

APPLICABLE AND ENHANCED PassREg-SOLUTIONS

Report of the solutions developed and enhanced
throughout the PassREg-project

IEE PassREg

PASSIVE HOUSE REGIONS WITH RENEWABLE ENERGY

Deliverable D 4.7

Deliverable D 4.8

Prepared by DNA in de bouw

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1. Introduction

1.1. Task 4.3: Adapting and implementing of solutions

With this document we proudly hand over the outcomes of work package 4, task 4.3. Within this task the PassREg partners involved transposed PassREg-solutions into the context of their regions, cities or networks. By doing this, a lot of knowledge and experience has been generated, transferred from one region to another or deepened. And most of all the PassREg process in the different regions has been fuelled and the lessons learned have been made accessible for the regions that want to join the PassREg- process.

Task 4.3 included three aspects of the implementation of the solutions:

- adapting of solutions for dissemination under specific regional circumstances (4.3.1)
- enhancing of solutions for implementation (4.3.2)
- sharing of the adapted and developed solutions throughout the project (4.3.3)

1.2. Partners involved

The following partners worked on this task and contributed to the realization and implementation of the solutions described in this document:

Participants from frontrunner regions (FR):

- IG Passivhaus Tirol, Innsbruck (AT)
- PHI, Darmstadt (D) representing Heidelberg and Frankfurt

Participants from aspiring regions (AR):

- BRE, Cardiff (GB)
- eERG-Polimi, Milan (IT)
- Community of Cesena (IT)
- PHP, Antwerpen (B)
- Nobatek, Aquitaine (FR)
- LEIF, Riga (LV)
- Eneffect, Gabrovo (BG)
- Municipality of Burgas (BG)
- Municipality of Zagreb (HR)
- DNA in de bouw, Arnhem-Nijmegen (NL)

1.3. From missing links to PassREg solutions

The execution of task 4.3 was preceded by task 4.2, Map of missing links, in which the complexity of factors that hinders the large scale out-roll of NZEB based on Passive House technology with adjusted renewable energy supply has been structured and discussed. Before this also the solutions were described that were already available at that time (autumn 2013), in front-runner regions and also in aspiring regions.

The solutions that were subject to this task were carefully selected and discussed in the context of the exposition of the missing links and available solutions in a workshop at the partner meeting in Innsbruck, see photo below. This was followed by discussions in several partner calls about the better solutions and how to adapt, enhance and implement them most effectively. The general aim was to create win-win situations by choosing to work on solutions that were needed by the individual partner regions but that also would be

supportive in a larger context. The partner calls also pointed out potential partners for cooperation and needs for support. Naturally, the main focus of the partners and the drive was merely on solving barriers in their specific regional situations. In order to make the work within this task effective in an interregional context the work package leader initiated the exchange of experiences about working on the solutions between PassReg partners and insisted on publication in a European context, e.g. on the SOS-wiki-database. In the following chapters links to the publications are provided with every described solution.

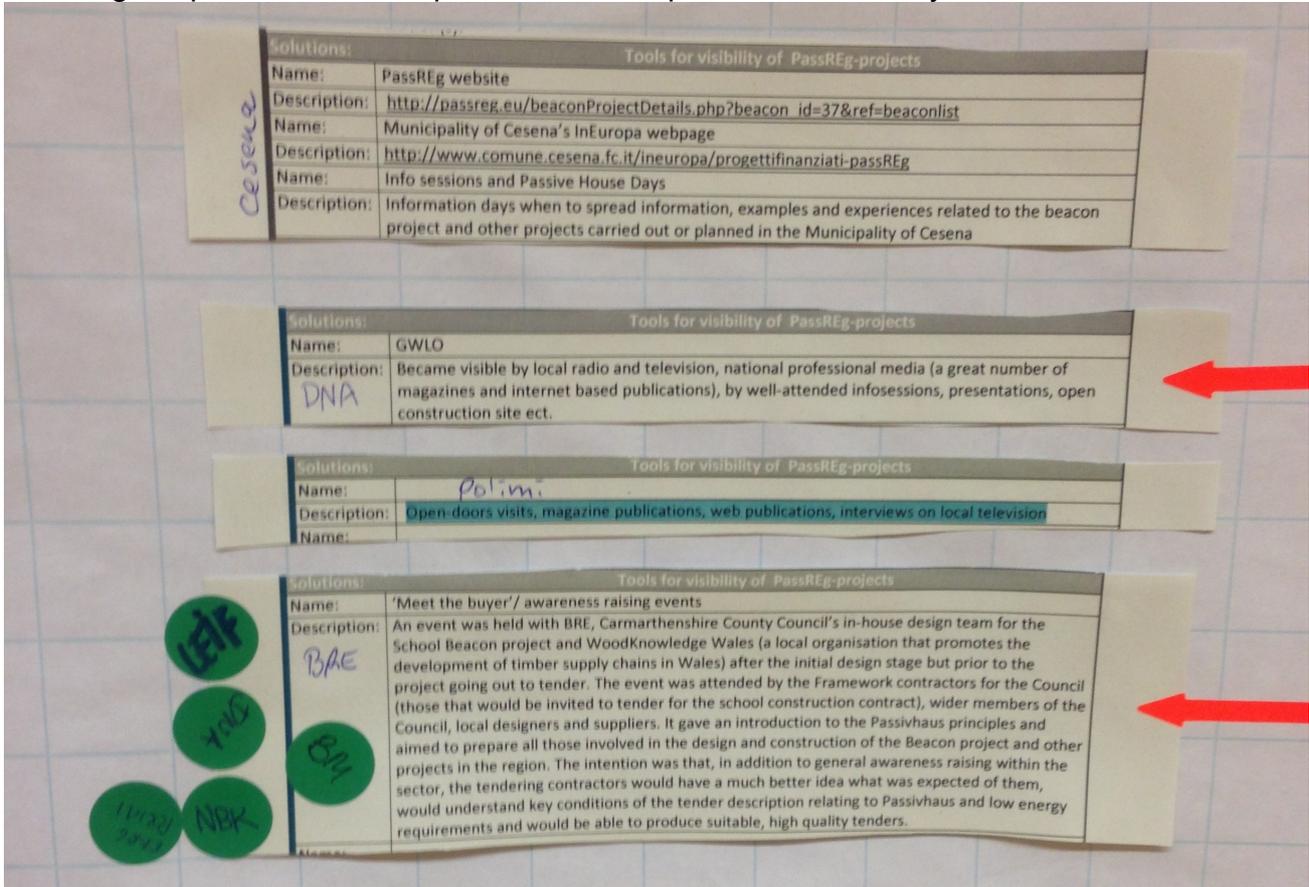


Figure 1, example of the “Exposition of available solutions” at the workshop in Innsbruck, 2013. The green dots indicate the interest of partners to implement the solution described into their regional context, the orange arrows indicated the request for sharing the solution. These solutions later were published in the SOS-wiki-database.

During the discussions about the selection of solutions already some confusion rose about the difference between task 4.3.1 and task 4.3.2. Although initially the distinction between the tasks and deliverables 4.7 and 4.8 had been planned and contracted in the PassReg-proposal, in the practical execution of WP4.3 the line between these two was hard to define. In order to avoid uncertainties the work package leader combined these tasks and communicated about both tasks as one. Therefore the deliverables are also combined into one document, although they are included as separate chapters. Solutions that are considered to go with deliverable D4.7 are presented in chapter 2. Solutions that fit in deliverable D4.8 are described in chapter 3.

After the collective round of decision making about the kind of activities within task 4.3 the work was performed mainly by the partners individually and often was very much intertwined with the PassReg-process in the regions. Through the sharing in partner calls some hurdles regarding specific solutions were solved and support was lent by providing needed information, sharing experiences etc. In some cases the partners had to deviate from the initial plan because not enough information was accessible or because some activities were more time consuming than initially expected.

1.4. How to read this document

Chapter 1 introduces the work of task 4.3.

Chapter 2 provides an overview of the solutions that have been developed within task 4.3.1: Adapting solutions for dissemination under specific regional circumstances. Existing solutions have been adjusted for implementation in the particular situation in the specific partners region.

Chapter 3 provides an overview of the solutions that have been developed within task 4.3.2: Enhancing solutions for general implementation. Relevant methods, tools and solutions were created for specific targets and enhanced for EU-wide application.

2. Solutions for D4.7

This chapter presents the solutions that have been developed within task 4.3.1: Adapting solutions for dissemination under specific regional circumstances. Existing solutions, experiences, facilities or tools have been adapted for implementation in the particular situation in the specific partner region.

Per solution the reason for choosing the solution for adaptation and the process of the work is described. The outcomes are described as results within this chapter, links are provided to the resulting publication or a document is included in the annex.

2.1. Solutions adapted by BRE (Great Britain) - AR

2.1.1. Establish differences and equivalent assumptions between PHPP and UK SAP

Description and context

One of the major barriers to the widespread acceptance of the Passivhaus standard as a basis for the UK NZEB regulations is a lack of understanding of how the Passivhaus calculations relate to accepted UK calculations. In order to dispel concerns about applicability, BRE thought it would be valuable to undertake a comparative study on the key variables in each of the tools, highlighting similarities and differences in the assumptions made. The aim was to prove to the industry that the calculations were relevant in the UK context and/ or to identify parameters that would require more justification to facilitate widespread acceptance. There was also concern that if Passivhaus energy performance was not fully acknowledged by SAP, additional (hence more costly than necessary) renewable energy sources would be required on a Passivhaus to meet UK regulatory compliance.

Activities and process

This study compared calculations and/ or assumptions for key variables in two tools - the UK Standard Assessment Procedure (SAP) for dwellings and PHPP for Passivhaus. Previous studies that had compared the calculations in earlier (now superseded) versions of SAP highlighted the likely areas of discrepancy, so these were the focus of the present study. In particular, we looked at how calculations and/ or assumptions for key parameters have changed in SAP based on data collected in UK buildings. It became apparent that parameters shown to offer potential differences between calculations were: occupancy rates, internal gains, hot water usage, pipework distribution losses, thermal mass parameter, window frame factors and MVHR efficiency rates.

Results and output

The study determined that many of the parameters considered in each of the tools were equivalent (or could be shown to be equivalent if taking into account conversion factors for measurement conventions). However, there were some key assumptions that would inevitably lead to differences in the calculations. In particular, 'utilisation factors' were applied to UK MVHR efficiency values to account for variability in installation quality, which may be a reasonable assumption for mainstream 'regulations compliant' construction with less rigorous quality assurance procedures than required by Passivhaus. (SAP is after all a tool to demonstrate regulatory compliance, not a design tool and if a building performs better in reality it would be of no detriment to the building or its occupants.) It was recommended that the impact of these variables should be assessed further via comparative studies.

The study identified that some of the issues that would inevitably be perceived by the UK construction industry were procedural rather than with the calculation procedures themselves. All tools used for Regulatory compliance in the UK need to be approved for use (by BRE on behalf of DECC for domestic buildings and DCLG for non-domestic buildings) and have their performance verified to ensure that they give results within acceptable tolerance to all other tools available on the market. It is likely that this would need to be carried out for PHPP before it could be accepted in place of existing Regulatory Compliance tools. It may also be necessary to demonstrate that the behind-the-scenes workings of the PHPP tool, which is essentially a complex spread sheet, could not be manipulated by users in a way that could misrepresent the final results to the compliance body.

A secondary issue, which goes beyond any differences inherent to the calculation methods, is the demonstration of competency of whoever carries out the calculations. In the UK, this has been addressed by the establishment of competent person schemes that sit alongside each of the approved software programmes currently used for compliance. This results in the 'On Construction' qualification that allows users to formally lodge 'as build' EPCs. If outputs from PHPP were to be considered for Regulatory compliance, an equivalent approved training and competency scheme would inevitably need to be founded to ensure the tool is used correctly and consistently in all cases.

The study therefore identified a number of items that would warrant further investigation to bring PHPP closer to wholesale acceptance in the UK.

Findings of the comparative study are available on the PassREg SOS:
[http://passregsos.passiv.de/wiki/Comparison_of_PHPP_with_SAP_2012_\(UK\)](http://passregsos.passiv.de/wiki/Comparison_of_PHPP_with_SAP_2012_(UK))

2.2. Solutions adapted by Cesena (Italy) – AR

2.2.1. 100 Tips on Protecting the Environment and Saving Energy

Description and context

The Municipality of Cesena adapted the advices of a Brussels guide with 100 tips for private owners to maintain, renovate or build their homes in an environmentally friendly and energy efficient way. Bruxelles Environnement developed this guide based on the experience of the frontrunner region. The Municipality of Cesena extrapolated the most interesting for it's own reality. These tips were summarized to stay in a few pages and a document that ~~will be published~~ has been published on the project page on the institutional PassREg ~~the website of the Municipality of Cesena~~ and in the Energie per la città website.

Cesena decided to implement this solution because the PassREg project has as its main aim the promotion of energy saving (which also involves important benefits for environment) achieved through buildings with high-energy performance and with the installation of energy production plants using renewable sources. However, a key role in saving energy is played by all the actors involved in the construction / renovation / building use. End users are particularly involved in the proper management of the building and facilities. Therefore it is extremely important to promote good practices and give some tips on how saving energy not only when we refurbish or we make some maintenance in our homes but also in our daily house management.

Activities and process

We translated the 100 tips from the Belgian brochure into Italian and we chose 50 tips that could be suitable for Cesena situation. Then we decided to reduce the 50 tips in 30 tips, to make the leaflet more readable by citizens and users. We drafted a brochure that has been published on Energie per la Città and Municipality of Cesena website. The brochure will also be printed internally in Municipal printing department and distributed to citizens. Cooperating partners: Municipality of Cesena, Energie per la Città inc.

Results and output

A 30 tips printed brochure and .pdf brochure has been published in local language on the institutional website of the Municipality of Cesena and of Energie per la città inc.: <http://www.comune.cesena.fc.it/flex/cm/pages/ServeBLOB.php/L/IT/IDPagina/9690> and at the SOS-wikidatabase: http://passregsos.passiv.de/wiki/30_Tips_on_Protecting_the_Environment_and_Saving_Energy.

