Beacon brochure

PassREg

Contents

The beacon projects: a window into the Passive House regions

The beacon projects represent distinguished best practice examples of Nearly Zero Energy Buildings (nZEB) implemented in the European "Passive House regions" - both frontrunners and aspiring - which make exemplary use of the PassREg strategy: Passive House principles plus renewables to cover the remaining energy demand, reaching optimal profitability and significant GHG emissions savings.

These case studies teach us a lot about the applicability and effectiveness of solutions for both the development and the continuous optimization of PassREg success models; moreover, they provide an insight into the future of the European urban development and building practice.

The PassREg beacon projects are either new builds or renovations, ranging from larger individual buildings to entire urban settlements. While many of the beacons have benefitted from support from the municipalities/regions in which they are located, some of them are private undertakings without any special public support. All of them, however, are shining examples of Passive House and RES principles and all are implemented within the scope of a "success model": a regional

development framework applying various financial, capacity building, technical, quality assurance, political and communication solutions and approaches.

As case studies, the analyses of the beacon projects provide valuable information about the applicability and effectiveness of the development of the PassREg regions and serve as a source of tested, effective solutions for execution of ambitious building projects in various conditions. Additionally, they all play a major role as information and know-how exchange hubs, practically transferring effective solutions and approaches onto the actual building sites. Partners from 11 European countries have engaged and delivered their own beacons and, indeed, for some of the less advanced regions, successful beacon projects proved to be the best possible driver for the energy revolution in the building sector. It is definitely no exaggeration to state that, in some cases, PassREg beacons lead the way towards development functional regional models of success, aimed at achievement, and, in fact, exceeding the EU 2020 goals in the area of climate and energy.

A celebration of architecture

The PassREg beacons are truly a celebration of architecture – a triumph of the integrative approach combining design, efficiency, comfort, cost-effectiveness and care for the environment. It is not a matter of chance, then, that many of the beacons entered and ranked quite high in the 2014 Passive House Award competition. Supported by the EU through the PassREg project and under the patronage of Sigmar Gabriel, German Federal Minister of Economic Affairs and Energy, the

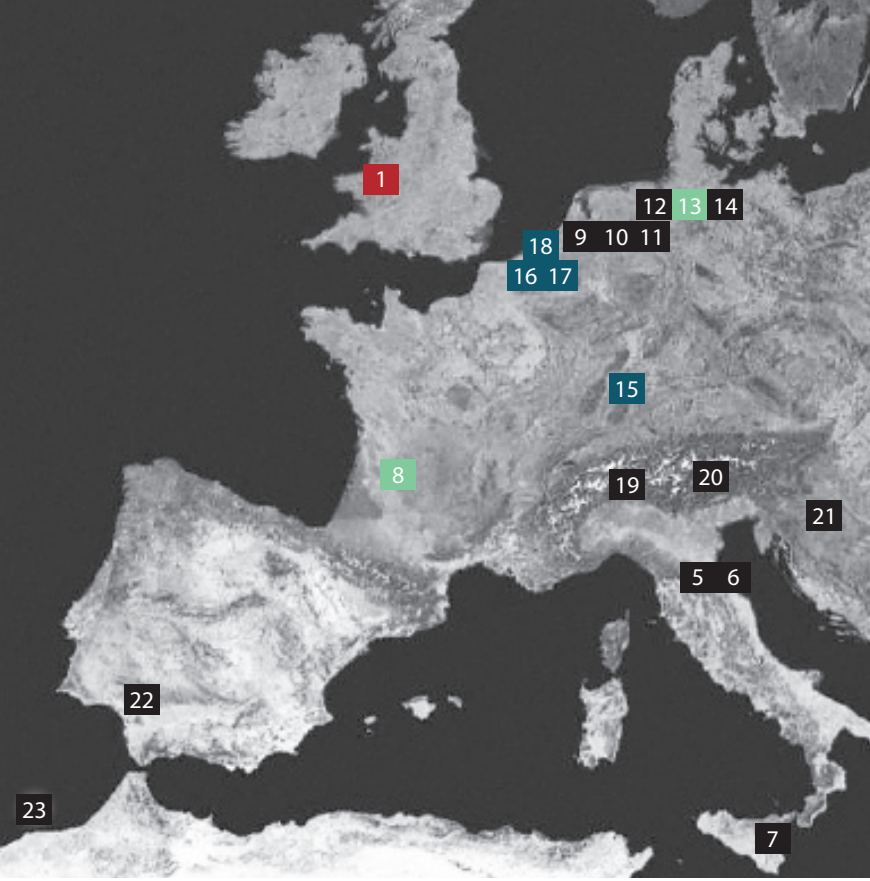
Award demonstrated the great potential and versatility offered by Passive House solutions with renewable energy. Its winners have again proved that world-class architecture and the Passive House Standard complement each other perfectly.

An international jury made its selection from approximately a hundred submissions, coming from all parts of the world and demonstrating the full spectrum of functional and design possibilities combined with significantly increased efficiency and living comfort. The award recipients in a total of six categories were announced on 25 April in Aachen, Germany, at the 2014 International Passive House Conference; many of the nominees are presented in this brochure as well.

From "Success models" through "Beacon projects" to a definition of nZEB

Actually, it is the implementation of whole models and not of single solutions which leads to the building of optimal nZEBs. Each regional model of success makes use of a complex set of approaches (financial, technical, political, communicative, etc.) and rely on particular infrastructure (capacity building in Passive House and renewables, legislation, financial incentives, etc), required for the successful uptake of PassREg concepts. The beacon projects provide the best possible illustration of the interplay between all factors of success, a large window into the models in which they fit so well, thus allowing for a deeper look at the approaches and infrastructure used – and sometimes in the new solutions needed. And this is what the European approach is all about.

The analyses of the specific technical solutions implemented in the beacon projects (including implementation of RES) and the aggregated results of these projects with reference to specific socio-economic and climatic conditions brilliantly showcase the feasibility and economic viability of the approach. They aim to show how the Passive House concept applied in accordance with the requirements of the EPBD (2010) and supported by renewable energy can serve as a proven model for the Nearly Zero-Energy Building. The facts are already more than convincing: it is not only the energy efficiency that wins over the curious reader; PassREg beacons are also comfortable, healthy, environmentally friendly, and cost effective. Just let us show you...



