

International Policy Maker Workshop: Deep Retrofit Financing and Quality Assurance

The [International Passive House Association \(iPHA\)](#), in collaboration with the [Passive House Institute](#), was able to bring 28 policymakers from all over the world together to meet and discuss retrofitting solutions, with a focus on financing and quality assurance, as part of the SINFONIA project. The meeting took place during the 22nd International Passive House conference in Munich. The Lihotzky Room in [WagnisArt](#), a Passive House community in Munich that chose to build to the Passive House Standard for its quality and cost-efficiency, provided the perfect setting for the event.



Wagnis Art Area, Munich / ARGE bogevischs buero architekten und stadtplaner gmbh, shag, udoschindler undwalter habe architekten gbr ©Passive House Institute

Successful retrofitting with quality assurance

After a short greeting by Giorgia Tzar from iPHA and a more detailed introduction from PHI's Witta Ebel, the first topic on the agenda 'Successful retrofitting with quality assurance' was addressed. Ebel presented numerous monitoring projects stretching out over more than a quarter of a century, demonstrating that the

Passive House Standard is a tried and tested solution which performs exceptionally well with no performance gap. Explaining this accomplishment, Ebel listed the keys to success as being well trained and accredited professionals, the accurate design and energy balance tool ([Passive House Planning Package - PHPP](#)) and high quality, in best case certified Passive House, components, which as a total, ensure that the high standards of Passive House are quality assured. Passive House components, which can be found in the comprehensive Passive House component database, meet the challenge that deep retrofits present. As of today, there are thousands of examples all over the world and around 900 certified Passive House components. Independent quality assurance of components ensures reliable performance through the identification of relevant parameters, appropriate testing and calculation procedures, as well as their documentation and integration into the performance calculation of the building.

Zeno Bastian from PHI then continued this thread by discussing the [EnerPHit](#) Standard. EnerPHit is the Passive House Institute's solution for retrofits and targets a slightly lower energy efficiency goal than the classic Passive House standard for new builds, taking the challenges of retrofitting into full consideration. Part of this is offering an EnerPHit Retrofit Plan, which plans the stages of retrofitting in a step-by-step manner, consistent with the way most buildings are retrofitted. In the case of step-by-step retrofits, it is particularly important that each stage of the retrofit is planned to highest quality. This avoids lock-in effects caused by inferior retrofitting work and components and makes sure that each step is completed at the economically optimal point in time. This plan can be pre-certified to ensure that owners and contractors know that the path they are taking will lead to the desired result. Bastian also introduced PHI's new district energy balance tool 'districtPH', which can be used to make decisions about retrofitting strategies or energy supply systems for whole districts, something that is particularly relevant to city planners and policymakers. Calculations with districtPH consider different retrofit approaches and show why high quality retrofits are so important for avoiding lock-in effects. Bastian then went on to discuss a few of the many funding programmes available in Germany for Passive House, such as that from the KfW, and funding by the governments of Bavaria and Hesse, which strongly support the EnerPHit and new build Passive House approaches.



City of Innsbruck © Marco Carli

The smart city project [SINFONIA](#) funded by the European Union (FP7 program) aims to develop replicable measures to increase efficiency in the building sector and solutions for heating and cooling networks. Klaus Klewein from [Standortagentur Tirol](#) described his experiences working as district coordinator in Innsbruck, one of the two demonstration cities – the other one is Bolzano. Highlighting both the EU and Innsbruck city's own energy efficiency policies, Klewein explained the steps that were taken to meet the set targets: 50% energy savings, 30% more RES and 20% less CO₂ emissions. Klewein demonstrated the innovative solutions the city implemented, such as using waste heat from industry. With the experiences from Sinfonia the city of Innsbruck is now considering requirements for all new municipal buildings from 2023 ; refurbishments will be in line with the EU's Nearly-zero energy building (NZEB) standard at a comprehensive renovation rate of 1,3% per year.