2.3. Solutions adapted by PHP (Belgium) – AR

2.3.1. Training for professionals

The Passiefhuis-Platform offers for several years now a comprehensive passive house specific training possibilities for the building professionals in Flanders, including city of Antwerp.

The training program is called 'building energy neutral' and consists of three specific pathways: designers/planners, builders and calculators. Each of these pathways offers a number of individual courses that can be chosen as wanted. Typically, the courses are attended by architects, engineers, builders/contractors, facility managers and installers.

The courses topics for building designers are:

- nZEB houses
- multi residential and non residential buildings
- highly energy efficient renovations
- insulation and thermal bridges in new buildings
- insulation and thermal bridges in renovation
- windows, window frames and sun shading
- building air-tight
- ventilation and indoor climate
- energy techniques including renewable techniques
- energy efficient lighting.

1)

The course topics for builders are:

- Building nZEB in practice: basic principles
- Building nZEB in practice: building envelope
- Building nZEB in practice: techniques
- Practice course: ventilation
- Renovation for builders: windows and doors
- Renovation for builders: insulation and air-tightness
- Renovation for builders: HVAC

2)

The course topics for calculators are:

- THERM: calculating thermal bridging for EPB and PHPP
- Basic PHPP, netto energy use calculation
- Advanced PHPP: primary energy calculation.

These courses are given in 3 locations in Flanders covering geographically and are available in 3-4 cycles per year.

All info on PHP trainings can be found at:

<http://www.passiefhuisplatform.be/artikel/pakketkorting-van-20-op-phps-opleidingsaanbod>

Within PassREg a specific training offer was given to the important stakeholder AG VESPA, which is the autonomous building company of the city of Antwerp. To increase the local capacity of architects and engineers involved in the city development, PHP and AG VESPA started from the existing course offer and agreed on a training programme that meets their specific needs.

A meeting between PHP team and architects of AG VESPA (city of Antwerp) was organized to identify needs and opportunities. An analysis was made on basis of the specific training programme which was then suggested to be adapted to extent to suit local needs for passive house developments in the city.

As a result of this process, three type of courses on passive house buildings with renewable energy were selected:

- Single family houses
- Multi-family residential buildings
- Non residential buildings.

In each of these course topics, the PHP course was adapted to integrate their specific needs.

Namely, in the single family houses, special focus was included on to how to reach passive in cases where the site/building have non favourable orientation? How to design and build passive in densely urbanized city areas? Compact ventilation units and acoustic – best approaches?

In the multi-family residential buildings course, special focus was included on centralized vs decentralized heating systems; windows and doors (type of glazing, effects on heat gains per orientation; how to reach nZEB; controlling systems (ventilation)

In the non residential buildings, special focus was included on ventilation, especially aspects: how to select appropriate system? Types of control systems with pros and cons and financial consequences; ventilation systems maintenance; summer comfort and how to calculate them; windows and doors types, effects on heat gains per orientation; special

type of windows and doors; passive cooling techniques; installations and their maintenance.

The training was delivered within PasREg project work in the second half of 2014. These courses are now available in the regular PHP training program for all professionals throughout Flanders.

More information:

http://passregsos.passiv.de/wiki/Training_for_professionals

2.3.2. Traject begeleiding (Building Process Guidance)

Since 2013, the Passiefhuis-Platform offers a “Building Process Guidance, BPG” service to building professionals in city of Antwerp (and wider in Flanders), specific for the building teams involved in passive house developments.

This BPG has grown from necessity to support professionals throughout the whole building process with clear direction and quality milestones, in order to reach the high quality and avoid unnecessary costs from building design phase till operation phase.

The origins of this service is from the Brussels Capital Region support within Sustainable Building Facilitator Network ‘that served as inspiration to develop the BPG.

Two pathways are possible

1. Building Process Guidance: Sustainable Buildings and Neighbourhoods, and
2. Building Process Guidance: in the framework of certification.

1. <http://www.passiefhuisplatform.be/trajectbeleiding-bouwproces>

2. <http://www.passiefhuisplatform.be/trajectbegeleiding>

The Building Process Guidance: Sustainable Buildings and Neighbourhoods is aimed at cities and municipalities that would need support by developing sustainable buildings based on passive house standard with renewable energy and sustainable neighbourhoods. The method of this BPG service is based on PHP defining a clear check-points from project definition until project delivery. The level of wished/needed support is agreed together.

Specific support is provided on:

- definition of requirements
- evaluation of the received applications on the design competition for the project
- optimalization of the winning project
- control of energy calculations including assessment of possible risks that may appear during construction phase to which attention should be given (e.g. air tightness).

During the construction phase itself, quality aspects that are supported are in checking possible defaults and assisting by air tightness measurement. Also, attention is given on the quality of ventilation installation.

In the end, a certification-as build is given for the building.

The Building Process Guidance: in the framework of certification.

In order to enable buildings to have healthy indoor climate as well as being very energy efficient, PHP developed, several years ago, a specific certification framework. This framework is suitable for non residential buildings of different use such as schools, offices, kindergardens, fire stations, etc. and it can also be applied to collective residential buildings (multi family apartment blocks).

The aim of this framework, i.e. building process guidance, is to increase the chance of a successful project in the passive house developments. The framework includes providing support to the parties involved in the building development at the right time for this support in the whole building process.

Specific procedures are placed for the developer, architect, engineers, contractor(s). In addition to increased chance to successful project, the end result is also a certificate at building level (as built). The path to success is based on different information exchanges between the building team and PHP support, at all phases of the building process. At the start, a check is done to the project definition.

Support is then provided to the pre-design phase, including meetings where PHP gives independent advise for optimisation of the pre design. Then, checks are done to the tendering/execution files (plans, details, texts, energy calculations). Aim is to avoid any choices that can be harmful to the quality of the building as passive house. During construction phase checks are done with the contractor(s) on technical documentation and on site visits.

At the end a full as-built file is checked and should satisfactory a certificate is given.

During PassREg, this solution was improved in terms of refining its procedure. Namely, the procedure is improved and includes now elements that address renewable energy technologies in the building developments that undergo a BPG. The renewable energy technologies are stimulated by means of informing at early stage of the building design, later during the pre-design and tendering phase the renewables are also addressed and advise given to the building team. During the construction phase on site check involves attention to installations and in the as built file, what is installed on the building is verified.

The whole Building Process Guidance within PassREg has aimed at providing local capacity raising assistance to passive house developments in the Aspiring Region, city of Antwerp.

More information:

[http://passregsos.passiv.de/wiki/Traject_begeleiding_\(Building_process_guidance\)](http://passregsos.passiv.de/wiki/Traject_begeleiding_(Building_process_guidance))

2.3.3. Business Zoo

The Business Zoo is an event that originates from the Intelligent Energy Europe supported project COHERENO, www.cohereno.eu

The EU project "**C**ollaboration for **h**ousing nearly zero **e**nergy**r**enovation", abbreviated to COHERENO. Nine institutions from five European countries are involved in the project.

By March 2016, they will develop proposals and concepts for promising cross-sector and company business models for high efficiency refurbishment of single-family houses to nearly zero-energy housing. The models are to pave the way for refurbishment from a

single source. From financing, consulting and planning, right through to implementation – all parties in the construction process are to be involved.

A major goal of COHERENO is to improve the quality of the construction measures by providing specific support to all stakeholders, thus increasing customer confidence. With these two key aspects, nearly zero-energy houses can gain credibility and acceptance, and win a higher market share.

Within activities of COHERENO, as well as aiming to increase local capacity on nZEB renovations of single family houses as pathway of city of Antwerp becoming an advanced aspiring region of PassREg towards a European front runner, a Business Zoo event was organized in Antwerp in January 2015. Specific building cases from Antwerp were worked on and local building professionals attended the event. It is worth noticing that a previous edition of the Business Zoo event within COHERENO took place in Brussels (Front Runner in PassREg). This was valuable experience based on which the programme of the Antwerp Business Zoo used the 'lessons learnt'.

Therefore, the enhancement that was made possible within PassREg on the Business Zoo solution lies in adaptation of the event to suit the aspiring region city of Antwerp using the lessons learnt from a front runner region.

More information:

http://passregsos.passiv.de/wiki/Business_Zoo

2.3.4. Eco-house doctor

The Eco-house doctor is an ongoing programme of the EcoHuis Antwerpen whereby residents of Antwerp with building plans and renovations can come for a free of charge support.

The Passiefhuis-Platform is providing advise to residence (plan-advise), to stimulate passive house standard at local level as well as highly energy efficient house renovations.

Within PassREg, in which the EcoHuis was an important local stakeholder as well as proactively involved in the project to make Antwerp from an aspiring towards a front runner region in Europe, the Eco-house doctor solution was advanced to include better service to residence, access to subsidies and incentives that the city of Antwerp provides has been made easier.

During the support sessions PHP paid attention to provide an independent advise on renewable technologies for the intended building/renovation plans.

The advancement also was done on level of up scaling advise to residents, from one to one level, towards working in groups with those who wants to implement energy renovation measure(s), such as group roof renovations, or group wall insulation and windows replacements, etc. This is to stimulate growth of energy renovations in Antwerp.

Cooperating partners: EcoHuis Antwerpen <http://ecohuis.antwerpen.be/>

More information:

http://passregsos.passiv.de/wiki/Eco_house_doctor

2.4. Solutions adapted by Nobatek (France) – AR

2.4.1. Best practices about PH standards application in warm climates

Description and context

In the building sector, the steps needed to define the objectives of Passive House in terms of comfort, energy savings and costs can be applied indistinctly for continental and warm climates. The climate of Aquitaine region in France, for example, is influenced by its close proximity to the Atlantic Ocean and the warming effects of the Gulf Stream. The summer climate tends to be hot, with plenty of sunny weather to go around. Until now, just one building certified Passive House was built in the region.

The question is: Can Passive Houses also be built in warmer climates like Aquitaine region, where hot and possibly humid conditions prevail in summer?. To answer this question, we realized a desk study to identify the basic steps that must be followed in order to accept the application of Passive House standard in the warm climates.

Activities and process

- 1. Defining the main objectives:** we tried to find answers to the following questions:
 - Does the heating and cooling thresholds related to the Passive House certification criteria still make sense in the considered climate zone?
 - Would it be coherent to target more performance on heating?
 - Is it even possible to reach a zero heating demand?
- 2. Implementing rules from the early stage :** it is essential to take into account the Passive House principles as early as possible in order to obtain easy to apply and reasonably cheap solutions. Bioclimatic parameters are to be considered as well for warm climates as for colder ones: they are key issues for the effective design of the envelope of the building (orientation, compactness).
- 3. Airtightness as a challenge :** To respect the Passive House Principles, airtightness is an especially challenging issue for warm climates, as airtight construction is sometimes not a common practice in the concerned regions.
- 4. Component quality:** Certification of Passive House suitable components allows a high level of transparency.

Results and output

- In warm climates, reaching a 15 kWh/(m².a) can be met more easily than in cold ones.
- It is then possible to reduce heating needs even though various design parameters are not optimal (shapes, orientations, window sizes, performance of components, etc.).
- However, it may be interesting to aim at "NZEB" targets to achieve the cost optimum. It can then heat the air directly through the air supply. This challenge could then make it possible to reach low heating demand values around 7 kWh/(m².a) in the case of Mediterranean climates and lower than 12 kWh/(m²a) for oceanic climates.
- However, airtight construction is also necessary there, even in the most favorable climates.

- The study was uploaded to SOS:
http://passregsos.passiv.de/wiki/Passive_House_in_Warm_climates

2.5. Solutions adapted by LEIF (Latvia) - AR

2.5.1. Brochures and Flyers

Description and context

LEIF translated Saxion *Sanierung* brochure about the Passive Houses, because the content was found as very valuable information that must be published in Latvian Passive House Platform and divided under section Set of Solution according to its chapters. In Latvia so far were no brochures or information as described in *Saxion* brochure in national language with examples from the local practice. *The Saxion* brochures were published in several volumes and LEIF decided to choose one of them where are the entire essential subjects where described that must be known about Passive Houses, especially about refurbishments to Passive House Standard. The *Saxion* brochure on refurbishments with Passive House Components offers a structured overview on all stages of building refurbishment starting from decision to refurbish to building process and commissioning.

Also a training leaflet about the Passive House Designer and Passive House Tradesperson courses has been developed.

Activities and process

LEIF has used only the information and knowledge that is written in the *Saxion* brochure, but all other materials, tables, charts and pictures were taken from local experience and practice and adapted to show international experience with local examples.

LEIF developed a leaflet for the promotion of the trainings for the Passive House Designer course and Passive House Tradesperson course as well as for the promotion of the new Latvian Passive House platform. It was created in an electronic version in Latvian as well as in an editable version in English for other partners. They can easily adapt this leaflet and write in the text in their national language and replace pictures with their local examples. It can be distributed in electronic version or paper.

Cooperating partners: DNA in de bouw (suggested the brochures and tried to organize the original documents for reusing, but the German Interreg-partner refuses to share this brochure).

Architect bureau Krauklis & Grende and Passive House Latvija association (helped with pictures and examples with local experience).

Results and output

The information uploaded in Latvian Passive House Platform from *Saxion* brochures provides practical solutions with the photos and examples from the local experience and case studies and it is very valuable for the local experts to learn from. Selected and translated information will be useful for experts and interesting/educating for house owners, stakeholders and others.

Training leaflet will contribute to the education, knowledge and awareness raising function. It is distributed electronically as well as in printed version in all info sessions, seminars, workshops and various exhibitions in Latvia – such as annual trade fair “Environment and Energy”, “Home”, etc. The main aim and context of the courses, prices, benefits and contacts where to apply for the participation are briefly described in this leaflet.

The brochure can be downloaded at: <http://pasivamaja.lv/?p=11757>.