1	Burry Port Primary CP School	UK	Cardiff	new build	Education
2	Sun Daycare Centre	BG	Gabrovo	new build	Education
3	Burgas Art Gallery	BG	Burgas	new build	Commercial
4	Ergli Vocational School Student Dormitory	LV	Vidzeme	retrofit	Residential
5	Fiorita Multiresidence project	IT	Cesena	new build	Residential
6	Case Finali Social Housing	IT	Cesena	new build	Residential
7	Botticelli Housingproject	IT	Mascaluci	new build	Residential
8	Zac Euralantique Office Building	FR	Bordeaux	new build	Commercial
9	House Orduynstraat	NL	Den Bosch	retrofit	Residential
10	Vroomshop Service-flats	NL	Oosterhout	new build	Residential
11	GWLO Multigeneration Residences	NL	Oosterhout	new build	Residential
12	Zero:e-park urban development	DE	Hannover	new build	Residential

> Map of the beacon projects

13	REWE Supermarket	DE	Hannover	new build	Commercial
14	Quellengrund Apartment House	DE	Hannover	retrofit	Residential
15	Bahnstadt urban development	DE	Heidelberg	new build	Mixed use
16	Simons Frontispace development	BE	Brussels	retrofit	Mixed use
17	Haren Eco-district	BE	Brussels	new build	Mixed use
18	Nieuw Zuid urban development	BE	Antwerp	new build	Mixed use
19	Pallazo Positivo Multi family dwelling	CH	Chiasso	retrofit	Residential
20	Olympic Village	AT	Tirol	new build	Residential
21	M6 House	HR	Zagreb	new build	Residential
22	Family House	ES	Tenerifa	new build	Residential
23	Patio House	ES	Sevilla	new build	Residential

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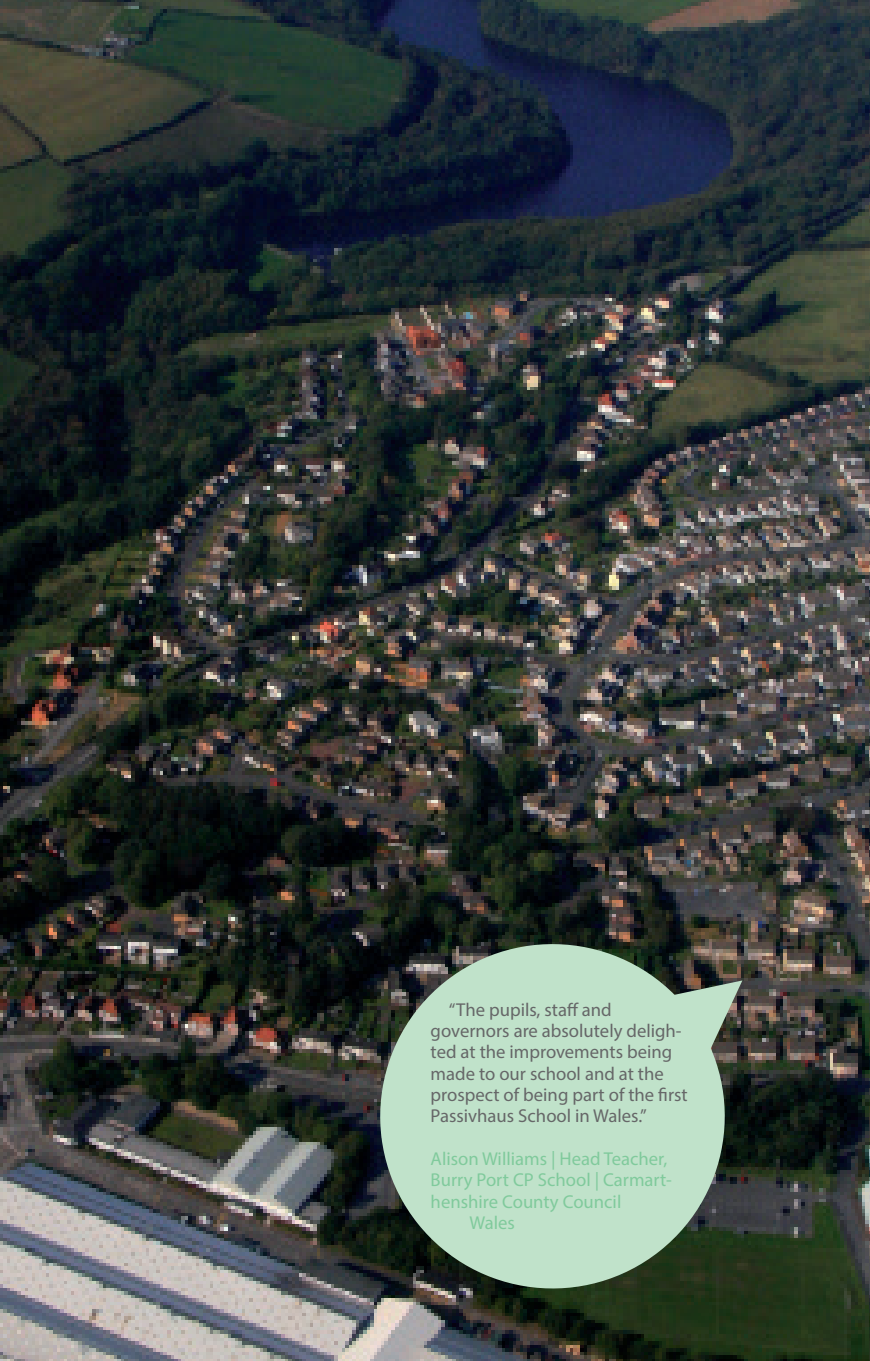
BEACONS: Shining examples



"The pupils, staff and governors are absolutely delighted at the improvements being made to our school and at the prospect of being part of the first Passivhaus School in Wales."

Alison Williams | Head Teacher, Burry Port CP School | Carmarthenshire County Council Wales

> Beacon: UK

Burry Port Primary CP School

Carmarthenshire Council justified piloting the Passive House Standard on a new school project in the small coastal village of Burry Port by considering capital investment and lifecycle costs to determine the overall 'cost optimal' solution. This first Passivhaus school in Wales provides manageable and predictable running costs for the Local Authority.

The project demonstrates the feasibility of building to this Standard in a rural setting, thus proving the viability of Passive House in almost any location. In more urban situations, wider supply chains offer increased value for money. The school serves as a very important example to assess the benefits of and barriers to energy efficient construction.

The development unites the town's infant and junior schools, accommodating 210 pupils and a nursery class holding up to 30 children. In addition to low running costs, the aim was for the classrooms to offer a comfortable, healthy, well-daylit environment to enhance the learning experience of the students.

Swiss Valley Reservoir, Llanelli | Wales | © Carmarthenshire County Council

Burry Port | Wales | © Jez Hewitt Photography

"The new Burry Port CP School design hinges on a 'fabric-first' approach to energy efficiency, meaning the building does the work, rather than relying on bolt-on energy devices."

Andrew Tidy | Architect & Projects Team Leader, Property Services | Carmarthenshire County Council Wales

Architype | Burry Port CP School | Wales | © Architype

> Beacon: UK

The school takes a 'fabric first' approach to energy efficiency via the Passive House Standard, with quality assurance built in to guarantee performance. The design will maximise 'free' energy from the sun during winter months but also offer shade and nighttime cooling to avoid any need for air conditioning in summer. Although the building will be constructed to eliminate leakage and prevent heat from escaping, there is no risk of the classrooms becoming 'stuffy', since fresh air will be provided throughout the building by a heat-recovering ventilation system. The project will use Welsh timber throughout the structure and cladding, thus supporting local supply chains.