Harald Malzer from the housing company [Neue Heimat Tirol \(NHT\)](#) also discussed experiences with retrofits within the SINFONIA project. Malzer reported that when a large retrofit is planned in most cases a step-by-step solution is necessary. This was developed as part of the EU's EuroPHit project so that PHI can now offer the EnerPHit Retrofit Plan: Offering comprehensive planning for the whole concept so that a coherent retrofit solution will ultimately be achieved. NHT has decided to integrate the EnerPHit retrofit plan into its retrofitting projects. Malzer described

NHT'S historical energy demand, as well as the social housing situation in Austria. Demonstrating the potential of energy efficiency measures in the refurbishment sector on the basis of concrete implementation of best practice solutions for "deep retrofit" is another Sinfonia goal. Malzer explained why NHT decided to use EnerPHit to achieve this, showing completed examples of retrofits and the huge savings (84%) achieved during the project. Malzer also stressed that their main challenge was socio-technical – convincing the tenants of the inhabited buildings to agree to measures such as the installation of the ventilation system. This can be achieved by involving the tenants in the project from early on and training construction workers to complete the work in shorter periods of time so as to put less strain on the inhabitants: the ventilation system installation was originally projected to take 2-4 weeks, after a lot of coordination and practise the professionals could install it in just 4 days.



Reichenauerstraße 62-66, Innsbruck / Neue Heimat Tirol ©Passive House Institute

The final speaker for this session was James Traynor from [ECD Architects](#), who described his experience working on the social-housing project '[Wilmcote House](#)' in Portsmouth, UK. Wilmcote House was a large scale EnerPHit project. After careful canvassing of the residents, Traynor and his team were able to assess the major issues with the building: it was cold and damp - requiring extreme levels of heating which the many of the residents could not afford (25-40£ a week), many of the components needed replacing such as the windows and concrete and the general

disrepair of the building was leading to antisocial behaviour. After much discussion, it was decided that the best solution would be external wall insulation to the EnerPHit standard, a new insulated roof and triple-glazed windows, mechanical ventilation with heat recovery (MVHR), and structural concrete repairs among other things. While comparing costs it became clear that retrofitting to the EnerPHit standard would only cost 83£m² more than the UK building regulations (9% increased building costs), but with the benefits of a heating load of less than 25 kWh/m²a, resulting in £82,675 net energy savings per year and positive NPV after 19 years. By conducting this retrofit they have extended the building's life by at least 30 years, conducted successful resident energy education, and improved the contractor's training – a major challenge for the project. Continued monitoring of the project has shown positive feedback so far with no overheating and demonstrated significant energy and carbon savings.



Wilmcote House, Portsmouth / Portsmouth City Council ©ECD Architects

Reports on retrofit support programmes

Martina Demattio began the second session 'Reports on retrofit support programmes' by discussing the results of the Sinfonia project in Bolzano, Italy. Demattio works for the Agenzia [CasaClima](#), the local agency determining the quality assurance of energy efficient buildings and retrofits from Bolzano. Since 2014 CasaClima A-certified buildings correspond to an nZEB as defined in the 31/2010/EU

directive and since 2017 the same A standard is a requirement in the Province [of Bolzano](#) (30 kWh/m²a as per the CasaClima calculation tool). The CasaClima Standard looks at environmental sustainability, the building's total energy efficiency and its envelope and has a standard for new builds as well as retrofits. Bolzano is a SINFONIA demonstration city and has used the Cubatur-bonus as well as the project funds to complete multiple retrofit projects, achieving excellent and replicable energy savings throughout the city. One of the policies that has helped spur the Italian market for energy efficient renovation on is the Renovation Bonus, offering tax deductions of up to 65% on eligible renovation interventions. Energy-efficient retrofits also benefit hugely from a non-financial incentive called the Cubatur-bonus which allows for 20% more floor-space to make the necessary insulation for an energy efficient building affordable. This incentive carries no financial outlay for the municipality and represents a win-win for all parties involved in a building project: the region gains highly energy efficient buildings, while the owners, investors and builders gain the extra space needed to make that possible at no extra cost – something particularly valuable in a time and region when each extra m² of space carries a high cost, making it a highly effective policy.