2.5.2. Adapting PHPP to national regulation

Description and context

Creating energy certificates is required by Building Energy Efficiency Law in Latvia. There are several calculation tools available to fulfill this requirement. There is one official web-based tool (HeatMod6) which was developed by an expert team of University of Latvia with a support from European Regional Development Fund to meet the demand for energy efficiency calculations and energy certification software. The other tool to use for energy efficiency calculations is Passive House Planning Package (PHPP). Both tools are based on the same EN ISO 13790:2009 standard for cooling and heating demand calculation, thus fulfilling the requirement stated in the Latvian regulation. When it comes to passive house standard and close to passive house standard building a high precision is required of the energy balance calculations to achieve the best results and to determine the values that can prove themselves in monitoring. PHPP has proven itself to be very precise and reliable software for this purpose. Our goal under this project task was to adapt PHPP for Latvian regulation so that it could also be officially used for the creating of energy certificates.

Activities and process

The differences and similarities of HeatMod6 v. 2.0 and PHPP 7.1 were discussed in a workshop held by Industrial Energy Efficiency Cluster. More than 20 experts and energy auditors were present in this event. It was concluded, that the main similarities that help PHPP to be adapted to the national legislation and used for energy certification are the calculations based on EN ISO 13790:2009 standard for cooling and heating demand and integrated calculations from EN 6946, EN ISO 13370.

The main differences and challenges for adapting PHPP for national legislation turned out to be following – the Latvian regulations undergo frequent changes and adjustments are needed; for the use of PHPP translation to Latvian is needed, but it is challenging due to the frequent new version issues of this software; there are different approaches to DHW calculation. Another challenge that was stressed is that PHPP license costs money, but HeatMod6 is free of charge.

PassREg project expert Mare Mitrevica had several discussions with energy auditors about their approaches to energy certification and energy balance calculations using PHPP.

Cooperating partners: Association Passive House Latvija, Industrial Energy Efficiency Cluster – they held the workshop on understanding the similarities and differences of both tools; energy auditors.

Results and output

Currently, there are about 50 PHPP users in Latvia, but this number is growing. Many energy auditors are using PHPP as a tool for energy balance calculation and Passive House planning and optimization. Energy auditors who use PHPP have no doubt that it is the best available static calculation tool for energy efficient buildings. A lot of them have attached their own spread sheets to PHPP in order to implement the needed Latvian regulations for energy passports. We are cooperating with them in the process of making suggestions for the Ministry of Economics to make these attachments to PHPP official. The source of financing for programming is the current issue, thus no date can be set for accomplishing the task to make PHPP as one of the official tools for energy certificate

issuing. Nevertheless, the awareness about PHPP as energy balance calculation tool has grown during the PassREg project time, partially as a result of the mentioned activities. The analysis can be downloaded at:

http://www.klasteris.lv/files/files/Ventilacijas_domnica-pasakumu_plans_03_03_2014-1.pdf

More information: <http://www.heatmod.lv/>.

2.6. Solutions adapted by Eneffect (Bulgaria) – AR

2.6.1. Political decision for accelerated implementation of the NZEB/Passive House standard in the municipality

Description and context

Taking into account the new policy on buildings, the municipality aims to contribute to the 20% increase in energy efficiency in buildings by 2020. Increased activities in the field of building renovation are expected to contribute to the recovery and growth in the construction sector, which is planned to reach the levels of 2008-2009. The energy costs in the occupied buildings - municipal property must be reduced by 40% by 2020, providing an optimal comfort of living at the same time. Energy costs of households should be reduced to below 10% of the income by 2020.

In the view of the expected implementation of real projects for new buildings and renovations in 'passive' standard, economic models to calculate the economic efficiency and profitability of such projects will be developed, in order to be used by future investors.

Activities and process

Studied main solutions from FRR's; translated; adapted/applied

The first and only public building in Bulgaria, designed, built and certified under the "Passive house" standard is in Gabrovo – „Sun” daycare centre. The concept of the project is to cover Energy Class "A" for net energy demand according to the Bulgarian and at the same time to follow the concept and comply with the Passive House standards. According to PHPP calculation, the building has an energy heating demand of 15,47 kWh/m²a. The comfort will be ensured by floor heating and highly efficient ventilation with heat recuperation. Solar panels with selective collectors will be used for hot water. As the very first of its kind – and not only in the region of Gabrovo – „Sun“ daycare centre is drawing the attention of many professionals in the building sector in Bulgaria.

Results and output

Gabrovo is a founder and longtime member of the Municipal Energy Efficiency Network EcoEnergy. The „Sun” daycare centre was realised with the support of the network and its secretariat – the Centre for Energy Efficiency EnEffect. A number of regional building forums, trainings and study visits were conducted along with other capacity building events related to energy efficiency in buildings. „Sun” kindergarten is also presented at the major national conferences and events with the participation of EnEffect and EcoEnergy.

Translation of "Integrated Energy and Climate Protection Policy Hannover"

http://passregsos.passiv.de/wiki/Инструменти_за_финансиране_на_енергийна_ефективност_в_Хановер

Translation of "Exemplary Buildings: Success Stories (from Brussels)"

[http://passregsos.passiv.de/wiki/Програма_„Образцови_сгради”_\(BatEx\)_в_Брюксел](http://passregsos.passiv.de/wiki/Програма_„Образцови_сгради”_(BatEx)_в_Брюксел)

Policy Instruments for Energy Efficiency in Hannover

http://passregsos.passiv.de/wiki/Политически_инструменти_за_енергията_и_климата_в_Хановер

2.6.2. Political decision for application of an ambitious energy efficiency standard to the building projects of the municipality

Description and context

In 2013 Gabrovo joined the Covenant of Mayors - the most successful European initiative to support local sustainable energy development. Through this act, which reaffirmed the municipality's determination to work towards the European 2020 objectives, the city developed its Sustainable Energy Action Plan (SEAP) in which the construction sector occupies a major position. Now Gabrovo is a partner in the SPP Regions project, supporting sustainable public procurement practices in the building sector.

Activities and process

Studied main solutions from FRR's; translated; adapted/applied
Gabrovo also joined the project EuroPHit, through which the school "St. St. Cyril and Methodius" will be renovated to the EnerPHit standard considering the Step-by-step renovation approach. Today Gabrovo municipality continues to execute a number of projects in the field of energy efficiency, demonstrating its commitment to an active policy in this area. Modern construction standards and economic conditions impose new standards and challenges, which are reflected in concrete initiatives of local authorities to improve energy efficiency in all areas, with special emphasis on the construction sector. And not only because of the energy savings that this approach can achieve; expected social benefits in terms of improved public services and quality of living are perhaps even more important for them. During the period 2008 - 2014, comprehensive measures to achieve energy efficiency in a number of buildings of the educational, social and cultural infrastructure were implemented. In order to further the sustainable management of energy measures, the city will seek opportunities to build a centralized system, which allows remote monitoring of installations and centralized energy accounting.

Results and output

Translation of "Ecological Standards for Building Construction"

http://passregsos.passiv.de/wiki/Стандарти_за_енергийно_потребление_на_сградите_в_Хановер

Translation of "Energy Subsidies in Brussels"

http://passregsos.passiv.de/wiki/Енергийни_субсидии_в_Брюксел%5D

Translation of "Energy efficiency programmes in Hannover"

http://passregsos.passiv.de/wiki/Програми_за_енергийна_ефективност_в_Хановер

Translation of "Brussels passivehouse 2015"

http://passregsos.passiv.de/wiki/Политика_за_ПНЕС_в_Брюксел

Translation of "Green loans in Brussels"

http://passregsos.passiv.de/wiki/Зелени_заеми_в_Брюксел

2.6.3. Cooperation with local NGOs, civil associations, companies and other stakeholders

Description and context

As it was mentioned, Gabrovo is one of the founders and active member of the Municipal Energy Efficiency Network EcoEnergy. The municipality actively cooperates with:

Technical University - Gabrovo

Professional high school for Construction and Architecture

Regional branch of BCC

Local construction companies

Manufacturers and distributors of materials, components, technologies

"District Heating Gabrovo" EAD

"Citygas Bulgaria" EAD

Energo-Pro Bulgaria

Associations of condominiums

Activities and process

Studied main solutions from FRR's; translated; adapted/applied

The residential building stock is essential for the implementation of the policy for energy efficiency improvement, which currently allocates almost 40% of energy consumption.

Gabrovo Municipality is committed to being an active partner of the owners and their associations in the preparation and participation in this process, which will allow the implement a set of measures to improve energy efficiency in multifamily buildings, using the opportunities provided by the National Programme for Energy Efficiency of Residential Buildings.

Results and output

For the accelerated deployment of passive houses and NZEBs, it is necessary to use the principle interest which all companies and professionals engaged in the construction sector have in increasing the volume and quality of the construction activities as a result of dedicated policies implemented at municipal level. Unfortunately, this interest is not yet sufficiently acknowledged and pursued by many SMEs and other business actors, so they should be distinguished as the main target group, and a number of measures related to communication and involvement of stakeholders should be initiated.

Translation and publishing of the brochure: "Active for more comfort: Passive House.

Information for property developers, contractors and clients", see:

[http://passregsos.passiv.de/wiki/Брошура_\"Активни_за_повече_комфорт:_Пасивната_къща](http://passregsos.passiv.de/wiki/Брошура_\)

Translation of Facilitators Network in Brussels

http://passregsos.passiv.de/wiki/Мрежа_на_фасилитаторите_за_устойчиво_строителство_в_Брюксел

Translation of "Sustainable Neighbourhoods in Brussels"

http://passregsos.passiv.de/wiki/Договори_за_устойчиви_квартали_в_Брюксел

Translation of "Passive House Platforms in Belgium (PHP and PMP)"

[http://passregsos.passiv.de/wiki/Платформа_\"Пасивна_къща\"_в_Белгия](http://passregsos.passiv.de/wiki/Платформа_\)

2.6.4. Capacity building for municipal experts, policy makers, end users and external stakeholders

Description and context

In Gabrovo region, no training courses for certified passive house designers conducted and there is no information for designers participating in such courses, with the exception of the courses conducted by EnEffect within the projects "PassREg" and "EuroPHit". There are no local certified designers of passive buildings.

Activities and process

Studied main solutions from FRR's; translated; adapted/applied

Support for training courses for local designers and specialists of construction companies (providing room and certified trainers through participation in international projects funding such measures); target scope - 20% of practicing planners until 2020. Exchange of experience with advanced regions from other European countries through the participation in international projects.

Results and output

Courses conducted by EnEffect within the projects "PassREg" and "EuroPHit".

Translation of Capacity for design and planning in Brussels

http://passregsos.passiv.de/wiki/Капацитет_за_планиране_и_дизайн_в_Брюксел

Translation of Capacity for design and planning in Hannover

http://passregsos.passiv.de/wiki/Капацитет_за_планиране_и_дизайн_в_ХанOVER

Institutions in support of energy efficiency in Hannover

http://passregsos.passiv.de/wiki/Институции_в_подкрепа_на_енергийната_ефективност_в_ХанOVER

see also the translation of "Passive House Platforms in Belgium (PHP and PMP)" above, paragraph 2.6.3.

2.6.5. Communication campaigns

Description and context

The communication strategy of the Municipality of Gabrovo in the field of energy efficiency and renewable energy sources is related to the vision of the city as quickly advancing economic, tourist and cultural center with impressive natural and cultural resources, preserved social capital and developed educational infrastructure. The communication programme is focused on the following priorities:

- 1) Public support for the activities of the Municipality in the field of efficient use of the available resources;
- 2) Dissemination of information to improve the quality of services provided by the municipality;
- 3) Establishing the vision of Gabrovo as a center of green development.

Activities and process

Studied main solutions from FRR's; translated; adapted/applied.

The Communication Plan for the first year of implementation of the Success Model of Gabrovo is correlated with the planned activities, as along with this it build a basis for

sustainable management, implementation, monitoring and feedback during the whole programming period 2014-2020.

Cooperating partners:

Results and output

Translation of "Visibility and Public Support in Brussels"

http://passregsos.passiv.de/wiki/Публичност_и_обществена_подкрепа_за_енергийната_ефективност_в_Брюксел

Translation of "Public support for energy efficiency in Hannover"

http://passregsos.passiv.de/wiki/Обществена_подкрепа_за_енергийната_ефективност_в_Хановер

2.6.6. Other translations

Translation of "Translation of "Hannover Ten Plus":

http://passregsos.passiv.de/wiki/Политически_инструменти_за_енергията_и_климата_в_Хановер

Translation of "Overview on funding on climate protection in Hannover region":

http://passregsos.passiv.de/wiki/Инструменти_за_финансиране_на_енергийна_ефективност_в_Хановер

Translation of "ImpulsProgramme Passive House":

http://passregsos.passiv.de/wiki/Инструменти_за_финансиране_на_енергийна_ефективност_в_Хановер

Translation of "Zero e-Park, Hannover":

http://passregsos.passiv.de/wiki/Zero:e_park_в_Хановер

2.7. Solutions adapted by Burgas (Bulgaria) – AR

2.7.1. Translation of SOS in Bulgarian

Description and context

Translation of SOS articles in to Bulgarian language, allows all stakeholders to find the information they need quickly, easily and conveniently. The Bulgarian version of the PassREg SOS, solve one of the main problems that local authorities face - the lack of detailed and accessible information.

Activities and process

Translation of SOS articles in to Bulgarian. The aim is to continue the process after the end of the project, and after six months most of the available information to be available in Bulgarian language.

Results and output

Translated articles on SOS.

