prevents one from saving considerably more energy over a long period of time," says Peper, describing the lock-in effect. For this reason, for all retrofits, whether individual measures are applied in stages or the retrofit is carried out in one go, it is vital to implement high quality components in terms of energy efficiency. The

EnerPHit standard provides this quality for building retrofits.

Avoiding the lock-in-effect

The negative impacts of an avoidable lock-in-effect where a retrofit's poor or mediocre quality prevents one from achieving higher energy savings for many years, are impressively demonstrated through calculations performed using districtPH. The districtPH tool for energy balancing of city districts and neighbourhoods was developed by the Passive House Institute within the framework of SINFONIA. Experiences with the model projects in Innsbruck and Bozen will be transferred to five other medium-sized cities in Europe: Rosenheim (Germany), La Rochelle (France), Seville (Spain), Pafos (Cyprus) and Borås (Sweden).



General Information

26th International Passive House Conference: The #26intPHC will take place in March 2023 in Wiesbaden, Germany. Additional online events. www.passivehouseconference.org

#EfficiencyNOW: The call of the hour is to save fossil energy. To achieve this, the Passive House Institute has started the #EfficiencyNOW campaign. All information on this can be found on the platform **Passipedia**.

Passive House buildings: With the Passive House concept, the typical heat loss through the walls, windows and roof is drastically reduced. By applying the following five basic principles – 1. Excellent thermal insulation, 2. Windows with triple glazing, 3. A ventilation system with heat recovery, 4. Avoidance of thermal bridges, 5. An airtight building envelope – a Passive House building needs very little energy for heating and cooling. A major part of its heating demand is met through "passive" sources such as solar radiation or the heat emitted by occupants and technical appliances. SINFONIA and other projects around the world have demonstrated that the Passive House concept works well also in deep retrofits of existing buildings. The Passive House Institute has developed the EnerPHit standard for this purpose.

Other advantages of the Passive House & EnerPHit standards: 1. Increased thermal comfort. 2. In winter the heating demand is very low; the heat escapes out of the house very slowly. 3. The cooling demand of Passive House buildings in the summer is low. 4. The utility costs are predictable due to the low energy costs – the basis for affordable homes and social housing.

Pioneer project: The first Passive House building in the world was built 30 years ago in Darmstadt, Germany, by four private homeowners. Professor Wolfgang Feist was one of them. Ever since the families moved in in 1991, these terraced houses have been regarded as a pioneer project for the Passive House standard.

Passive House and renewable energy: The Passive House standard and generation of renewable energy is an excellent combination. For this, the Passive House Institute has introduced the building classes *Passive House Plus* and *Passive House Premium*. The pioneer project in Darmstadt was equipped with a photovoltaic system in 2015 and therefore received the *Passive House Plus* certificate.

PHPP: The planning tool PHPP (Passive House Planning Package) is available for realistic and reliable energy balance calculation and planning of highly energy efficient buildings. This Excel-based tool is routinely used worldwide for planning and quality assurance of Passive House buildings and EnerPHit deep retrofits.

Passive House Institute: The Passive House Institute in Darmstadt was founded by Professor Wolfgang Feist in 1996; since 2010, the Institute also has a branch in Innsbruck. The independent research institute holds a leading position in research and development relating to highly energy efficient construction and refurbishment.

Passive House Austria / iPHA: The purpose of the German language network Passive House Austria and the international Passive House Association (iPHA) is the dissemination of knowledge relating to highly energy efficient construction and retrofitting as well as networking.

Social media:



Twitter: @PHAustria

Facebook: Passive House Austria



Twitter: @the_iPHA

Facebook: International Passive House Association

Instagram: @passivehouse_international

LinkedIn: @passive-house-institute

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Socially compatible and highly energy efficient apartment blocks built to the Passive House standard.
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In 2021, the world's first Passive House building in Darmstadt celebrated its 30th anniversary! © P. Cook



Prof. Dr. Wolfgang Feist
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