Projekt Via Brescia / Via Cagliari, Bolzano / Social Housing Association IPES ©Passive House Institute

Conor Hanniffy from [Sustainable Energy Agency Ireland \(SEAI\)](#) introduced Ireland's [pilot retrofit programme](#). The project has five million Euros available during the pilot

phase and is aiming to retrofit residential buildings to at least an Irish A3 standard. Many Irish homes are below the nation's D1 standard, with a large amount being designated F or G standard. Therefore, the project's goal is to lift the standard of low-performing residential buildings and thereby instigate behavioural change in the Irish construction market by improving the living standard and energy savings residents expect from their homes. The programme grants 50 % support to private owners and 95 % grant support for social housing. They also allocate 50 % of €200 toward the cost of a Building Energy Rating certificate (BER) (Energy Performance Certificate), 50 % of €500 towards cost of Airtightness testing as well as 5 % of the total eligible project costs for project management among many other things. The early results are positive and will be published to the public in the coming months. SEAI, the agency conducting the project is looking for collaboration partners and would be interested in hearing from or about further pilot projects.



City of Vancouver ©Passive House Institute

Monte Paulsen from [RDH Building Science](#) in Canada presented on the current political climate in Vancouver and how the [Passive House \(PH\) that Austria built for the Winter Games in 2010](#) inspired its Greenest City Action Plan. He described the steps to realising Passive Houses throughout the city and getting the provinces and wider Canada involved. Step one: Focused on making PH attractive to owners and construction companies with measures similar to the Cubatur-bonus in Italy:

offering extra floor area to compensate for thicker walls, extra building depth in which to put the extra floor area, extra height to compensate for more ceiling insulation and an openness to resolving code compliance issues. Step two was doing the same for larger PH buildings and included the possibility to negotiate a reduction of other fees. Step three was to close the gap between PH and the building code. One- and two-family homes currently demand a 70% GHG reduction and will soon require 30 kWh/m²a. For four- to six-storey or high-rise rezoning buildings require either TEDI 30 or Passive House, which will soon be exclusively or at least very close to the Passive House Standard. This policy has been highly effective, as building to the PH Standard comes with the aforementioned allowance benefits that the TEDI 30 constructions do not receive. These compensating benefits make PH more attractive. The fourth step is quality assurance, making sure that development permits include: Preliminary PHPP & summary of Passive House plan, identification of any challenges to PHI Building Certification with the building permit includes the successful completion of Design Stage Review, a written “Passive House Commissioning Plan” and a registered professional sign-off on the commissioning plan, which must be approved by a PHI-accredited Building Certifier prior to the issuance of a building permit. The next steps include expanding PH and EnerPHit as well as the Zero Emissions Buildings Center of Excellence across Canada and to rapidly escalate training and coordination of these policy and construction changes.

Ernesto Infante Barbosa from [Sociedad Hipotecaria Federal](#) sent a video from Mexico to explain to [EcoCasa programme](#) in Mexico, a social housing strategy which through subsidies aims to incentivise high-quality constructions. Through the first NAMA project applied in Mexico, some of the houses built under the EcoCasa programme have been built to the Passive House Standard and are achieving an 80% reduction in greenhouse gas emissions. The long-running programme has had wide-ranging success in Mexico, especially in a country with access issues to quality components and multiple climate zones to cover.



Some of the first Passive House projects in Morelia, Mexico, / being built as part of the LAIF Component, program implemented by SHF ©Passive House Institute