1. http://passregsos.passiv.de/wiki/Финансови_механизми_за_представители_на_местните_власти
2. http://passregsos.passiv.de/wiki/Пилотни_проекти._Повишаване_на_обществената_осведоменост.
3. http://passregsos.passiv.de/wiki/Габрово_SOS
4. http://passregsos.passiv.de/wiki/ЕСКО_в_България

2.8. Solutions adapted by Zagreb (Croatia) – AR

2.8.1. Adaptation, promotion, dissemination and implementation of communication strategies

Description and context

City of Zagreb has adapted different types of materials during the PassREg project, which helped institutions and users to get more involved into process of making and using passive houses. The most influenced method is to provide materials to the market for investors, which have to be informed properly about quality and economic savings provided by passive houses. Dissemination was provided during the Zagreb Energy Week, Days of Passive Houses Croatia, Training Courses and lectures on University of Zagreb, Faculty of Architecture. Promotion was made online via different kinds of websites. During last few years, awareness of a global climate changes has taken hold on rising consciousness as the higher costs of living (heating and cooling), what is directly connected to the increased interest in NZEB and passive houses. The plan for increasing NZEB was made during 2014. on the national level and it contain and define NZEB and passive houses. It contains the examples of the reconstruction possibilities for the existing buildings as the review of the existing targets to increase energy efficiency of buildings with the aim that all the new buildings will be NZEB until the 31.12.2020. Also all the public buildings have to be NZEB until the 31.12.2018. The importance of the directive is more as a support to local authorities to direct their goal for increasing the number of passive and NZEB houses. Additional information, as the specific ones, about economic savings, is really important for the investors. Although the main importance is to educate users and investors to increase the number of passive houses, the other main goal is to educate young architects and contractors through trainings.

Activities and process

Zagreb Energy Week is one of the biggest events where different kinds of professions meet and collaborate together. Therefore, that is the main base to communicate and disseminate knowledge, as the Days of Passive Houses. Through these events, every year circulate approximately 350 experts, 1000 visitors and 2000 citizens. City of Zagreb organized lectures and discussions for investors and providers during Zagreb Energy Week, as the supported materials.

Cooperating partners: City of Zagreb, City Office for Energy, Environment and Sustainable Development, Passive House Consortium Croatia

Results and output

The main result was informing a large number of participants about importance to build new passive and Nearly Zero Energy Buildings, as the use PHI standards in reconstructions. As the result of bigger interest in implementing and using the knowledge, Passive House Consortium Croatia was formed during Zagreb Energy Week 2014.

2.8.2. Training the experts: courses in higher education institutions

Description and context

The Passive House Institute makes its knowledge available to everyone. Its research, its certification and training programs, as well as the distribution of its planning tools such as the Passive House Planning Package (PHPP) and design PH. Training the experts is one of the most important activities for implementation and distribution the knowledge. Oikon Ltd. - Institute for Applied Ecology designed and translated PHPP program for City of Zagreb area, which is approved and will be used as an instrument for verifying calculations

in ongoing projects. Importance of the trained experts was noticed during and after training sessions. The result and amount of interest was more than expected.

Activities and process

Cooperating partners: City of Zagreb, University of Zagreb, Faculty of Architecture, Passive House Consortium Croatia

Results and output

Expected result is connected with dissemination and an increased possibility to develop the network of experts.

More information is available at

Zelena energija: <http://www.zelenaenergija.org/> ; and
pasivnakuća.net: <http://www.pasivnakuca.net/> .

2.9. Solutions adapted by eERG-Polimi (Italy) - AR¹

2.9.1. Guideline and synthesis for Implementation of passive house requirements in MUNICIPAL REGULATION for buildings (e.g. “Regolamento edilizio”)

Description and context

Passive house strategies and standard mean a clear set of quantitative requirements, which can lead design and construction activities to reach actual nearly zero energy buildings, proved by a complete quality control procedure and on-field tests. Many monitoring campaigns of energy and comfort performances of certified passive house all over the world demonstrate quantitatively the high performances and the very low energy demand, which passive houses really reach as estimated in the design phase. This made passive house requirements a very useful and important opportunity to be requested in local policy decision acts, local energy plans and building codes. Passive house requirements are clear, completed, quantitative and measurable, from technical point of view they can easily insert in local regulation documents, directly as they are or with intermediate steps.

Activities and process

Collection of technical requirements for Passive House and Enerphit Standard
(http://www.passiv.de/en/02_informations/02_passive-house-requirements/02_passive-house-requirements.htm)

Collection of detailed references

(http://passiv.de/en/03_certification/02_certification_buildings/02_certification_buildings.htm)

Presentation of suitable tools (PHPP, calculation method, controls and tests, ...)

(http://www.passipedia.org/basics/passive_house_checklist)

Presentation in a document useful for implement these in local building regulations

Examples in place in Italy (please see here below)

Results and output

A comprehensive document presented requirements, RES integration opportunities and examples put in place has been developed and it's available on the PassREG solutions wiki web-site here:

http://passregsos.passiv.de/wiki/Implementation_of_passive_house_requirements_in_MUNICIPAL_REGULATION_for_buildings

¹ AR= Aspiring region

A comprehensive document summarizing technical information on PH suitable for direct implementation in local building regulation (as “Regolamento edilizio”, regional guidelines, etc.). In addition, some municipalities in Italy already implemented these, adopting the passive house targets in the local building codes (*Regolamento Edilizio*) as quantitative requirements needed to reach financial supports and construction taxes incentives. For example is the case of Municipality of *Muzzano (Biella)* and Municipality of *Botticino (Brescia)*. In Muzzano, Certified Passive Houses are eligible for a 60% reduction in construction permitting fees (primary and secondary planning fees as well as a construction cost based fee) with a maximum discount of € 20 000 for each building. In Botticino, Certified Passive Houses enjoy reduction up to 55% on primary and secondary planning fees. These represents first actual examples where the Passivhaus requirements and complete certification scheme have been implemented in the local buildings codes. Some relevant references are available here:

- Example from the Municipality of Muzzano (in Italian):
<http://www.comune.muzzano.bi.it/online/Home/IlComune/Regolamenticomunali/articolo31009133.html>
- Example from the Municipality of Botticino (in Italian):
<http://www.comune.botticino.bs.it/regolamento/regolamento-edilizio-ed-allegato-energetico>

This analysis is attached to this report, annex **Fout! Verwijzingsbron niet gevonden.** and can be downloaded at:

http://passregsos.passiv.de/wiki/Implementation_of_passive_house_requirements_in_MUNICIPAL_REGULATION_for_buildings

2.9.2. Guideline and synthesis for Implementation of passive house requirements in TENDERS for design and construction activities

Description and context

Passive house concept is quite easy to be understood both by experts and buildings end-users. Passive house standard as comprehensive set of quantitative requirements and quality assurance methods represents also a useful way to ask for high performances and nearly zero energy buildings in public procurement procedures and in private market, in order to give reliable guarantees to clients and buildings occupants.

Public tenders requesting passive house projects could be useful to increase the capacities and the opportunities for this market. And on the other hand this could provide local administrations with high quality buildings with lower (and also much lower) operation costs for energy bills, leading to an overall savings for the local public bodies.

Many examples of public buildings built according the Passive House standard are described as beacon projects in PassREg. For examples we can see kindergartens, day-care centers, schools, social housing buildings, cultural centers.

Activities and process

- Collection of technical requirements for Passive House and Enerphit Standard (http://www.passiv.de/en/02_informations/02_passive-house-requirements/02_passive-house-requirements.htm)
- Collection of detailed references (http://passiv.de/en/03_certification/02_certification_buildings/02_certification_buildings.htm)
- Presentation of suitable tools (PHPP, calculation method, controls and tests, etc.) (http://www.passipedia.org/basics/passive_house_checklist)
- Presentation in a document useful for implement these in local building regulations (<http://www.passipedia.org/municipalities>)

- Examples in place in Italy (Public School in San Giovanni Lupatoto - Verona)

Results and output

Documents (main texts and related technical annexes) of public and private tenders are suitable to be easily integrated with overall passive house requirements. They can be expressed both as energy performances (energy need for heating and cooling, total primary energy demand, etc.) and comfort requirements both as limits on building components and systems (envelope thermal transmittances, glazed surfaces properties, airtightness level, efficiency ratio of heat recovery, electrical specific fan power or energy demand for the mechanical ventilation system, etc.).

Also the passive house calculation method and the quality assurance procedures can be easily required in the tenders specifications. All the performances and technical features of Passive Houses can be requested asking for numerical and quantitative performances and limits typical of the standard and / or asking directly that the Passivhaus certification label have to be reached.

The Passive House process is affordable also in order to ask actual actions for quality assurance and check tests on field (e.g. intermediate and final blower door test to check the airtightness level of the building envelope, in-situ controls to calibrate airflow rates of the mechanical ventilation systems, etc.). An interesting example of a public building designed and built according the Passive House principles is the public school “Raldon” of the Municipality of San Giovanni Lupatoto (Verona). This school building, after it was designed and built according public tenders developed by the Municipality, reached the Passivhaus certification. A comprehensive document on this has been developed and it’s available on the PassREg solutions wiki web-site here

http://passregsos.passiv.de/wiki/Implementation_of_passive_house_requirements_in_TEN_DERS_for_design_and_construction_activities

Some relevant references are available here:

- http://passreg.eu/beaconProjectDetails.php?beacon_id=58&ref=beaconlist
- http://www.passivhausprojekte.de/index.php#d_4150
- http://www.architetto.info/la-scuola-media-passiva-di-raldon_speciale_x_845.html

2.9.3. Examples of cost-optimal / low-cost passive houses

Description and context

Passive house solutions adopted in new buildings and in renovations can present lower costs in term of global cost over considered life span, while generally the initial investments to reach the selected targets can be higher respect bad levels of performances. This is not always true, because the amount of initial investment to develop a project of new or renovated building is determined by several factors and features. It is so possible to optimize all aspects of a building project in order to reach a high quality buildings, mainly focusing on its energy and comfort performances, controlling the initial investments level at the same time. Actual examples of this integrated process are many projects of social housing Passive House buildings we can see in Europe also in the framework of the PassREg project. In addition for example an analysis conducted on the construction market in Belgium showed that initial investment costs of Passive Houses are not necessary higher respect buildings with worse energy and comfort performances. Actual data show that it can be close or even below the average initial costs for construction of conventional buildings.

Activities and process

- Review of examples of passive house certified buildings with very low initial investment costs for construction or renovations

- Evidence of initial investment costs: i.e. as €/m² of treated floor area
- Examples of social housing or other public / private building with this features

Results and output

Here some actual examples of Passive social housing and cheaper passive house projects:

- http://passregsos.passiv.de/wiki/Examples_of_cost-optimal/_low-cost_passive_houses
- eco-neighbourhood in Harenberg (Belgium):
http://passreg.eu/beaconProjectDetails.php?beacon_id=16&ref=beaconlist
- Social housing in Brussels: <http://www.buildup.eu/cases/28549>
- Lodenareal Social housing in Tyrol:
http://passreg.eu/beaconProjectDetails.php?beacon_id=33&ref=beaconlist
- Social housing in Italy in Lonato:
http://passreg.eu/beaconProjectDetails.php?beacon_id=55&ref=beaconlist
- Social housing in Italy in Cesena:
http://passreg.eu/beaconProjectDetails.php?beacon_id=37&ref=beaconlist

2.10. Solutions adapted by DNA (Netherlands) – AR

2.10.1. Establishing of foundation for dissemination of knowledge on NZEB

Description and context

The Knowledge institution for Energetically Renovation and New building (KERN) is established for the acceleration of the implementation of knowledge about designing and construction of nearly zero energy buildings.

The reason for the establishing of KERN is the understanding that educational opportunities turned to be a bottleneck for the successful large scale implementation of Passive House Technology after political decisions in 2007 to make Passive House standard mandatory for new buildings and existing buildings undergoing major renovation in the region Brussels. The fast implementation of knowledge and the cooperation of all training organisations for the building sector were needed to meet the suddenly increased demand of education. The Dutch educational programs do not stroke with the expected fast transition towards an energy neutral building sector. Also the Dutch training bodies are traditionally segregated in levels and disciplines and the implementation of new or adapted modules takes up to seven years.

The lessons from Brussels and the actual Dutch training situation led to the primarily strategy of KERN: facilitating the existing training bodies in the Netherlands to efficiently implement and spread the missing knowledge in an integral way.

Education in the Netherlands is nationally organized; therefore this national approach was needed. This led to the decision to establish a separate national foundation next to the regional oriented parent organization DNA in de bouw.

Activities and process

The foundation KERN was established in Nov. 2013. Then the business plan was developed in cooperation with Erwin Mlecnik (researcher TU Delft and co-founder of PHP Antwerp) until Nov. 2014. This comprehensive plan contains aspects as the development of targeted integral trainings modules and programs, a train the trainers-program, a program for supporting of networks in the building sector and the facilitation of assistance of individual businesses in the transition towards integral operating flat organizations. The latter is seen as an optimal pre-condition for the required high quality building process.

The business plan and the underlying financial plan is basis for the ongoing lobbying activities of the initiators of KERN to gain the required societal and financial support to out roll the anticipated activities. This contains the active involving of local governments throughout the Netherlands and the umbrella organization for local governments VNG, the National Government / Ministry of Education and the national organizations of education for craftsperson (RTC/ROC), of secondary vocational technical education (MBO) and of higher vocational technical education (HBO).

Within work package 5 the trainings material of the certified Passive House tradespersons course was translated and the first three courses took place through KERN in 2014 and 2015. Related initial marketing activities took place. Marketing / awareness rising activities needs to be intensified. The website of KERN was publically launched at the annual DNA-congress in autumn 2014.

Cooperating partners: TU Delft, PHI Darmstadt

Results and output

- Website: <http://www.StichtingKERN.nl>
- Two press releases and publications of articles in divers professional journals
- 32 tradesperson's and building engineers where educated as certified Passive House Tradespersons, more to come
- Article about KERN including Business plan ect: <http://passregsos.passiv.de/wiki/KERN>

2.11. Solutions adapted by Tyrol (Austria) - FR

2.12. Implementation of ground policy as a solution to evoke energy-efficiency in building

Activities and process

Description and context Remarkable examples of ground policy in the neighbourhood as a solution to evoke energy-efficiency in building from South Tyrol and the city of Ulm have been looked at, discussed and analyzed and taken into account for implementation in Tyrol's urban and town planning. To attract better energetic standards, the federal government of South Tyrol remunerates better energetic standards with higher density of building volume on site to cover additional cost without public grants ore subsidies. The City of Ulm is using ground policy since the end of the 19th century. NZEB-districts as Ulm Eselsberg had been created with restrictions imbedded within urban and city planning instruments. To limit land speculation, benefits of reclassification of rural land into land zoned for urbanisation are serving the city and used to keep land-costs avoidable and to attract the location-quality for inhabitants, educative instutions and the local economy. Another best practice example for integration of energy efficient principles within urban planning and district developments is the PassREg Beacon "Bahnhof Heidelberg".