Usable floor area (TFA): 675m^2
Heating Demand (according to PHPP): 15 kWh/(m^{2}a)
Heating Load (according to PHPP): 12 W/m^2
Cooling Demand (according to PHPP): 0 kWh/(m^{2}a)
Cooling Load (according to PHPP): 0 W/m^2
Primary Energy Demand in kWh/(m^{2}a) (according to PHPP): TBC
Airtightness: n_{50} = 0.6/h (design)
Costs: £ 3.8 million (approx.)
Architect: Architype
Architect's website: www.architype.co.uk

It all begins with the quality of the construction process. High quality construction is essential in order to achieve the expected results. Often high quality construction is linked to the perception of „expensive" construction. However, it is crucial to understand that costs have to be calculated for the whole life cycle period of the building, not just one section of this period/construction of the building.

Mayor of Gabrovo Tanya Hristova on local energy efficiency policy

> Beacon: Bulgaria

Sun Daycare Centre

The Sun Daycare Centre is the first certified Passive House building in Bulgaria and the country's only public building designed and constructed to the Standard. The project was initiated by the municipality of Gabrovo and the Centre for Energy Efficiency EnEffect. Technical support was also provided by the EcoEnergy Municipal Energy Efficiency Network.

The daycare was built as part of a project under Grant Agreement with the Ministry of Labour and Social Policy through a loan from the European Bank for Reconstruction and Development. It is the flagship energy efficiency project for the municipality, celebrating Gabrovo joining the EU initiative Covenant of Mayors in 2013.

The concept of this project was to achieve "Energy Class A" for net energy demand and comply with the Passive House Standard. High comfort levels were ensured through floor heating and highly efficient ventilation with heat recovery. Solar panels with selective collectors are used for hot water.

Sun Daycare Centre | Gabrovo, Bulgaria | SolAir architects | © EnEffect

Sun Daycare Centre from above | Gabrovo, Bulgaria | SolAir architects | © EnEffect

It is not only a good living space for children, but also a model that demonstrates the latest solutions in the field of energy efficiency. When we take into account the benefits that this approach brings over time, we will certainly try to use it again in all similar projects in the future - as of course we will take into account all lessons learned so that we would be able to achieve even better results in the next steps we take.

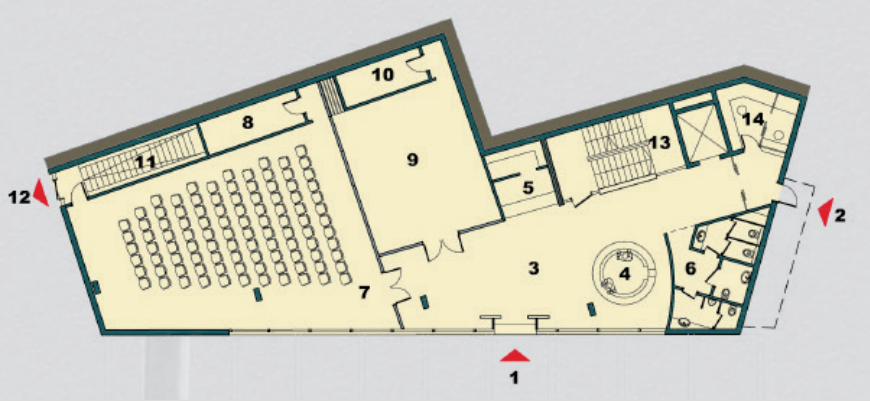
Mayor of Gabrovo Tanya Hristova on local energy efficiency policy

Sun Daycare Centre | Gabrovo, Bulgaria | SolAir architects | © EnEffect

> Beacon: Bulgaria

As the very first of its kind, Sun Daycare Centre is drawing the attention of many in Bulgaria's building sector. Careful communication between the designers and site staff was required to ensure no major mistakes were made. The process was observed closely by municipal construction, engineering, architecture, and planning experts. Trainers from the Technical University Gabrovo and the local Vocational High School of Architecture and Construction took part in the Train the Trainer course conducted by Passive House Institute. A number of regional building forums, training sessions and site visits were also conducted along with other capacity building events related to energy efficiency in construction.

Usable floor area (TFA): 734 m^2
Heating Demand (according to PHPP): 15 kWh/(m^2a)
Heating Load (according to PHPP): 14 W/m^2
Cooling Demand (according to PHPP): 0 kWh/(m^2a)
Cooling Load (according to PHPP): 0 W/m^2
Primary Energy Demand (according to PHPP): 102 kWh/(m^2a) incl. heating | domestic hot water | household and auxiliary electricity
Airtightness: n_{50} = 0.55/h (design)
Passive House Database ID: 2996
Architect: SolAir Int. Ltd
Architect's website: http://solair-bg.eu/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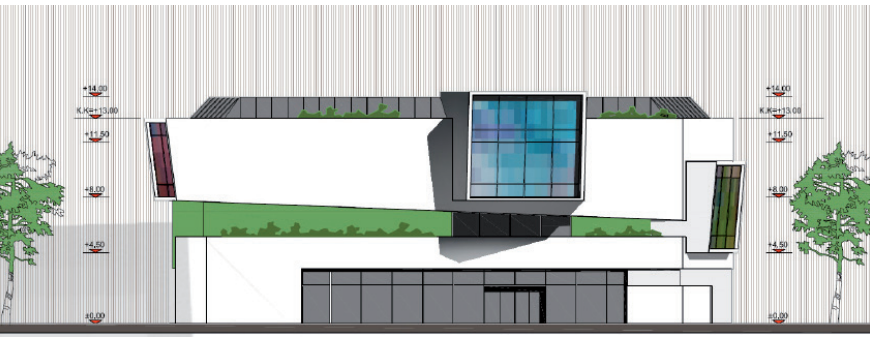
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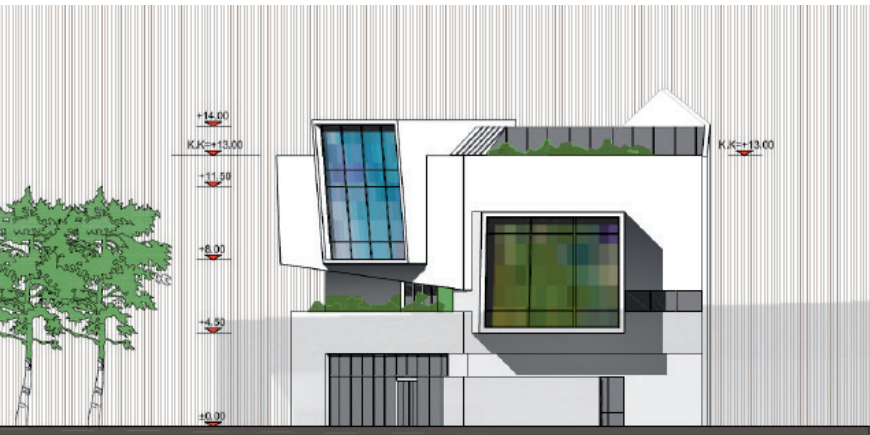
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> Beacon: Bulgaria

Burgas Art Gallery

Currently the Burgas Art Gallery is the most ambitious project in the sphere of energy efficiency in the province of Burgas. This is the first building in the region that will be built to the Passive House Standard in combination with renewable energy sources.

As a public building, the gallery is 100 % municipal property and in a combination with its attractive location in the heart of the city, this project is a major step towards breaking the status quo. This project also applied modern methods of design and construction beyond the legally accepted limits, establishing it as a true beacon within the city .