Complementing Barbosa's video was Andreas Gruner from [GIZ](#)'s presentation on the Existing Housing NAMA Mexico study. Gruner discussed the main issues facing Mexican policymakers: a population growth of around 1.7 Mio. per year and urbanisation rate approx. 80 % which is still expected to rise. At least a third of the approx. 28 million existing homes will require a total or partial renovation by 2030 (SEMARNAT / GIZ, 2011) and an average 400.000 dwellings per year will be built over the next 10 years, mainly targeting the low-income population. Therefore policy solutions focusing on the re-densification of inner-city districts as well as more compact and vertical construction and a 25% GHG reduction (conditionally up to 40% by 2030) have been set as targets. The Existing Housing NAMA Mexico looks at seven different climate zones, three housing prototypes and a whole house approach to energy certification, meaning that there is a certification system for energy and water demand. Like the EnerPHit step-by-step approach, the concept of the NAMA assumed a step-by-step refurbishment towards the optimal energy and environmental performance focusing on thermal insulation of the building envelope, airtightness, mechanical ventilation, thermal roof insulation, solar collector, high thermal quality windows (according to climate), improved shading with an additional focus on energy efficient electrical appliances. The NAMA concept also foresees that beneficiaries of funding receive support from an energy advisor. The financing

programmes focus on the energetic improvement of existing homes of families with an income of up to 5 times the minimum wage and is financed through a combination of schemes. Currently there different operation schemes under discussion to ensure: holistic EE design, implementation, quality control, verification and registering of NAMA houses.

EU and UNECE outlook

Janna Schönfeld from [The Executive Agency for Small and Medium-sized Enterprises \(EASME\)](#) started off the final session presenting international organisations by describing the work of the EU agency she works for. The EASME manages EU programmes which then feed into the policy-making process with project outcome and success stories. After discussing the 2020 and Energy Union strategies, as well as the Clean Energy for all Europeans Package, Schönfeld laid out the current energy efficiency legislation clearly, detailing the Energy Efficiency Directive, Energy Performance of Buildings Directive and the Ecodesign Working Plan 2016-2019. She noted that EASME encourages ambitious projects that seek to be more energy efficient than the directives require as a minimum. Stressing that the EU recognises that 75 % of the housing stock is energy inefficient, renovation rates are too low and renovation depth is too shallow. In order to meet this need to accelerate and finance building renovation investments, EASME has started the '[Smart Finance for Smart Buildings initiative](#),' initiative, which aims to improve the investment climate for energy efficiency by deploying financial instruments and flexible energy efficiency and renewable financing platforms, supporting the project pipeline at EU and local level, offering Project Development Assistance facilities and de-risking the Energy Efficiency Platform. Schönfeld also presented three successful EASME programmes: Transition Zero: Mass market for Zero-Energy refurbishment, ICPEU: Certified, Standardized, Bankable Energy Efficiency and The Energy Efficiency Mortgage Initiative.



Deep Retrofit Financing and Quality Assurance / EuroPACE presentation ©Passive House Institute

A project currently funded by the EU was presented by Eduard Puig Maclean from [GNE Finance](#). The EuroPACE: Integrated building improvement platform for Europe aims to make home renovation projects easier for all by offering investors secure, scalable returns and technical assistance combined with 100 % financing for up to 20 years, attached to the property and not the person – meaning it can transfer on sale. The programme helps find and train the labour force required and makes deep retrofits more attainable with the long payback period. Typically, local governments can finance improvements that meet a valid public purpose – such as sidewalk repairs, water filtration plans, or new lighting districts. Local governments then add special charges on home-owners tax bills who directly benefit from such improvements. With PACE this concept is applied to private building improvements. Homeowners decide to voluntarily join PACE districts and repay the financing. Thus the improvement is financed by a private investor and is repaid and collected using property taxes and charges. Cities place liens on homes that use PACE, which provides investors with repayment security. PACE financing was developed in the US and with the support of the EU, it is now in Europe. GNE Finance states that this financing option stimulates demand for retrofits and in turn, stimulates the job market creating over 40,000 jobs in the US.