Activities and process

Networking with local and regional stakeholders, leading to a request to municipal council of Innsbruck from councilor Hans Haller (FI), this was discussed within the International Workshop in Innsbruck on 2013-10-9.

The example of the City of Ulm was presented within the 2nd passiv house summit as incentive for future urban development in Tyrol. Decision makers from NHT and members of the network IG Passivhouse Tyrol were invited to a studytour to "Bahnpark Heidelberg" on 2015-2-11.

Cooperating partners: Standortagentur, Land Tirol, Stadt Innsbruck, Stadt Bozen, NHT, IIG, IKB, AlpS

Results and output

This ideas and incentives were implemented in the development of Innsbruck Energy Development Plan (Innsbrucker Energieentwicklungsplan IEP).

Energy efficient improvements in district scale, focusing also on energy distribution, implementation of RES and smart metering are tried out within the EU "Sinfonia" FR 7 program, the willing of the partners to do this was also a result out of the participation within PassREg. Within the Sinfonia Project different types of buildings within districts are being refurbished near to EnerPHit Standard, results out of these projects can be used to derive information on how the projects succeeded, good example of improving thermal quality of building stock can be gained.

Description on SOS: http://passregsos.passiv.de/wiki/Ground_Policy
http://www.swp.de/ulm/lokales/ulm_neu_ulm/Bodenpolitik-aus-Ulm-als-Vorbild-fuer-Tirol;art4329,2951656

2.13. Solutions adapted by PHI (Germany)

2.13.1. Compilation of quality assurance mechanisms

Due to the major need for information about quality assurance mechanisms, the Passive House Institute has compiled descriptions of different approaches to guide interested parties through the relevant processes. The summarized mechanisms include the quality assurance mechanism in Heidelberg for the Bahnstadt quarter, the procedures in the City of Frankfurt and additional information from the zero:epark provided by proKlima in Hanover. In addition, the certification process by the Passive House Institute was also been briefly described.

Through this compilation, the similarities in the different locations and with the Passive House certification approach became obvious.

The compilation and rough description of the processes are now available:

http://passregsos.passiv.de/wiki/Quality_Assurance_for_Passive_Houses

Cooperating partners: City of Heidelberg, proKlima Hanover

This activity is related to task 4.3.1

2.13.2. Passive House + renewables - the perfect NZEB

Since the ratification of the Recast of the Energy Performance of Building Directive, the 28 Member States have been working to develop their own definitions of Nearly Zero Energy Buildings, which will be required as of 2020. The Passive House Standard already offers a highly efficient and economically viable solution that can be effectively combined with renewable energy.

The entire concept of the PassREg project was based on the premise that Passive House + renewables is a proven and cost effective solution for NZEBs. An article has been written, which is also found as a chapter in the PassREg brochure (task 6.2.6) about this perfect match:

http://passregsos.passiv.de/wiki/Passive_House_%2B_renewables_-the_perfect_NZEB

The text was developed in task 6.2.6 for the brochure. In order to further disseminate this information, the text was also put on the SOS.

The Passive House Institute developed the text, with support from PassREg partner BRE in polishing the English language.

This activity is related to task 4.3.1 and to 6.2.6

2.13.3. Translation of the "Scrum Team" article into German

The name 'Scrum Team' comes from IT development and is used for client-oriented and agile programme development. In the Netherlands, this method has been transferred to the construction sector, particularly in relation to highly energy efficient renovation. Small groups of different trades work together with the architect, an energy expert, a building service expert and other relevant professionals in the so-called 'Scrum team'. The process is supported by BIM, a tool used for decision making (e.g. morphological design). This approach is very innovative and worthwhile to transfer it to German-speaking countries. In light of this, the Passive House Institute translated the article, and the information about organising renovation work with 'Scrum Teams' is available for further dissemination. No other partners were involved.

http://passregsos.passiv.de/wiki/Scrum_team_-_DE

This activity is related to task 4.3.1

2.13.4. Translation of the "Soft Landings" article into German

From experience it is known that in the first phase of a building's occupation, the energy consumption is significantly higher due to the fine tuning required to meet the users' needs for the installed and programmed building services. In addition, the users or occupants are not familiar with the building technologies. In Germany this is an issue which the investor faces. The 'Soft Landings' approach deals with the problems the users have in the beginning when having shifted to a new highly energy efficient building. It was developed in the UK and has already been introduced in Brussels. BRE has written an article about the 'soft landings' and the Passive House Institute has translated this article into German. Other partners were not involved.

The information on 'Soft Landings' is now available in German and could be a first step for further dissemination within the procuring authorities in German-speaking countries.

http://passregsos.passiv.de/wiki/Soft_Landing_im_Passivhausbau

This activity is related to task 4.3.1

2.13.5. Translation of article about "Competitive dialog" into German

BRE has written an article about the 'Competitive dialog' and their experience with this kind of procurement process. Alternative approaches are also listed to avoid the disadvantages that often come with this approach. Since procurement is an integral part for highly energy efficient building, project planning and delivery this procurement procedure could be an option for Passive Houses and NZEBs.

The Passive House Institute has translated the article from English to German, keeping the content unchanged. Other partners were not involved.

The article about competitive dialog is now available in German. It could be a first step to disseminate this approach in Germany, where it is not widely known and not very common. This approach is likely even unknown from investors. The competitive dialogue in connection with other innovative elements could be an interesting element of future procurement processes.

http://passregsos.passiv.de/wiki/Wettbewerblicher_Dialog_als_Vergabeprozess_in_Gro%C3%9Fbritannien

This activity is related to task 4.3.1

2.13.6. Translation of Frankfurt's Passive House Act

On 6 September 2007, the City Council of Frankfurt decided that all new builds owned and/or used by the City would comply with the Passive House Standard or – where not possible on account of the location or due to construction reasons – will be at least 30% more energy efficient than stipulated in the German energy saving regulations ENEC. The article on the act was translated German to English because of the importance of its dissemination for the Passive House Institute has. Other partners were not involved.

http://passregsos.passiv.de/images/9/96/Translation_Passive_House_Act_-_City_of_Frankfurt.pdf

This activity is related to task 4.3.1

2.13.7. Economic feasibility of Passive House Design

Are Passive Houses more costly than traditional buildings? Of course the windows and ventilation system must be of higher quality, the insulation must be thicker and an overall higher level of workmanship needs to be ensured throughout the construction. Are these aspects too costly? A study in Brussels has shown that using an integrated project design and delivery approach, the costs for Passive Houses are not higher than conventional buildings. The Passive House Institute has also a financial calculation tool within the PHPP9, 'PHeco', which performs the recalculation of annual expenses to present cash values.

The article briefly describes the PHeco and shows how to design components for energy efficient renovation (EnerPHit) and new builds so that all measures as a bundle are economically feasible as well as energetically reasonable. It includes cost calculation procedures such that architects and engineers can work with. This article will help architects and engineers in their selection. No other partners were involved..

http://passipedia.org/basics/affordability/economic_feasibility_of_Passive_House_Design

This activity is related to task 4.3.1 and to 6.3.4

2.13.8. Step-by-step retrofits towards the EnerPHit standard

In Europe and elsewhere, most buildings already exist and there is a relatively low number of new builds. Because about 40% of the energy consumption comes from buildings, the renovation of the existing building stock is the challenge if the energy consumption in the

buildings should be reduced significantly. Experiences gained from new builds need to be transferred in an adapted manner to the renovation of the building stock.

The IEE co-funded project EuroPHit is paving the way towards a step-by-step certification which culminates with an EnerPHit certificate when all renovation steps are successfully completed, which means that the building has been renovated with Passive House Components.

In the article on SOS the methodology of the step-by-step refurbishment process has been described and linked to further information. Other partners were not involved.

Link to SOS:

http://passregsos.passiv.de/wiki/Step-by-step_refurbishment

This activity is related to task 4.3.1

3. Solutions for D4.8

This chapter presents the solutions that have been developed within task 4.3.2: Enhancing solutions for general implementation. Existing methods, tools and solutions were created for specific targets and enhanced for broad usability.

Per solution the reason to enhance it and the process of the enhancing is described. The outcomes are described as results within this chapter, links are provided to the resulting publication.

3.1. Enhanced solutions by BRE (Great Britain) - AR

3.1.1. Adaptation of PHPP to accepted national/regional energy calculation tool

Description and context

It is often noted by professionals carrying out the Passivhaus design process that it is an unfortunate burden to have to carry out two modeling calculation processes – one using PHPP to verify performance for Passivhaus certification and another using the UK's National Calculation Methodology (NCM) for Regulatory compliance (the Standard Assessment Procedure, SAP, for domestic buildings and the Simplified Building Energy Model, SBEM, for non-domestic buildings). In other parts of Europe where the relevant NCM calculations and assumptions are more aligned with PHPP, additional functionality has been added to PHPP to produce the necessary EPC output for Regulations (e.g. in Germany and the Brussels region of Belgium).

There may be instances where designers/ developers may be prepared to accept the utilisation factors and assumptions from SAP but find the cost of using multiple calculation tools a barrier. A further option may therefore be to consider the example set in Germany and other areas where additional functionality is added to the standard PHPP tool to provide an output compliant with the UK Regulations. This would require the assumptions used in the Regulations to be applied to data already entered into the PHPP tool so as to produce a 'normalised' output for compliance purposes. The remainder of the PHPP worksheets could still then apply for design purposes.

Activities and process

A detailed analysis was made of all data inputs and calculations in both SAP and PHPP. The SAP calculations were built into a new tab within PHPP, with the required inputs

crosslinked from elsewhere in the PHPP sheets where this was feasible and some additional manual entry of data specifically for the purposes of the SAP calculation where there was no suitable alternative. The aim was to assess how much existing data from PHPP could be used and whether it could produce viable SAP results as a 'proof of concept'. If promising, this could be explored further (beyond the timeframe of the PassREg project), taking into account the wider procedural issues established in the earlier study of calculation variables and barriers.

The study carried out both a microscopic and macroscopic analysis on 5 dwellings' PHPP calculations:

The microscopic gap analysis (MIA) examined model discrepancies from a low level and compared necessary modeling input parameters for both models with each other. The following steps have been undertaken:

1. Listing and comparing all input parameters that are necessary to produce a SAP rating of a dwelling previously assessed in PHPP
2. Classifying occurring discrepancies and outline how they could be overcome
3. Linking PHPP model input parameters to a new SAP spreadsheet tab
4. Analysing the SAP rating results

In the macroscopic gap analysis (MAA), PHPP model outputs have been extracted to reduce the need for fundamental user input when producing SAP ratings based on a PHPP model. The following steps have been undertaken:

1. Extract PHPP model output parameters that are equivalent to the SAP energy requirements; fuel for space heating, hot water as well as electricity for lighting and auxiliary
2. Generate SAP ratings
3. Compare SAP ratings with results from microscopic gap analysis

Results and output

The new tab built in PHPP was able to calculate the required SAP output using a good proportion of data inputs linked from elsewhere in the PHPP sheets. Some discipline in entering thermal elements in the PHPP 'Areas' sheet would likely be needed to aid in data linking and some new data would need to be added, but this was mostly dimensions that could readily be taken from CAD drawings. Appropriate re-calculation of thermal bridging psi values would also be required to convert between external (PHPP) and internal (SAP) dimension conventions.

Estimates for ventilation heat loss, fabric heat loss, internal and solar gains as well as annual heat demand derived through SAP are in general higher than PHPP. The highest discrepancy is perceived for ventilation loss and internal gains estimates. However, annual heat demand shows the smallest difference in average as gains and losses seem to be nearly equally overestimated within SAP. The final difference in the estimated annual heat demand in SAP is on average 2.8 kWh/m² higher than in PHPP. When undergoing macroscopic analysis, consideration of the annual fuel for space heating in both models relative to their respective reference floor area shows a very strong linear correlation, with a coefficient of determination R² of 0.97. This strong correlation suggests that despite many model discrepancies there could possibly be a proportional relation between both models. If these findings can be validated on a bigger sample size, many input parameters could be neglected and a calibration equation based on a regression model applied. That would save time and effort needed for additional user input.

Link:

http://passregsos.passiv.de/images/c/cc/PassREg_SAP-PHPP_Project_Report.pdf

3.1. Enhanced solutions by Cesena (Italy) – AR

3.1.1. Courses in higher education institutions: involvement of all stakeholders

Description and context

We examined Passive House training of Brussels Environment, by PMP/PHP, the Department of Architecture at the Université Libre de Bruxelles and other examples in Brussels. Despite the course "Technologies for Sustainable Design" of the University of Architecture in Cesena there are currently no courses that deal with Passive House buildings.

With regard to the similarities with the courses organized in Brussels to other school levels, the Municipality of Cesena, in cooperation with Energie per la città Inc has undertaken a training module for secondary school and for all citizens, which aims to promote energy saving and renewable energy in a funny and informal way. This project started in November 2013 and continued in 2014 in secondary schools and in the 12 districts of the city. Furthermore, regular open days and events were organized for citizens, in which pupils show the results of this project.

Activities and process

Energie per la Città Inc, in collaboration with the Municipality of Cesena, has proposed a new training project in schools to deal with the issues of environmental sustainability and energy saving.. The project wants to focus its activities on children and young in order not only to act on new generations, but also to reach their families. This awareness increasing training courses have been organised in several primary and secondary schools of Cesena and have been run through interactive and games, allowing children to understand the energy consequences of their daily actions. The project, entitled "Questa te la potevi risparmiare ..." (which in English could be "you could have saved this"), started in December 2014 has ended in June 2015.

During the training days, a quiz was provided to the students to be completed by their parents about their daily habits and their knowledge of the major energy issues, taking a cue from the teaching material published on the website of Brussels Environment. In attachments to the quiz there are tips to implement virtuous behavior and some data that explain how our daily inattentive behavior may affect energy consumption in our dwelling. In this way, students will be spokesmen with the families explaining the lessons learned during the energy workshops.