The concept of this project is to cover energy Class A in accordance with Bulgarian legislation and to apply the concept of Nearly Zero Energy Buildings. The building includes green roofs and vertical greenery on the façade, to prevent overheating. The installation of renewables will cover part of the building's energy needs.

Buda | Office/commercial building | Burgas Art Gallery | Burgas | Bulgaria | © Buda

Buda | Office/commercial building | Burgas Art Gallery | Burgas | Bulgaria | © Buda

> Beacon: Bulgaria

The example of a building designed to the Passive House Standard with renewables is key to stimulate policies for sustainable energy development in Burgas. As a member of the Covenant of Mayors, the Municipality of Burgas committed to reduce carbon emissions and increase renewables by 20 % by 2020. In its sustainable energy development strategy, one a main priorities is energy efficiency in the building sector.

Passive House buildings with renewables provides a comprehensive solution. Wide public support of the project was achieved through meetings and events. This building initiated new local policy, such as the introduction of the highest energy for municipal new builds, setting an example for developers.

Usable floor area (TFA): 1 200m^2
Required energy for heating (according to PHPP): 15 kWh/m^{2}a
Required energy for cooling (according to PHPP): 15kWh/m^{2}a
Primary Energy Demand in kWh/(m^{2}a) (according to PHPP): ≤ 120
Costs: (€/m^2): 750 €/m^2
Architect: Bureau for Architecture, Urban Planning and Design "BUDA"
Architect's website: http://buda.bg/bg/home

Buda | Office/commercial building | Burgas Art Gallery | Burgas | Bulgaria | © Buda

Vidzeme, Latvia | © Ansis Starks

Vidzeme, Latvia | © Ansis Starks

> Beacon: Latvia

Ergli Vocational School Student Dormitory

The Ergli Vocational Secondary School Student Dormitory in the Vidzeme region of Latvia, originally built in 1972, was retrofitted in 2012 with Passive House Components. The goal was to complete the first large scale EnerPHit renovation of this type in Latvia and Northern Europe.

The project was built with the support of Climate Change Financial Instrument (CCFI) for the retrofits of school buildings. This project is an excellent example of an affordable EnerPHit retrofit supplied with renewable energy. The total construction costs for all implemented energy efficiency measures were only €240 per m^2 of living space. The school serves as an inspiration for multi-family building retrofits in Latvia.

The space heating demand of the building was reduced from 154 kWh/(m^2a) to 9.8 kWh/(m^2a). Renewable energy was integrated by using the local district heating system, produced by biomass (wood-chips). An excellent airtightness result was achieved by wrapping the old building shell with an airtight membrane.

> Beacon: Latvia

This was the first example of a retrofit of a Soviet-era building in Latvia using Passive House Components. The project was a challenge for both the designers and the construction company. The project was important not only for the school, but was significant for the country as a whole. It clearly demonstrated that refurbishment of Soviet-period building stock with Passive House Components and renewable energy is feasible with local skills and expertise. The retrofit resulted in extremely low heating costs, unparalleled thermal comfort and high indoor air quality. The success of this project demonstrated that energy efficiency solutions can be replicated on a large scale in Latvia.

Usable floor area (TFA): 3 521.3 m^2
Heating Demand (according to PHPP): 9.8 kWh/(m^2a)
Heating Load (according to PHPP): 13 W/m^2
Cooling Demand (according to PHPP): 0 kWh/(m^2a)
Primary Energy Demand (according to PHPP): 98 kWh/(m^2a)
Airtightness: n_{50} = 0.58/h (design)
Passive House Database ID: 2913
Architect: Ervins Krauklis
Costs: €240/m^2 gross

Vidzeme, Latvia | © Ansis Starks

Fiorita Multiresidence | © Piraccini Associati

Fiorita Multiresidence | © Piraccini Associati

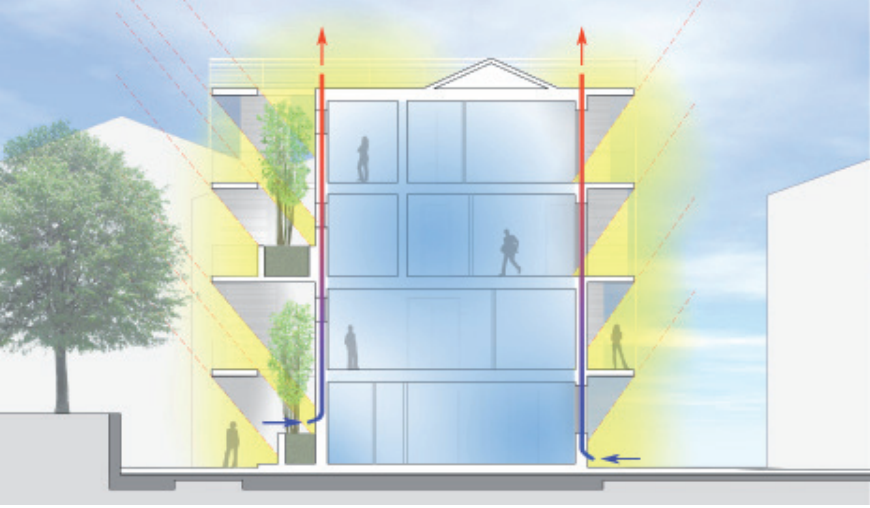
> Beacon: Italy

Fiorita Multiresidence

An old private building with high-energy consumption will be demolished in order for the Fiorita Multiresidence project to be developed. This new residential building is designed to meet the Passive House Standard. The building has been optimized to be highly energy efficient.

It will be the first wooden multi-unit residence certified to the Passive House Standard and it will contribute to the fulfilment of the Cesena Sustainable Energy Action Plan, which prioritizes retrofits of existing buildings in order to reach the EU 2020 Buildings Directive. The project is a pilot example for the Urban Regeneration Protocol promoted by the Artisans National Confederation of SMEs (CNA) of Forlì-Cesena Province.

The project will use renewables to fulfill the building's energy demand. A PV plant will be installed on the roof, supplying 10 kW of energy. A heat pump will be installed for domestic hot water. The annual heating demand will be around 11 kWh/m^2. The project will be certified to the Passive House Standard by Zephir.



Fiorita Multiresidence | © Piraccini Associati

Fiorita Multiresidence | © Piraccini Associati

> Beacon: Italy

The project involves the construction of eight residential buildings. Each building is designed to the Passive House Standard and will be certified once built. As the first multi-unit timber residence certified to the Passive House Standard, the Fiorita Multiresidence is an outstanding example. This project is significant not only in Italy, but also for the broader territory. The building is also a pilot project in the Urban Regeneration protocol, signed by cities, trade associations, architects, SMEs and public bodies to promote a more sustainable use of landscape and territory.