The final presentation for the day was by Domenica Carriero from the [UNECE's](#) Forests, Land and Housing Division discussing the UNECE'S work promoting energy efficiency standards in buildings in the Economic Commission for Europe's (ECE) region. With a region that encompasses 17 percent of the world's total population, 1.3 billion people and creates more than 40 percent of world's GDP, this equates to 30 % of total final energy consumption, 50 % of global electricity demand and 30 % of energy-related GHG emissions. Therefore, it is the role of Carriero's department to ensure the access to decent, affordable and healthy housing for all and improve the sustainability of housing in the ECE region in connection with sustainable development through effective policies and actions at all levels, supported by international cooperation. According to Carriero, this is achieved through a Global research consortium, research and demonstration projects and International Centres of Excellence. The United Smart Cities project, which aims at addressing the major urban issues in medium-sized cities in countries with economies in transition in the UNECE region by creating city profiles and action plans using key performance indicators with a focus on capacity building to show where there is room for improvement and how to achieve it. The second project is the [Standards on Energy Efficiency \(EE\) in Buildings](#) project, which is currently in its mapping phase to compile a database on EE technologies and standards for buildings and prepare gap analyses. This project will then result in developing and organising training programmes, promoting partnerships, preparing guidance materials and establishing a database of experts.

Alternatives and roundtable remarks

The workshop also featured a roundtable discussion moderated by Passive House Canada's Rob Bernhardt and a panel discussion moderated by [Treehugger's](#) Lloyd Alter featuring experts Zeno Bastian, Martina Demattio, Monte Paulsen and Andreas Gruner. The panel discussion led to an interesting dialogue on the incentives needed to achieve highly energy efficient retrofits. Demattio discussed the difference site visits made to the quality of a project when new craftspeople are employed, noting that the oversight made contractors work better. Bastian added that knowing that funding will only be available to projects that meet the strict requirements of support programmes, such as the one offered in the German State of Hesse, added another incentive to complete the retrofit properly. Gruner offered a different perspective for developing economies, noting that the education levels of the contractors is often a barrier to achieving better building standards, Paulsen added that this is an issue throughout North America in general and is not necessarily only a barrier for developing economies. The panel concluded by saying that aiming high

is important but making sure that the capacity building and funding options are available is key to achieving ambitious goals.



Deep Retrofit Financing and Quality Assurance / Panel discussion ©Passive House Institute

The last addition to the agenda was a roundtable discussion during which attendees who did not hold a presentation were given a chance to discuss their own retrofitting experiences and solutions. The session began with Benoît Lebot, Executive Director [IPEEC](#) praising the Passive House community and advocating for highly energy efficient solutions like those offered by Passive House to be implemented on a greater scale. Noting that often policy does not go far enough to ensure that only the highest quality energy efficient retrofits are being promoted and funded, although tried and tested retrofitting solutions such as those presented on the day already exist. Shou-Kong Chen from PHI added to this line of thought, noting that Passive House is making great strides in China. Other participants such as Michal Bartko from [the National Research Council of Canada](#), were optimistic that the policy changes in Canada presented by Monte Paulsen were leading in the right direction. Janna Schönfeld mentioned during her presentation concerns that some funding can inadvertently undermine what it has set out to achieve, a point that group members agreed with, noting that consistency is key in retrofitting policy - implementing long-term financing and quality assurance strategies must continue past individual administrations and be carefully administered so as not to undo or

contradict existing policy or financing measures. All in all, the roundtable displayed the group's optimism that retrofits can be completed to a high level if the proper incentives are in place and monitored for their effects and progress. The group wished to collaborate and exchange data and project results on policies that were successful as well as unsuccessful to avoid unknowingly replicating programmes that failed elsewhere and being unsuccessful in their own attempt. Therefore, the main accomplishment of the session was to improve international awareness, partnerships and collaboration.

Conclusions

Jan Steiger from the PHI made conclusory remarks on behalf of iPHA and PHI. The first in what iPHA and PHI hope to be many policymaker workshop, was successful in bringing together policymakers from all around the world, collecting international examples from a multitude of climate zones, economic development stages and cultural backgrounds. Countries and regions have found different financing solutions that work for them and sharing data and programme results is of the utmost importance to make sure that effective, successful policies can be implemented in further regions. The feedback from participants has been overwhelmingly positive and it is hoped that the networking opportunity the workshop presented will result in further partnerships and collaborative efforts.



Deep Retrofit Financing and Quality Assurance / Roundtable discussion ©Passive House Institute