Cooperating partners: Energie per la Città inc, Cooperativa Caleidos

Results and output

As output an article on courses held in Cesena secondary schools was drafted to be published on the SoS. This can be a starting point for other regions involved in the project. Furthermore, the quiz distributed to the parents of the students involved Cesena school training has been published in the SOS:

http://passregsos.passiv.de/wiki/Training_courses_in_universities_and_secondary_schools

3.1.2. ESCOs in Italy

Description and context

The implemented solution includes the study of energy service companies in the Italian context, both from a regulatory point of view and from the point of view of the assets and skills that these companies, called ESCOs, must guarantee.

Furthermore, we have analyzed the types of contracts offered by ESCOs and in particular the Energy Performance Contract.

In addition, we analyzed the application of such contracts with Public Bodies through studies and researches published by FIRE (Italian Federation for the Rational Use of Energy) and ENEA (Italian National Agency for New Technologies, Energy and sustainable Economic Development), reporting best practices, statistics and lessons learned.

Starting from the solutions published on the SoS on ESCO in other European regions, we decided to implement a solution on ESCO in Italy.

Activities and process

Through the solutions uploaded on the SoS, the activities of ESCOs in other partner regions have been analyzed; a research in regulations applicable to such companies and publications on the results of the implementation of contracts between ESCO and public administrations was made. The experience of the Municipality of Cesena which, through his company Energie per la Città realizes some of the activities required for an ESCO, has been analyzed.

This research was summarized in a document and an article has been published on the SoS.

Cooperating partners: Energie per la Città Inc, Municipality of Cesena

Results and output

As output an article on ESCOs in Italy was published on the SoS so that it can be a starting point for the other regions involved in the project.

Link: http://passregsos.passiv.de/wiki/ESCO_in_Italy

3.2. Enhanced solutions by PHP (Belgium) – AR

3.2.1. Training for professionals

This solution has been adapted and enhanced. This has been described under paragraph: 2.3.1 above.

More information:

http://passregsos.passiv.de/wiki/Training_for_professionals

3.2.2. Traject begeleiding (Building Process Guidance)

This solution has been adapted and enhanced. This has been described under paragraph: 2.3.2 above.

More information:

[http://passregsos.passiv.de/wiki/Traject_begeleiding_\(Building_process_guidance\)](http://passregsos.passiv.de/wiki/Traject_begeleiding_(Building_process_guidance))

3.2.3. Business Zoo

This solution has been adapted and enhanced. This has been described under paragraph: 2.3.3 above.

More information:

http://passregsos.passiv.de/wiki/Business_Zoo

3.2.4. Eco-house doctor

This solution has been adapted and enhanced. This has been described under paragraph: 2.3.4 above.

More information:

http://passregsos.passiv.de/wiki/Eco_house_doctor

3.3. Enhanced solutions by Nobatek (France) – AR

3.3.1. Comparative analysis between PH standards and French regulation/standards

Description and context

The thermal regulation RT2012 is currently applicable to any construction project in France. It defines the minimum requirements of energy efficiency. Other labels aim to improve energy consumption for construction; the label “Effinergie+” imposes an overall performance that is 20% better than RT2012, HQE (High Environmental Quality) to minimize construction impact on the environment, HPE & THPE (high & very high energy performance buildings) impose an overall performance (10, 20%) for non-residential buildings (new and renovation). In parallel, the "Passive house" is often cited as a model of German expertise in the field of green building. The Passivhaus standards strengths lie in

the simplicity of its approach; build a house that has an excellent thermal performance, exceptional airtightness with mechanical ventilation.

Activities and process

- In order to compare the RT2012 with Passive House label, a state of the art was realized for the technical requirements and the limits for French standards and regulations (Thermal regulation RT2012, Effenergie+, HPE, THPE, etc.);
- Researching about the main French authorities strategies for the building's energy by 2020 and the perspectives of the next thermal regulation RT2020 & BEBOS "Building energy positive" in France were realized;
- A complete technical requirements and limits for Passive House and Enerphit Standard were collected;
- Then, a comparative study between the RT2012, and passive House was conducted by Nobatek;
- The results of the main differences between Passivhaus label and RT2012 were presented on PassREg-SOS
- the comparative study was also synthesised and presented on a poster and in a 10 minutes of oral presentation at the 19th International Passive House Conference in Leipzig / Germany

Results and output

RT2012 and Passive House are difficult to compare directly, several regulatory tools are used in French context, new tools that will be launched in 2020, relevant to Passive House as in step with NZEB. However, it will be difficult to integrate PHPP due to the stakeholders involved in the development of this next tool and difficulties with using a tool developed in Germany. The RT2012 labeled Passivhaus buildings require the achievement of PHPP calculations liabilities label simultaneously with regulatory conventional calculations. The only method to accommodate the PH label by the future French regulation RT2020 is to begin a roadmap in order to survey the points of convergence and unify the method of calculation.

Link: http://passregsos.passiv.de/wiki/French_efficient_regulations_and_PHI_standards

3.3.2. Economical comparison between PH and usual buildings in French context

Description and context

The sector of passive house building is still largely undeveloped in France, limited in terms of acceptability and accessibility for the particular. It is a matter of will, training professionals and structure of the industry, not a cultural problem or that it is wrong with the French model!, The "Passive House", until now, has been considered in France as a too expensive solution, yet it is one of the most cost-effective solutions to save energy and reduce its carbon footprint.

In order to verify the over cost of "Passive House" labeled construction, a case study was conducted by Nobatek to compare the PH standard with RT2012 in Aquitaine Region.

Activities and process

- A virtual building of 150 m², a traditional detached house for four persons located in Bordeaux (Atlantic coast), was created using “Alcyone”.
- Heating energy requirements for the building according to Passive House standard have been calculated using “PHPP 7.1” and for RT2012 using “Pléiades+Comfie 7.0”.
- The building constructive parameters were varied in order to present the most interesting optimization results for each simulation.
- Then, energy performance and energy consumption for the RT2012 and the Passive House standard were calculated and compared.
- The results of the comparative study were synthesised and presented on a poster and 10 minutes of oral presentation at the 19th International Passive House Conference in Leipzig / Germany

Results and output

- The quantity of insulation materials necessary for achieving the Passive House standard objectives is 26% more than RT2012 (for a case study).
- The glass of the windows must be 60 % more efficient for achieving Passive House objective.
- The heat requirement for the RT2012 building according to Passive House standard is between 22 and 25 [kWh/m².a.] against 14.7 [kWh/m².a.] for Passive House.
- The cost of “Passive House” labeled construction is 25-30% higher than RT2012, one of the main obstacles that faces Passive Houses.
- RT2020 will be very close to Passive House, when it will be implemented the objective of NZEB.
- The application of the French labels are covered by a government subsidy, (Tax Deductions, VAT Reductions, etc.) This subsidy is not applicable for PH standard at the moment.

3.4. Enhanced solutions by LEIF (Latvia) – AR

3.4.1. Latvian Passive House Platform

Description and context

Latvian Environmental investment Fund (LEIF) has developed the Latvian Passive House Platform as one of the solutions that could help to implement the Passive House standard development in Latvia. There was no database in Latvia that consolidated the information about the experience, solutions and local experts in the context of Passive Houses. Not only valuable information for increasing the knowledge for Latvian architects, builders, developers and end-users is collected but also the database with build Passive Houses with renewable energy.

The context of the platform is strongly related to PassREg information and goals. Passive House Platform in Latvian language for our beacon regions will give a significant development in implementing the PassREg concept and will significantly help strengthen the local capacity and support regional stakeholders. The politicians and experts in the beacon regions can find on the PassREg platform in their national language evidence of Success model and many other international experience. Platform content to its visitors are educational as well as entertaining.

Activities and process

The structure of the website was defined in order to address the target groups with specific content. LEIF decided to start with the basics and explain the 5 principles of the Passive Houses that is in the *Main* page. Further Page sections were designed according to the importance of information and to make it easy to find. The most difficult and time-consuming activity was the creation of the filter for the Passive House buildings database. For the project team it seemed important to create a filter for the web-site users where the buildings can be sorted according to different parameters – new built or refurbishment, residential or public, heating demand etc.

Cooperating partners: After the end of PassREg project, it will be funded from external sponsors - Association Passive House Latvija. It will keep the project results for longer period, update the content and make the platform sustainable.

Results and output

Passive House platform was not directly included in the initial project proposal, but will improve the results of all PassREg-activities: Beacons, Trainings, Solutions Open Source and Success model. It will make PassREg results available for a large audience in the regions of the beacons and beyond in national language.

The platform contains both educational and entertaining information. The aim of it is to educate and raise the awareness of the visitors as well as to give interesting facts and news related to Passive Houses and renewable energy.

The main sections are – the basics about the **Passive House standard, Set of Solutions** with main chapters – Regulatory Framework, Business Case and Financing, Knowledge and Communication, Design and Consultancy, Construction, Quality Assurance and Monitoring and Renewable Energy. Solutions are especially analyzed and collected for the Latvian region. Next main section is - **Myths about passive houses**. This section summarizes the various articles scientific and entertaining, written by Passive House designers and architects, where they are telling about they experience, case studies and practical things. This section is created as a blog to be easy to read and find interesting articles. The next chapter **Implemented Projects** performs the function of the database. Below this you can find the map, where implemented projects are tagged. Second item is the list with the projects and here the option of the filter can be applied. Last section is **Certified Experts**, where all the local experts who have the Passive House Designer, Consultant or Tradesperson certificate are gathered in one common list.

Very important is to highlight that the national platform contains the information and banner to primary source – the PassREg-Solutions Open Source webpage were international experience and solutions from all partner countries and beyond are described. Such a connection between Latvian and international platforms gives the opportunity for the local experts and visitors to search more information and also share their experience uploading the solutions in International Solutions Open Source page.

Visit the Latvian Passive House Web platform: www.pasivamaja.lv

3.5. Enhanced solutions by Eneffect (Bulgaria) – AR

3.5.1. Sustainable development strategy / actions for environment and climate protection.

Description and context

The national policy in the area of energy efficiency in buildings is detailed in the concept for a national plan to increase the number of buildings with near zero

(<http://ec.europa.eu/energy/en/topics/energy-efficiency/buildings/nearly-zero-energy-buildings>)

Another document is the National Action Plan for Energy Efficiency 2014-2020, (http://ec.europa.eu/energy/sites/ener/files/documents/2014_neeap_bg_bulgaria.pdf), which sets national targets and policy measures to achieve them.

Based on the target and problem analysis and in line with the leading European documents in the field of integrated urban planning, a new vision for the development of the city Gabrovo is created. The “**Integrated plan for urban reconstruction and development (IPGVR)**” is strongly focused on environmental and energy issues and initiates a movement towards energy autonomy and optimal use of the local resources. The project included in this plan will be eligible for financing under the “Regions in Growth 2014-2020” Operational Programme. The plan is available (in Bulgarian) at the official website of the municipality at [www.gabrovo.bg/files/files/IPGVR_Resume\(1\).docx](http://www.gabrovo.bg/files/files/IPGVR_Resume(1).docx).

The “**Municipal Development Plan of Gabrovo**” defines medium-term objectives and priorities for the development of the municipality, taking into account its specific characteristics and potential. The first step consists in defining a vision for development of the municipality by 2020. The second step is selecting strategic objectives, the achievement of which would lead to realization of the vision. It formulates priorities linked to the three strategic objectives. For each of the priorities, specific goals to achieve through the identified specific projects are defined.

Energy efficiency as a horizontal objective is enshrined in all three strategic objectives, but a particular focus on measures in this area is given in Strategic Objective 3: Achieving sustainable and balanced development and good management in the Municipality of Gabrovo, Priority 8: Conducting an active policy of Municipality Gabrovo in the area of sustainable energy and reducing the carbon footprint. Available at <http://gabrovo.bg/bg/page/365>.

The “**Sustainable Energy Action Plan (SEAP)**” of Gabrovo is based on the two previously described planning documents. The short-term and medium-term actions and long-term measures to be undertaken by Gabrovo municipality in order to reach the goal to reduce CO₂ emissions by at least 20% by 2020 are set, based on the results of the baseline inventory of CO₂ emissions from 2008 and trend to 2013.

An essential tool for implementation of the municipal policy in the field of sustainable energy development, the **Municipal Energy Programme** implements the state policy on energy efficiency at local level to achieve the national indicative target by 2016, saving fuels and energy.

Activities and process

Approach to the implementation of the energy autonomy concept announced through the Municipal Development Programme

Studied main solutions from FRR’s; translated; adapted/applied

Parts of the projects included in the above listed plans are in a process of implementation.

Results and output

Translation of "Local Energy Action Plans (P.L.A.G.E.) in Brussels"

[http://passregsos.passiv.de/wiki/Местни_планове_за_действие_за_управление_на_енергията_в_Брюксел_\(P.L.A.G.E.\)](http://passregsos.passiv.de/wiki/Местни_планове_за_действие_за_управление_на_енергията_в_Брюксел_(P.L.A.G.E.))

Introducing NZEB & PH concepts in the practice of the national Municipal Energy Efficiency Network and in SEAPs

http://passregsos.passiv.de/wiki/Декларация_на_ОМЕЕ_ЕкоЕнергия,_2013_г.

10 point programme for municipalities

http://passregsos.passiv.de/wiki/Силата_на_градовете

3.5.2. Sustainable energy Action Plan on the Covenant of Mayors

Description and context

In 2013 Gabrovo joined the Covenant of Mayors. In March 2015 the Sustainable Energy Action Plan (SEAP) was submitted:

(http://www.covenantofmayors.eu/about/signatories_en.html?city_id=6261&seap).

Activities and process

Studied main solutions from Burgas, Zagreb, Antwerp, Latvia and Brussels; adapted/applied

The SEAP is under implementation.

Results and output

The SEAP was developed with the strong support of EcoEnergy – supporting structure to the Covenant of Mayors.