Usable floor area (TFA): 3 18.7 m^2
Heating Demand (according to PHPP): 11 kWh/(m^2a)
Heating Load (according to PHPP): 8 W/m^2
Cooling Demand (according to PHPP): 9 kWh/(m^2a)
Cooling Load (according to PHPP): 9 W/m^2
Primary Energy Demand (according to PHPP): 95 kWh/(m^2a)
Airtightness: n_{50} = 0.58/h (design)
Passive House Database ID: 4086
Architect: Piraccini Stefano
Architect's website: http://ec2.it/stefanopiraccini
Costs: €1 500/m^2

Case Finali Social Housing | © Archefice Associati

Case Finali Social Housing | © Archefice Associati

> Beacon: Italy

Finali Social Housing

The Case Finali Social Housing projects is a multi-storey building with 25 apartments located in the city of Cesena. Designed by Archefice studio and owned by the Forlì-Cesena Savings Bank Foundation (Cassa dei Risparmi di Forlì-Cesena), the building features a revisited ballatoio typology.

The project is the first Passive House designed in the city of Cesena and it contributes to the fulfilment Cesena's Sustainable Energy Action Plan, which considers construction according to Energy Class A a priority in terms of fufilling the EU 2020 Buildings Directive. The Case Finali Social Housing project benefited from reduced development costs via a municipal policy regulation.

The ballatoio typology maximised the surface to volume ratio of the building to reduce heat losses. The building will be highly insulated and strongly integrates renewables with 25 kW of PV plants and a 50 m3 solar collector for domestic hot water. The building is designed to achieve Passive House certification.

> Beacon: Italy

The aim of the building is to consider social, environmental and financial performance, representing the triple bottom line of sustainability. To achieve this goal, courtyards and common spaces were designed to promote social integration and communication among tenants. The building is also equipped with a common laundry room, a large meeting room, a workshop and a library. There is also a garden which was designed to offer tenants the opportunity to cultivate homegrown vegetables on their own.

Usable floor area (TFA): 1735 m^2
Heating Demand: 11 kWh /(m^2a) calculated according to PHPP
Heating Load: 10 W/m^2
Cooling demand: heat pump with a reversible cooling circuit
Cooling load: heat pump with a reversible cooling circuit
Primary Energy Demand: 111 kWh /(m^2a) including heating, domestic hot water, household electricity and auxiliary electricity as calculated according to PHPP
Passive House Database ID: 3980
Airtightness: n50 = 0.6/h
Architect: Archefice associati
Architect's website: www.archefice.it

Botticelli project | Mascalucia, Sicily | SAPIENZA & PARTNERS

> Beacon: Italy

Botticelli Housingproject

The Botticelli project is a Nearly and net Zero Energy Building (NZEB) built to the Passive House Standard within the village of Mascalucia, Sicily. It is the first NZEB adopting Passive House principles in a south Mediterranean climate. It is also the first Passive House building in Sicily and has become an "Active House" with a positive energy balance.

The adoption of local building technologies ensures a very high level of thermal insulation. Glazing surfaces are equipped with automatic external blinds for solar shading, when required. This residential building is a certified Passive House building, meeting all requirements in terms of thermal performance, airtightness, and indoor air quality.

The building's extremely low energy demand is covered by the on-site production of renewable energy through solar panels and an earth-to-air heat exchanger in the mechanical ventilation system. An automatically regulated thermal solar system is employed in conjunction with a highly efficient heat pump generator.

Botticelli project | Mascalucia, Sicily | SAPIENZA & PARTNERS

> Beacon: Italy

This highly advanced nearly zero-energy building was designed by Eng. Carmelo Sapienza of Sapienza & Partners technical firm, with the support of dynamic simulations and comfort optimization techniques provided by eERG-PoliMI – the end-use Efficiency Research Group of Politecnico di Milano. eERG-PoliMI will closely monitor energy and comfort performances of the building during the following years. There are also some valuable industrial partners of the project as Rockwool, Siemens, PM Plastic Material and Herholdt Controls. The building's distinguishing features and the rising interest of local policy makers from Sicily as well as the national level make the Botticelli project a shining example not only for the region of Catania, but for the entire Mediterranean.

Usable floor area (TFA): 144m^2
Heating Demand (according to PHPP): 11 kWh/(m^{2}a)
Heating Load (according to PHPP): 7 W/m^2
Primary Energy Demand (according to PHPP): 88 kWh/(m^{2}a)
Airtightness: n_{50} = 0.6/h (design)
Architect: Eng. Carmelo Sapienza and
eERG Group - Politecnico di Milano
Architect's website:
www.sapienzaepartners.it | ww.eerg.it
Passive House Database ID: 2123

Nicolas Laisné Associés | Office/administration office | Zac Euralantique | Bordeaux | France | © Nicolas Laisné

Nicolas Laisné Associés | Office/administration office | Zac Euralantique | Bordeaux | France | © Nicolas Laisné

> Beacon: France

Zac Euralantique Office Building

Through the national interest urban renewal operation, Bordeaux Euratlantique, PICHET Group are building a seven-storey wood frame office building in the heart of Bordeaux. The building is designed to be a Nearly Zero Energy Building. With a floor area of 4,500 m^2, the high-performance envelope is designed to be very close to Passive House standards. Renewables have been integrated and locally sourced organic insulating materials will be used. Natural ventilation is used in the building by using a "thermal chimney" system. This project is located in the heart of Bordeaux city, close to the railway station and the Garonne River.

The façades were designed to optimize homogeneous natural lighting throughout the building. The building's compactness ensures a balance between daylighting and energy performance. Renewables have also been taken into consideration including geothermal, adiabatic cooling, heat pumps and a photovoltaic generation system.

Garonne river quayside | Bordeaux | France | © Saed Raji

> Beacon: France

This project is part of a comprehensive approach in Aquitaine that aims to develop and strengthen engineering expertise in the field of energy-efficiency and timber frame construction, using local timber resources such as maritime pine and bio-based insulation. It also aims to increase capacity for implementing multi-storey timber buildings. This will enable a strong positioning of actors on the regional housing and tertiary market. These are expected to be implemented in the coming years at an annual rate of 25000 dwellings and 159 000 m^2 of office floor area. This project is part of Bordeaux Euratlantique and the Bordeaux Metropolitan area (CUB) housing activity, which includes more than 9500 units per year.

Usable floor area (TFA): 4 475 m^2
Heating Demand (according to PHPP): 20.2 kWh/m^2a
Primary Energy Demand (according to PHPP): 51 kWh/(m^2a)
Airtightness: $n_4 = 0.6 m^3/(h.m^2)$ (design)
Architect: Nicolas Laisné Associés
Architect's website:
http://www.nlaparis.com/actualites.html,9,28,0,0,0

Nicolas Laisné Associés | Office/administration office | Zac Euralantique | Bordeaux | France | © Nicolas Laisné

Orduynenstraat: Just about all sustainable interventions suitable to this type of home were applied | Den Bosch | © Carl-peter Goossen

Orduynenstraat: Added were an airtight insulating shell on the outside, insulation under the ground floor, and an extention with a wooden frame and highly insulating panels| Den Bosch | © Carl-peter Goossen

> Beacon: Netherlands

House Orduynstraat

This 1960 home in the city of Den Bosch is the first owner-occupied terraced house in the Netherlands retrofitted to a zero-energy level. Initially, the owners merely intended to add an extension to the kitchen, but eventually they were looking to achieve a higher energy performing building. Just about every type of sustainable upgrade suitable for the home was made.

To achieve a zero-energy home, professional support was received through the regional "coalition energy zero '73" and by the diligent work of the renovation team. The city coordinated the process in conjunction with the national programme for the energy revolution "Energiesprong".