10 point programme for municipalities:

http://passregsos.passiv.de/wiki/Силата_на_градовете

Introducing NZEB & PH concepts in the practice of the national Municipal Energy Efficiency Network and in SEAPs

http://passregsos.passiv.de/wiki/Декларация_на_ОМЕЕ_ЕкоЕнергия,_2013_г.

3.6. Enhanced solutions by Burgas (Bulgaria) – AR

3.6.1. Financial mechanisms for local authorities

Description and context

Due to limited budgets, municipalities in Bulgaria rely mostly on grants to fund their projects. This applies both to the construction of new buildings and refurbishment and upgrading of existing municipal buildings (mostly kindergartens, schools and cultural infrastructure). Municipalities benefit mainly from programs that have a high co-financing rate, usually between 95% -100%.

Unfortunately, these schemes for financing investment limits energy efficiency measures that can be applied to the minimum requirements of the law in force in Bulgaria for energy efficiency and renewable energy sources. This leads to the application of surfaces refurbishment to existing buildings and unsatisfactory level of energy efficiency in newly constructed buildings

Introduction and use of flexible financing mechanisms is necessary to ensure efficient utilization of public funds provided in various forms and programs.

Our solution is based on analysis on the type of municipal buildings and selection of the most suitable financial instruments for their financing.

After studying the success models of FR's regions (Brussels, Hannover and Tyrol), we found that the provision of additional incentives to cover initially higher value of passive buildings than conventional ones is essential to implement the new energy policies in the regions.

Effective use of grant schemes in combination with its own municipal contribution can provide sustainability of the planned enhancing of energy standards in the region, namely the introduction of a combination of passive buildings and renewable energy as a normal method of construction and renovation.

Activities and process

- Analysis of funding schemes and co-financing of passive buildings in the leading regions.
- Analysis of local conditions and possibilities to cover the difference in value of the conventional approach to reach the indicators of the standard Passive House.
- Determination of the main characteristics of buildings which will facilitate local authorities in the selection of a financial mechanism.

Results and output

As a result of the analysis financing for the building of the pilot project of the Burgas Municipality is insured as well as the methodology for the selection of a financial instrument for municipal buildings is developed.

The introduction of contracts with guaranteed results is a new approach for Burgas municipality, but not for the leading regions. This type of contracts has proven as suitable for renovation of existing municipal buildings that can not be otherwise financed by municipal budget.

Link: http://passregsos.passiv.de/wiki/Financial_mechanisms_for_local_officials

3.6.2. Pilot projects - Raising public awareness

Description and context

In 2012, when the project PassREg began, Burgas had no passive buildings. Public awareness of the principles of passive house was very limited. The same can be said also for public administration and professionals in the city.

One of the best ways to make the topic of passive buildings a part of the public agenda is the development of a beacon projects, by which the local authorities can categorically demonstrate the advantages of PH compared to the conventional buildings.

Within the project, public awareness has been raised continuously, but activities promoting the concept PH + RES = nZEB should continue. Special emphasis on the public awareness activities will be the public monitoring on the building of passive houses as well as organization of annual events to rise public support by the model of Brussels.

Activities and process

Study on successful methods to raise public awareness and support in FRR's, including some of the solutions in the roadmap which are part of Burgas Success model.

Results and output

At present the results of the implementation of this solution are carried out by info sessions and cooperation with stakeholders, which significantly increased public support, advanced understanding of the local administration and strong media interest.

Link: http://passregsos.passiv.de/wiki/Pilot_projects._Raising_public_awareness

3.7. Enhanced solutions by Zagreb (Croatia) – AR

3.7.1. Establishing of Passive House Consortium Croatia

Description and context

Passive House Consortium Croatia have been established so it could improve the acceleration and implementation of the knowledge connected with design and construction of passive houses and nearly zero energy buildings. During this short period where Republic of Croatia is a part of the European Union, different energy models were used to increase passive and low-energy buildings. It appeared that adjustment process have obtained a bigger interests of the users and investors in this type of building, which means that these investments are more affordable to the citizens. That is regulated with different kind of plans in Croatian laws, as the plan to reduce energy consumption, increase use of renewable energy sources and reduce greenhouse gas emissions (scenario "3x20"). Energy models of the Passive House Institute, as the design and calculations, created by Ph.D. Wolfgang Feist, is accepted and evaluated as the best base for energy savings, reducing the emissivity and achieving thermal and other benefits. In the past two decades in Europe, tens of thousands family houses and buildings of all functional types have been made. During 2012. year 15 houses have been built in Croatia and 5 were under construction. The overall results which include investment projects are more anticipated and excepted by the City of Zagreb. The progressive increase of interest and greater need for education of different professions (architects, civil engineers...), as the interest for education by the other Croatian associations of producers, representatives, state and local administrative bodies. All the above, there is a request for gathering on a common platform to advance and improve energy efficiency and sustainability of new buildings and renovation. The fast implementation of knowledge and the cooperation of all training organisations of building sector are need to meet so they can increase a demand of education.

Activities and process

Passive House Consortium Croatia was formed during the 5th Zagreb Energy Week in 2014. Since the establishment, PHCC contributed in several lectures where knowledge for passive house standards was generated; on 15th of September, architect Hans Eek presented Swiss experience from energy efficient architecture and refurbishment as the visions for the future. Shortly thereafter, on 20th November 2014 was the opening of the exhibition Piccole Utopie where architect Matteo Scagnol had lecture. PHCC working process was presented and leaded on the 7th Days of Passive Houses organized in the November of 2014. In future, PHCC will provide trainings for the Passive House Tradespersons.

Cooperating partners: Passive House Consortium Croatia, City of Zagreb, University of Zagreb/ Faculty of Architecture,

Results and output

Passive House Consortium Croatia strategy plan is to unite all the associations and make the progress in linking the experts who will ensure competitive and professional institution. Link: http://passregsos.passiv.de/wiki/Passive_House_Consortium_Croatia

3.8. Enhanced solutions by eERG-Polimi (Italy) - AR

3.8.1. Successful regulation processes in Brussels and Hannover

Description and context

PassREg front runners are regions and municipalities which show real success models in place for the implementation of nearly zero energy buildings (nZEB) adopting the comprehensive passive house criteria and strategies. Thanks to these, in few years the front runner regions actually have reached important targets visible as hundreds of passive house buildings recently built. These are very high performance but common buildings of all shapes and types (residential, social housing, office, school, care centers, sport facilities, etc.). These regions show in practice successful results both for real buildings and building market developments both for the supporting strategies, solutions and measures in the political field. These shining examples can offer complete set of solutions to be adopted also partially in each other regions. These solutions and models were deeply described, analyzed and summarized in many documents and web-site of the PassREg project - www.passreg.eu. Sometimes these successes could produce astonishment but they are real and affordable for very different regions.

Activities and process

Synthesis of regulation processes in Brussels and Hannover (from SOS and SMs)

Correlation with increasing of passive house buildings built (number of beacon projects, etc.)

Proposal of possible roadmaps to local / regional regulations to reach Passive House levels in Italy (for new buildings and renovations)

Initial knowledge of policy process in Brussels and Hannover (from SOS and SMs, study Tours

- A comprehensive document summarizing the successful processes

Results and output

A comprehensive document on this has been developed and it's available on the SOS-wiki database here (http://passreg.sos.passiv.de/wiki/Steps_for_successful_regulation_processes_on_the_examples_of_Brussels_and_Hannover), showing also possible steps to implement the requirements and optimized integration of RES systems.

It's possible to insert now the passive house requirements in local building codes, public tenders and policy decisions, as it is happening in regions and municipalities in Europe as Hannover (Germany), Brussels Capital Region (Belgium), Tyrol (Austria), etc.. But it's also possible to adopting passive house requirements in regulations by intermediate steps with intermediate quantitative requirements or initially involving only some building types following a coherent and effective medium and long term strategies to reach complete passive house solutions.

For example, the policy process in Hannover showed these following steps, since the year 1995 until now. Since the beginning, the Passive House standard was supported by the Municipalities offering different incentives and in the negotiations processes to allow constructions on municipal plots.

- Low Energy House (LEH) - with reduction of thermal energy consumption for space heating by 25% as compared to the related norms in force at that time;
- Low Energy House Plus (LEH-plus) - with further reduction of thermal energy consumption for space heating up to 40%;
- Passive House requirements and standard (PH).

Parallel with the application of the three low-energy standards for buildings of new construction (LEH, LEH-plus and PH), Hanover Municipality has introduced also a series of ecological requirements, applied in the event of construction of buildings municipal property or in the event of build-up of municipal plots sold to building contractors. These

requirements comprise the urban development plans (build-up density, solar orientation, engineering infrastructure), as well as the application of the above listed standards in the construction of new buildings.

Even faster has been the process in Brussels Capital Region, where in less than 7 years, the Region has transformed from “the worst student in Europe” to a laudable front-runner in matters of energy policy and energy efficient building. Currently, there are 860 new passive projects that are being built in Brussels, to add to more than 2,300 passive houses in the social housing sector. Evidence exists that the additional costs for building passive is decreasing more and more. The Brussels government has made a conscious decision to be a role model in the process. In 2007, the Passive Buildings idea started to take shape in Brussels, but not on such a high technical level as in Germany, which was good, because had Brussels applied the German model literally, it would not have worked. That is how BatEx emerged. If we compare 2004 and 2009, it is clear that energy efficiency is on the government agenda, with very specific targets. Based on three rounds of successful trials with Exemplary Buildings supporting programme (in 2007, 2008 and 2009), on July 12, 2009 the Brussels government passed an order imposing the passive standard on all regional new public buildings by 2010, and on May 3, 2011 adopted new energy target regulation for all new construction (housing, offices and schools) by 2015. The EPB recast directive imposed the zero energy standard, and the “passive” standard became an important first step towards achieving the zero energy standards in insulation.

3.8.2. Study: Towards nearly zero-energy buildings -Definition of common principles under the EPBD

Description and context

A consortium led by Ecofys (with eERG Group and University of Wuppertal), undertook a study for the Commission to provide more guidance to Member States and the Commission as regards the implementation of the requirements for nearly zero-energy buildings under the EPBD. The study, which was finalized early in 2013, developed an analytical framework for evaluation the national plans (including a reporting template), identified benchmarks and investigated the convergence between cost optimal levels and nearly zero-energy buildings. Particularly Task 3, led by the end-use Efficiency Research Group of Politecnico di Milano, aims to develop an explicit methodology for analyzing building variants in terms of energy performance and global costs over 30 years, for detailing the inputs and assumptions of such an analysis and for clearly reporting the results; it also aims to present examples of representative benchmarks for nearly zero-energy building in different European climate regions and based on the results suggest an analytical framework for analyzing national plans. The study can provide a relevant general framework for developing policy and legislation developments towards zero energy building also adopting the approach of Passive House strategy with integrated Renewable Energy Systems.

Activities and process

Scientific dissemination and technical communication on the developed study
Focus on opportunities with passive house strategies, quality assurance and calculation method

Results and output

The comprehensive set of requirements of the Passive House standard is already suitable for complete description of high quality nearly Zero Energy Buildings. This is considered also in relevant outcome of this study, particularly for what concerns common principles and indexes for a complete and more precise description of renovations targets and limits toward nZEB levels, eERG-PoliMI proposed more complete indexes for **description and**

ranking of buildings and NZEBs as foreseen by EPBD. This set of indexes, presented below, could describe in quite comprehensive way the building performance in terms of energy efficiency and comfort. These represents also indexes which can be easily and directly understood and interpreted, avoiding or reducing the use of some kind of indirect or normalize indexes, on which we could not have direct references for comparison.

heating and cooling energy need (which give account of the entity of heat losses/gains via the envelope and ventilation), considering a performance part and a prescriptive part on energy needs and energy uses:

energy needs for heating, cooling and hot water and energy use for lighting (and optionally energy use for ventilation, auxiliaries and plug loads - this has the advantage of not requiring any weighting factors (performance part);

additionally, a related prescriptive approach (e.g. U-values for windows and walls, g-values for solar protections, air tightness limits and control tests, (built-in) lighting installations, etc.);

this kind of approach is already used in the Passivhaus method, and for instance in legislations adopting it as the related Brussels regulation.

an index of long term comfort conditions (which gives account of both **winter and summer comfort** conditions integrating the hourly conditions over the entire year) for instance as indicated in **standard EN 15251**.

an index evaluating grid stress induced by **temporal mismatch** of energy generated onsite or nearby (by RES, high efficient cogeneration, etc.) and building energy demand a “load matching index“ or other similar indices in the end showing the share of self-consumed locally generated renewable energy - calculated with time steps of a month , day or (preferably) hour;

an index based on net yearly primary energy demand

The study “Towards nearly zero-energy buildings -Definition of common principles under the EPBD” is available here:

- http://passregos.passiv.de/wiki/Study:_Towards_nearly_zero-energy_buildings_-_Definition_of_common_principles_under_the_EPBD
- http://www.eerg.it/index.php?p=Progetti_-_NZEB_report
- <http://ec.europa.eu/energy/en/topics/energy-efficiency/buildings/nearly-zero-energy-buildings>

3.9. Enhanced solutions by DNA (Netherlands) - AR

3.9.1. Implementation of the PHPP/NZEB tool

Description and context

One of the successes that came forward from PassREg project was the implementation of the PHPP (Passive House Planning Package) calculation model in the Brussels-Capital Region. A quite easy to use, static calculation model with which insight into the consequences of the design options can be provided immediately, has resulted in Brussels that developments are much more savings-driven rather than energy generation-driven. In the current Dutch political climate of a retreating government with regard to energy legislation, it is very well possible to implement a similar model.

The implementation of the EPDB in The Netherlands is predominantly based on the NEN standards. The commissions that set these standards are dominated by companies, who, as stakeholders, are biased with regard to which measurements are best. There are two systems: the NEN 7120 indicates the energy performance coefficient for new constructions, and a system of energy labelling does so for existing buildings. The government wants to

replace these systems by one uniform system for newly build and retrofitted, that indicates energy performance in kWh/m²/a, by 2016, when the new EN 15603 comes into effect. From the PassREg project we have promoted the use of the PHPP. Based on the ideas of Gordon Sutherland, who indicated that the PHPP can very well indicate the need for renewable energy that can be generated around the house. His ideas also lead to the Passive House Institute to add energy generations measurements in the 9.0 version of the PHPP.

Activities and process

We have invested in the strengthened relationship with a number of stakeholders, such as the NEN 7120 commission, the insulation branch, builders, the government and local and regional administrations such as the municipalities of Arnhem and Nijmegen, the Province of Gelderland and the association of Dutch municipalities (VNG). From this we have concluded that the PHPP should be used in a wider context than only for Passive House. In consultation with the stakeholders mentioned above, we have chosen to launch the PHPP under a new name: the NZEB tool, in collaboration with renowned publishers in the building and installation branch: SBRCURnet and ISSO. Not only the market for energy efficient construction and retrofitted takes it on, also administrations support the tool enthusiastically. The government intends not to prescribe a calculation model, but to require guarantees for the building performance from builders and installers. New legislation is being developed by Minister Stef Blok in order to allow private quality assurance, and quality testing on actual performance. This is very different from the current practice, in which the calculation is assessed, but only 20% meets the requirements in practice.

We have started to translate the 8.6 version of the PHPP in Dutch in order to further develop it to the NZEB tool, together with the stakeholders, in the context of the PassREg project. The implementation started few months ago.

Result and output

The NZEB tool shows that the “market” can calculate energy performance themselves, without “help” from the NEN commission or administrations that is fair to all suppliers of products, excludes nobody, but provides the actual values for the measurements that are chosen. Calculation the performance during the design phase in order to be able to give guarantees is not an utopia any more. The ministry of Housing can overcome the gap between the traditional construction sector the NEN commissions. Private Warranty Insurers, would like to start using the NZEB tool, in order to have capture the new market for quality assurance. The result is promising. Stakeholders are very enthusiastic, and this surely will enforce new dynamics to the energy transition in The Netherlands, and to the rest of Europe!

Look for more background information at:

http://passregsos.passiv.de/wiki/Implementation_of_the_NZEB_Tool_in_The_Netherlands

3.9.2. Comparison of instruments for life cycle cost calculations on energy efficient measurements

Description and context

The Dutch housing market is driven by short-term investments and the financial valuation of energy-efficiency is considered ancillary with other selling points. The analysis of the life cycle costs can be an important lever to encourage investors to consider higher initial investments in energy efficient interventions that will pay off in lower energy bills or other benefits during the time of use. But the calculation of life cycle costs often is complex and

time consuming. Due to a lot of influencing (and exponential) factors, calculation results often are not understood or trusted by the decision makers.

Experts often prepare their “own” calculation model. Advanced, easy to use calculation tools with a well-defined and reliable outcome seemed to be unavailable...

Activities and process

DNA in de bouw investigated a number of calculation programmes suitable for LCC-analysis of energy conservation in renovations. From a larger set of 16 tools, four were selected for a closer comparison, namely EconCalc 2.0; LZK – Tool; E-calculator and KBA-Renovatie. These programmes were subjected to criteria such as relevance, scope, input items, output options and availability.

Cooperating partners: Azimut Bouwbureau

Results and output

E-calculator turns out with the better scores, as it can suggest combinations of retrofitting interventions that a designer might not think of. However, it is cumbersome to use and takes a lot of computer time. The same software development team is presently preparing a more user-friendly version for renovation projects. That effort started in September 2013 and was expected to last for 4 years. Concluding from this small investigation, a real handsome life cycle cost calculation programme of European relevance, easily accessible and usable by experts as a ground-breaking communication device towards decision makers is missing at present.

The comparison is documented and published at:

http://passregsos.passiv.de/wiki/Calculation_programmes_for_feasibility_studies_of_low_energy_renovations

3.10. Enhanced solutions by Tyrol (Austria) - FR

3.11. Housing subsidy as steering instrument

Description and context

As reaction to the Austrian Energy Efficiency Action Plan, the federal government of Tyrol developed federal energy guidelines, first “Energieleitbild 2000-2015” followed in 2006 by “Tiroler Energiestrategie 2020”. Within these papers as general targets up to 2020 the total energy consumption should be limited on the level of 2005 (about 100.000 TJ) and the use of RES extended up to a share of 34%. Till 2050 the gross final consumption of energy should be covered up to 100% by RES and halved to 50.000 TJ. To reach these targets, the federal government of Tyrol decided to work with both, incentives as obligations. Rising the energy efficiency of buildings was seen as one of the most effective tools, according principles in energy policy implemented in the federal building codes, the framework of housing subsidy and subsidy of biomass. Main activities within PassREg concentrated therefore on intensified awareness rising and educational trainings within the member network as with the public.

Incentives and obligations: The now reached outstanding density of low energy-/nearly zero energy-buildings within Tyrol was mainly driven by the federal housing subsidy office.

In 2007 the federal government in Tyrol declared low energy standard mandatory to receive housing subsidy. Additional grants are donated for heating demand less or equal than 10 kWh/m²a. The grants for Passive House standard were adapted to cover the additional costs compared to the basic low energy standard of about 10% and were about 150€/m² net floor space. Within 2007 and 2010 the payed out grants for Passive House standard in Tyrol have grown from 56.400 € up to a sum of 4.704.870 €, this was a milestone on the way towards nearly zero energy standard combined with RES.

Since 2007 the heating demand of single-family houses as of apartment buildings could be reduced to about further 30 percent. The number of subsidized passive house units in Tyrol has nearly doubled from 18,1% in 2012 up to 41% in 2013. So the federal government of Tyrol decided to increase grants for nearly zero energy buildings in January 2015 for additional 25%. Key-results out of this energy policy are not only remarkable reductions in CO₂ emissions but also regional social and economic effects. The biggest growth of passive house apartments has been achieved in the sector of social housing and is lowering the risks of energy poverty. Housing subsidy also provoked remarkable investments, 1 Euro of subsidy generated a volume of about 3 Euro construction volumes. So it was obvious to continue this successful strategy using housing subsidy as effective steering instruments to improve the energetic performance not only of new builds but also of the existing building stock.

Activities and process

Experts from City of Innsbruck and the federal government of Tyrol were invited to two international workshops and study tours, courses and trainings (PHPP, detailing...) were offered. A special course for property experts was developed and presented within fair presentations (Zeba 2013, 2014, 2015, Innsbruck).

Cooperating partners: Wohnbauförderung Land Tirol, Standortagentur, Energie Tirol, Stadt Innsbruck, NHT

Results and output

These activities helped to initiate and increase additional grants for passive house homes combined with ventilation and renewables and to raise the public acceptance. Housing subsidy in Tyrol covers the additional construction costs of Passive House with RES.

Description on SOS: http://passregsos.passiv.de/wiki/Housing_subsidy

3.12. Passive house summit: Implementation of communication strategies

Description and context

Recapitulating the first experiences in big scale constructing with Passive House principles at this time (Mitterweg and Lohbach, both social housing with 60+298 apartments, about a dozen of single family houses) a deep necessity of capacity building in planning and constructing high energetic thermal envelopes following the Passive House principles was detected by the involved planners and constructors. This was the starting point of the regional NGO network IG Passive House Tyrol, which was founded in 2002/2003 as a private initiative to spread the specific knowledge and awareness rising, make Passive House standard perceptible to the public and to communicate the long-term benefits within Tyrol.

As the experiences from the first NZEB's around Innsbruck have shown, the most convincing way to stimulate energy efficient building standards is explaining the benefits and knowledge on the basis of already existing examples to decision makers as to the public.

Activities and process

Passive House summits were organized in 2013-11-9 and 2014-11-5, intended as public/stakeholder information events. Further actions: International Passive House Days in 2012, 2013, 2014, International workshop/studytour on 2013-10-9/10, Studytour "Bahnpark Heidelberg" on 2015-2-11. Regular IGPHT network meetings are held as visits of building sites (for example "Home for elderly people Olympic Village"), tour of plant and product presentations, annual Passive House journals and weekly newsletters have been used as instruments.

Cooperating partners: Standortagentur, Land Tirol, Stadt Innsbruck, Innsbrucker Soziale Dienste, NHT

Results and output

Compared to other Austrian regions the educational level of decision makers, stakeholder, planners and builders/craftsmen in implementing high energetic levels is now high, additional costs in constructing high energetic levels therefore are decreasing (as post cost controlling of the federal housing subsidy office as of social housing companies have generated). Cost efficiency and acceptance of passive house homes combined with ventilation and renewables is high, even in

neighborhoods where it was not really expected, these results for example could be achieved by studies on the “Lodenareal” housing district.

Description on SOS: http://passregsos.passiv.de/wiki/Passivhouse_Summit

3.13. Enhanced solutions by PHI (Germany)

3.13.1. Passive House window specifications

Because only a few examples for Passive House tender specifications exist, the Passive House Institute has started a series of tender specifications, starting with the windows as they are a very complex building component. Also the installation and fixing of windows require specific description in tender documents. Two templates of specifications have been developed and are now available. The first one is for the window as a product to be delivered, the second one is for the fixing and installation. The documents need to be customized to the needs of the specific project. It is not possible for the template to integrate all legal aspects of every country; therefore, no liability for the template or the information provided is carried. The specification also includes tips for detailed planning, how to use the template and usable text pieces are included. The specifications are available on Passipedia and also on the SOS. No other partner was involved.

Link to SOS:

http://passregsos.passiv.de/wiki/Passive_House_windows_tender_specifications

This activity is related to task 4.3.2 and to 6.3.4

3.13.2. Climate protection at the municipal level – a ten-point programme for the building sector

While describing the frontrunner models and developing the success guide in the PassREg project, an ideal success model was developed through internet research on different models throughout Germany, Austria and Belgium. The ten-point programme is the outcome of this research putting together all different success factors. It draws a rough picture of a kind of ideal PassREg municipality which contributes significantly to climate protection and Green House Gas reduction in its building sector. Knowing that local political authorities are in the position for far reaching decisions and for quick decisions to make changes happen, the idea behind this ten-point programme was to animate many municipalities and regions to take on their role as frontrunners in climate protection as soon as possible. The ten-point programme also forms one chapter in the PassREg brochure (task 6.2.6). The Passive House Institute has developed this programme, other partners were not involved, besides translation into local languages.

SOS:

http://passregsos.passiv.de/wiki/Climate_protection_at_municipal_level:_ten-point_plan_for_the_building_sector

Passipedia:

<http://passipedia.org/municipalities>

This activity is related to task 4.3.2 and to 6.3.4

3.13.3. Testing requirements for split air conditioning units and for ventilation supplement frost protection

Because affordable highly efficient components are key for the successful implementation of Passive Houses and NZEBs, the development of component criteria and testing requirements for the required highly efficient components accelerates the availability of certified products providing reliable quality to the designers and investors. Air conditioning and frost protection are applications with a high energy demand and therefore huge potential for increased energy efficiency. The Passive House Institute has developed testing requirements for split air conditioning units and for ventilation supplementing frost protection. The testing requirements are still on a preliminary stage, but can already be used by manufacturers for guidance during their product development. No other partners were involved.

Link to PassREg website:

http://www.passreg.eu/index.php?page_id=389

Link to SOS:

http://passregsos.passiv.de/wiki/Split_air_conditioning_units_-_testing_requirements

This activity is related to task 4.3.2

4. Additional solutions

4.1. Solution developed by DNA (Netherlands) – AR

4.1.1. LCC analysis of energy interventions in 18 reference buildings

Description and context

Representative averages or generally applicable key figures on costs and benefits are a great help when discussing the feasibility of deep renovations. In the early phase of considering improvements in an existing building, the decision makers involved often have no idea of the required investment and the returns that can be expected. Measurements with the lowest investment costs than often look sensible and the financially and otherwise optimal measurements are not taken into account. While approximations, fairly reliable figures can be provided when tied to a particular building type. For example, all apartments of a particular kind and age tend to cost about the same to insulate to levels 1, 2 or ...6, and this will generally produce savings in energy bills of about 1*, 2* or ...6*. Figures like these can greatly facilitate the choice between these levels of renovation.

The Dutch governmental agency for the (construction) industry RVO has produced studies on the energy needs of representative buildings for some time. These were calculations based on the national Dutch calculation programme that does not provide reliable results for very well insulated buildings. Moreover, their studies report on only one possible renovation package per building type. Looking from the PassREg-perspective this particular package is sub-optimal (providing rather limited savings due to poor insulation) and the study does not indicate the potentials of the optimal energy saving retrofit approach.

Activities and process

Within the PassREg project the RVO study of 2011 was re-calculated, especially including measurements that lead to low energy buildings, passive houses or nearly zero energy buildings. The financial expert H. Wegkamp (of Dantuma&Wegkamp b.v.) calculated 6 alternative interventions for each of 18 reference buildings. To compute the energy

performance he used PHPP software version 8.6. Account was taken of energy need based on observed consumption before and after example renovations, as well as of investment costs and their returns in reduced bills according to a Total Cost of Ownership approach. A presentation on these interventions as well as their financial consequences was prepared.

Results and output

Outcome of this re-calculation is the juxtaposition on physical, energy and financial indicators of 6 possible interventions in the 18 reference buildings. It will enable stakeholders in the Netherlands to base their decisions not on a gut feeling but on reliable figures.

The conviction that conserving energy is more sustainable and cheaper by providing insulation than by providing interior climate systems is often heard in PassREg circles. Calculations based on up to date key figures support this notion for many types of housing and provide a convincing argument for the wide deployment of deep renovation. There are some building types, however, for which the more effective renovation today combines rudimentary insulation with a somewhat elaborate mechanical climate control system. This might change with the advent of factory (i.e. cheaper) production of insulation packages. So, the key figures per housing type and age category in the Netherlands have to be updated regularly as the Dutch construction industry is in transition.

The study can be downloaded at:

http://passregsos.passiv.de/wiki/An_energetic_and_economic_analysis_of_18_Exemplary_houses_in_The_Netherlands

http://passregsos.passiv.de/wiki/Energetische_en_economische_analyses_van_18_referentiewoningen_-_NL