Among the adjustments made to the building was an exterior airtight insulation shell, insulation installed below the ground floor and highly insulating panels. Solar panels were installed on the retrofitted roof. The building is now an all-electrical home, employing a ventilation system with heat recovery.

Orduynenstraat: The renewed, insulating roof now features solar panels. It became an all electric home with a heat recovery ventilation system | Den Bosch | © Carl-peter Goossen

Orduynenstraat: This 1960 home in the city of Den Bosch is the first owner-occupied rowhouse of the Netherlands renovated to a zero energy level | Den Bosch | © Carl-peter Goossen

> Beacon: Netherlands

The straight-forward combination of high insulation, airtightness and simple installations resulted in a zero-energy home. This approach enables homeowners to pay for the retrofit with money they would otherwise have to spend on their home energy bills. The Dutch government is now promoting the Passive House Standard through a development programme for the private sector Stroomversnelling Koop.

At present, the Netherlands draws its energy largely from natural gas. This project is using solar panels to cover its energy demand and demonstrates how the housing sector can become energy neutral without relying on fossil fuels.

Usable floor area (TFA): 125m^2
Heating Demand (according to PHPP): 17 kWh/(m^{2}a)
Heating Load (according to PHPP): 14 W/m^2
Primary Energy Demand (according to PHPP): 70 kWh/(m^{2}a)
Airtightness: n_{50} = 0.25/h-1 (design)
Costs renovation (€/m^2): € 880,-/m^2
Architect: Okko van der Kam
Architect's website: www.vdkba.nl
Passive House Database ID: 4379

Vroomshoop: 21 appartments for residents with reduced physical or mental abilities and one parent+child appartment | Vroomshoop | © Jacob Westra

Vroomshoop: The front of the building gets shade of deciduous trees | Vroomshoop | © Jacob Westra

> Beacon: Netherlands

Vroomshop Service-flats

The 'Mijande Wonen' housing corporation developed a project with 21 apartment buildings for residents with reduced physical or mental capacities in the village of Vroomshoop. The project includes one additional parent with child apartment and shared facilities, such as living rooms, a kitchen, an office and two guest rooms. Sand lime bricks and cavity walls were among the materials used for these Passive House buildings.

Mijande published a tendering for the most sustainable project proposal. The apartment buildings in Vroomshoop thus stand as a testimony to the many advantages of Passive House: high living comfort and low utility bills with heating and hot water as low as EUR 6 per housing unit per month.

The 22 apartments in traditional masonry construction are equipped with a cavity wall based on a thick layer of glass granulate. One small gas heater, suitable for a standard home, provides enough heat for the entire complex. The corridors use hatches for additional ventilation during hot summer nights.

Vroomshoop: The project features a solid passive house design with common- place construction materials such as sand-lime bricks and cavity walls | Vroomshoop | © Jacob Westra

Vroomshoop: For extra ventilation in hot summer nights, the corridors are equiped with hatches | Vroomshoop | © Jacob Westra

> Beacon: Netherlands

From the beginning, the client was passionate about applying the Passive House concept on a more traditional building design without the use of complicated machinery. In the subsequent interactive design process called 'scrumming', an independent team of professionals cooperated with the client in developing the plan, constantly looking to improve the measures.

The innovative design combined with Building Information Modelling (BIM) demonstrated the numerous advantages of Passive House. The project was kept well within budget, thus rendering the higher initial costs of Passive House buildings negligible.

Usable floor area (TFA): 1 800m^2
Heating Demand (according to PHPP): 11 kWh/(m^{2}a)
Heating Load (according to PHPP): 9 W/m^2
Primary Energy Demand (according to PHPP): 116 kWh/(m^{2}a)
Airtightness: n_{50} = 0.2235/h-1 (design)
Costs: (€/m^2): € 1.031/m^2
Architect: Carl-Peter Goossen
Architect's website: www.bouwquest.nl
Passive House Database ID: 3004

GWLO: a very energy-efficient design with sustainable and healthy construction materials | Nijmegen | © Clarence Rose

GWLO: The professionals involved used the LEAN method.| Nijmegen | © Clarence Rose

> Beacon: Netherlands

GWLO Multigeneration Residences

In the Oosterhout Estate near the city of Nijmegen, four multigenerational residences were built to the Passive House Standard. These buildings are arranged in a quadrant and contain six nearly zero-energy housing units. Three families initiated this project in order to provide high quality living for people of all ages.

From the start, the initiators expressed their desire for GWLO to become a model for future sustainability projects. Various experts on the Passive House Standard cooperated on this project to design a highly energy efficient building with sustainable and healthy construction materials. This proved feasible for a market price similar to that of a standard residential building.

The six housing units constitute an almost energy-neutral block: triple-glazed windows, a 40cm insulation layer on all sides, balanced ventilation system and automatic exterior sunscreens ensure a comfortable indoor climate throughout the year. Heating and hot water are supplied by a shared wood chip furnace.

GWLO: Three befriended families initiated this project so that several generations could live together | Nijmegen | © Clarence Rose

GWLO: The multigeneration Residences Oosterhout Estate is situated near the city of Nijmegen | Nijmegen | © Clarence Rose

> Beacon: Netherlands

The project in Oosterhout Estate not only met, but significantly exceeded the levels of energy efficiency and sustainability mandated by current regulations. The professionals involved in this project developed the construction plan together and supported each other in an effort to achieve high quality results so as to further reduce costs for the client.

This ambitious project strictly adheres to the Passive House principles even though a CO_2-neutral wood chip furnace, shared by six households, has been added to the building installations. By using scrap wood from Oosterhout Estate, the overall costs of heating and hot water amount to only EUR 8 per housing unit per month.

Usable floor area (TFA): 213m²
Heating Demand (according to PHPP): 14 kWh/(m²a)
Heating Load (according to PHPP): 10 W/m²
Primary Energy Demand (according to PHPP): 60 kWh/(m²a)
Airtightness: n_{50} = 0,47/h-1 (design)
Costs (€/m²): € 1 100,-/m²
Passive House design: Azimut Bouwbureau
Architect's website: www.azimutbouwbureau.nl
Passive House Database ID: 3887

> Beacon: Germany

zero:e-park urban development

By building nothing but Passive House buildings in the zero:e park in the southwest of Hanover, the city faces the challenge of building a new residential area with over 300 single family homes and terraced houses as a zero-emissions district.

The plan is based on an innovative concept, the ecological objectives of which are derived from the Kronsberg neighbourhood, built more than ten years ago for EXPO 2000. Overall, the new district will not emit any carbon from heat supply and household electricity. The zero:e-park is thus another testament for the City of Hanover's commitment to achieve its climate protection objectives.

The basic principle of the energy concept is to bring the building's heating demand to a minimum by relying on energy efficient construction with passive and active use of solar energy. Taking the use of renewables into consideration, only a small amount should need to be compensated for outside of the district.

proKlima | single houses / row houses | zero:e-park | Hanover | Germany | © proKlima

proKlima | single houses / row houses | zero:e-park | Hanover | Germany | © proKlima

> Beacon: Germany

Compared to a building built only to the current legal standard, the consistent application of the Passive House Standard reduces greenhouse gas emissions from heating by 65 to 87 percent. All buildings within the zero:e-park were constructed to meet Passive House requirements while using solar thermal or solar energy to reduce the residual energy demand. For the entire neighbourhood to achieve climate neutrality, compensation for heating and household power was calculated to be an average of 1,300 MWh. This amount is to be covered by a hydro power plant in Hanover. Work on the zero:e-park was planned to be finished in 2021. However, the market demand was stronger: by the end of summer 2014, all single plots were sold out.

Building types: Single family houses | semi-detached houses | row houses | supermarket
total development area: 260,000 m^2 (incl. green / public area, infrastructure)
net building plot: 130,000 m^2
Primary Energy Demand (according to PHPP): 120 kWh/(m^2a)
Heating Demand (according to PHPP): 15 kWh/(m^2a)
Primary-energy Demand for DHW, heating, cooling and aux-energy < 40 kWh/(m^2a)

proKlima | single houses / row houses | zero:e-park | Hanover | Germany | © proKlima


REWE

> Beacon: Germany

REWE Supermarket

In 2012, Germany's first supermarket built to the Passive House Standard opened in Hanover. The store is located in the zero-emission residential area zero:e-park, where 300 residential buildings complying to the Passive House Standard will be built.

In contrast to residential buildings, a supermarket's building envelope is not as important. The majority of the energy demand is from refrigeration and lighting. Market-leading refrigeration units with customized solutions were installed. A low-current lighting system, with installed power of 12W/m^2, obtained extremely low values but with outstanding illumination.

Spengler & Wiescholek Architektur und Stadtplanung | Office/commercial building | Supermarket REWE | Hanover | Germany | © O.Mahlstedt


REWE

> Beacon: Germany

The consumer market was built by “meravis Wohnungsbau- und Immobilien GmbH” for REWE and has a sales area of 1300 square metres. Its low energy demand reduces emissions of carbon dioxide by more than 30 percent compared to a conventional new supermarket of the same size.

The efficiency requirements for the individual components were developed by the Passive House Institute and proKlima in collaboration with REWE and Chalmers University of Technology in Sweden.

Spengler & Wiescholek Architektur und Stadtplanung | Office/commercial building | Supermarket REWE | Hanover | Germany | © O.Mahlstedt

Spengler & Wiescholek Architektur und Stadtplanung | Office/commercial building | Supermarket REWE | Hanover | Germany | © O.Mahlstedt

Spengler & Wiescholek Architektur und Stadtplanung | Office/ commercial building | Supermarket REWE | Hanover | Germany | © M.Wohlfahrt/proKlima

> Beacon: Germany

There is no conventional heating system for space heating and cooling is achieved by means of a central compound refrigeration system instead of a large number of vapor-compression refrigerators. This means that during summer heat can effectively be channeled away from the sales floor to the ambient environment, whilst during winter the heat demand for space heating is mainly covered by waste heat from the cooling system.

On very cold days when waste heat is not sufficient for space heating, an additional air source heat pump is available. The new REWE consumer market was awarded a certificate by the German Sustainable Building Council and also achieved Passive House certification.

sales area: 1 300 m^2
energy net floor area: 1 880 m^2
Heating Demand (according to PHPP): ≤ 15 kWh/(m^2a)
Primary Energy Demand (according to PHPP): kWh/(m^2a)
Airtightness: q_{50} = 0,28 m^3/(h m^2) (measured)
architects (facade): Spengler Wiescholek, Hamburg
energy concept: Christian Brand, Rewe / Jürgen Schnieders, Passive House Institute

Bauart Architekten | Apartment houses | Apartment houses-Quellengrund | Hanover | Germany | © bauart architekten

Retrofit apartment houses "Quellengrund":
Usable floor area (TFA): 715m²
Heating Demand (according to PHPP): 30 kWh/(m²a)
Architect (facade): bauart Architekten, Hanover
energy concept: Ing. Büro Peter B. Schmidt, Wennigsen

> Beacon: Germany

Quellengrund Apartment House

The existing structure of this retrofit project contained 14 apartments, two of which were on the top floor next to an unheated attic. A comprehensive modernisation was carried out using Passive House components to ensure a higher level of comfort while also lowering renters‘ energy costs. The old continuous balconies were replaced with large balcony towers in front of the facade. The top-floor apartments were dismantled as part of the modernisation while the top floor ceiling was insulated from above to meet Passive House requirements. The stairwell walls adjacent to the unheated basement and attic areas have also been insulated. Now, the stairwell is a warm area located entirely within the insulated building shell.

The new central heating system, which uses a condensing gas boiler, is located in the basement. The exterior underground walls and the walls separating the heating room from the unheated basement area are insulated. The apartments are heated by the heaters already in place. The entire heating network is equilibrated hydraulically.

> Beacon: Germany

Bahnstadt Urban development project

Bahnstadt's energy concept, developed in 2007, is part of a larger concept of sustainable urban development. The energy concept does not only include technical standards, but also obligations on property purchase agreements, urban development contracts, energy consulting, quality assurance, public relations and financial incentives. The quality assurance of the energy concept was developed on the basis of Passive House certification. Consultations and monitoring at the building sites, airtightness tests and mandatory PHPP calculations are also incremental steps of the quality assurance procedure. Among the other concepts, are plans for more efficient public transport connections, new bicycle lanes, electricity conservation and green roofs.
Since its district heating and electricity supply are based on renewable energies, Bahnstadt is a zero-emission district. The buildings combine Passive House principles with renewable energies and can thus be regarded as perfect examples for NZEBs, which are set to become the EU-wide standard for new builds as per the directive on the energy performance of buildings (EPBD).

Bahnstadt is supplied by a district heating network based on woodchip-fed combined heat and power. As such, there are net zero annual carbon emissions – all heating and electricity needs are supplied entirely via renewable sources.

Urban neighbourhood | Bahnstadt | Heidelberg | Germany | © City of Heidelberg | Photo Kay Sommer

> Beacon: Germany

Bahnstadt is an excellent example for carbon-neutral and ecological city development. It received the 2014 Passive House Award in the regions category. Heidelberg's new city district is a perfect illustration of what urban living of the future may look like: dense, due to its multi-storey buildings, but also green, cost-effective and comfortable.

Usable floor area (TFA) at final stage: about 250 000 m^2
Average heating Demand: 14 (estimated) kWh/(m^2a)
Heating Load: 9 (estimated) W/(m^2)
Cooling demand/ load: no average cooling demand/load determined
Cooling system: manual night ventilation, automated night ventilation, central heat pump chiller
Average primary Energy Demand: not determined
Airtightness: n50 = 0.6/h
Construction type(s): masonry construction, timber construction, insulated concrete forms, mixed construction (timber and masonry)
Wall system(s): masonry wall with exterior insulation and finishing system, lightweight timber construction, wall with ventilated facade, other
Window system(s): timber, timber-aluminium, PVC (vinyl), aluminium
Ventilation system(s): plate heat exchanger (heat only), rotary wheel (heat only)
Average gross costs (€/m^2): 2200 (estimated, no average cost determined)
Avg. building structure + mech. Systems costs (€/m^2): 1900 (estimated, no average cost determined)
Passive House Database ID: 3858

Urban neighbourhood | Bahnstadt | Heidelberg | Germany | © City of Heidelberg | Photo Kay Sommer

A2M | Combined flat + office | Rue Simons | Brussels | Belgium | © Filip Dujardin

A2M | Combined flat + office | Rue Simons | Brussels | Belgium | © Filip Dujardin

> Beacon: Belgium

Anvers Simons Frontispace development

In early 2015, the Land Management Agency of the City of Brussels completed the development of 51 dwellings, a primary school, a kindergarten and an office building in Brussels – all of which were built to the Passive House Standard. This project redefines an important section within the centre of the city.

It also illustrates the enormous dynamics of Brussels regarding the construction of Passive House buildings. The city of Brussels labelled this project an "Exemplary Building". This beacon is thus visited regularly by construction professionals and received a wide interest from the citizens of Brussels as well.

A very high level of energy efficiency was achieved through the adoption of Passive House principles and a particular emphasis on natural lighting. Additionally, solar panels were installed on the apartment buildings and on the school while adiabatic cooling is used in the school and the office building.

A2M | Combined flat + office | Rue Simons | Brussels | Belgium | © A2M

A2M | Combined flat + office | Rue Simons | Brussels | Belgium | © A2M

> Beacon: Belgium

As one of the most recent large scale public-private developments in Brussels, the project has a broad variety of distinguishing features: The overall construction cost proved to be a staggering 9 percent lower as compared to common market prices, thus refuting the assumption that Passive House buildings are more expensive than conventional buildings. Its status as an "Exemplary Building" also allows for the assistance and facilitation of monitoring and knowledge transfer by the municipality and even the Brussels Capital Region.

The fact that an existing school building was retrofitted to the Passive House Standard at one go is another remarkable achievement of this beacon project.

Usable floor area (TFA): 8 353.1 m^2
Heating Demand (according to PHPP): 14 kWh/(m^2a)
Heating Load (according to PHPP): 9 W/m^2
Primary Energy Demand (according to PHPP): 96 kWh/(m^2a)
Airtightness: n_{50} = 0.6/h (design)
Costs (€/m^2): 1 100 €/m^2 excl TVA
Architect: A2M
Architect's website: www.A2M.be

A2M | Multi family dwelling | Eco-district Haren | Brussels | Belgium | © Filip Dujardin

A2M | Multi family dwelling | Eco-district Haren | Brussels | Belgium | ©Filip Dujardin

> Beacon: Belgium

Haren Eco-district

The Land Management Agency of the City of Brussels built an eco-district of 30 Passive House buildings, five of which even achieved “zero energy” level. The project was innovative through the use of a prefabricated building system, reducing costs by 20 % in comparison to standard buildings. It also includes an autonomous management of water. Monitoring results will later be shared to raise awareness of the project.

The projects focused on energy efficiency through the use of the basic principles of the Passive House Standard. Once achieved, solar panels where then applied to the apartments in order for the building to incorporate renewables and achieve the “zero energy label”.

A2M | Multi family dwelling | Eco-district Haren | Brussels | Belgium | © Filip Dujardin

A2M | Multi family dwelling | Eco-district Haren | Brussels | Belgium | © Filip Dujardin

> Beacon: Belgium

This project is a clear demonstration of NZEBs becoming mainstream in design and construction practice in Brussels. It is an exemplary building of the local building policies in Brussels and as such monitoring was conducted to provide knowledge transfer and education. The project also received support for public relations by the region and municipality. The construction costs were found to be 17 percent lower than common market prices while the total primary energy for the apartments amounts to less than 45 kWh/m²yr. Through the integration of renewables, some of the houses even achieved the "zero energy" label. The project also included many eco concepts such as natural sewage and water management strategies.

Usable floor area (TFA): 2 591 m²
Heating Demand (according to PHPP): from 5 to 13 kWh/(m²a)
Heating Load (according to PHPP): from 10 to12 W/m²
Primary Energy Demand (according to PHPP):
from 83 to 96 kWh/(m²a)
Airtightness: n_{50} = from 0.3/h to 0.5/h (design)
Costs (€/m²): 1 027 €/m² excl TVA
Architect: A2M
Architect's website: www.A2M.be

Studio Associato Secchi Vigano | Combined flat/office | Nieuw Zuid | Antwerp | Belgium | © Studio Associato Secchi Vigano

Studio Associato Secchi Vigano | Combined flat/office | Nieuw Zuid | Antwerp | Belgium | © Studio Associato Secchi Vigano

> Beacon: Belgium

Nieuw Zuid urban development

In immediate vicinity to the historic city center of Antwerp, an old railway yard will be converted into a highly energy-efficient Passive House district by the name of Nieuw Zuid – or 'New South'. Covering an area of 70 hectares, the district will feature a total of 2,000 residential dwellings, office buildings, public facilities, a large park and other amenities. As part of the "Covenant of Mayors", the city of Antwerp is committed to achieve a CO2-neutral city by 2050, in order to comply with the European Union's climate targets.

The developments of Nieuw Zuid employ a variety of renewable energy sources: Solar panels were installed on the roof tops of several buildings and each building unit is equipped with smart digital meters as well as a heat exchanger to connect it to the district heating network.

> Beacon: Belgium

In immediate vicinity to the historic city center of Antwerp, an old railway yard will be converted into a highly energy-efficient Passive House district by the name of Nieuw Zuid – or 'New South'. Covering an area of 70 hectares, the district will feature a total of 2,000 residential dwellings, office buildings, public facilities, a large park and other amenities. As part of the "Covenant of Mayors", the city of Antwerp is committed to achieve a CO2-neutral city by 2050, in order to comply with the European Union's climate targets.

Usable floor area (TFA): 397.600m²
Heating Demand: 15 kWh/m²a
Heating Load: no information available
Cooling demand: 15 kWh/m²a for offices only
Cooling load: no information available
Primary Energy Demand: no mandatory restrictions
Passive House Database ID: no certification
Airtightness: no mandatory restrictions
Architect: Masterplanner: Studio Associato Secchi-Viganò
Architect's website: http://www.secchi-vigano.eu/
Costs (€/m²): 1250 - 1400€/m²

C.F. MOLLER-BRUT-ABT- Deerns & Peritas | Tower | Nieuw Zuid | Antwerp | Belgium | © C.F. MOLLER-BRUT-ABT- Deerns & Peritas

> Beacon: Switserland

Pallazo Positivo Multi family dwelling

This successful retrofit of an existing multi-family apartment block was based on Passive House principles and even achieved the level of a “plus” energy building. Composed of 19 apartments, the certified Passive House building represents a typical example of an apartment block built in 1965.
As part of the deep retrofit, Passive House principles were adopted and combined with renewable energy systems (RES), such as solar thermal panels and photovoltaic panels on the roof and the facades and balconies. Thanks to the integration of these Passive House and RES solutions, the building not only provides an architecturally attractive sight but also produces more energy than it consumes.

The building’s ventilation system with heat recovery filters dust and preheats outdoor air. Each apartment has an automatic airflow volume control. For space heating and domestic hot water production, a water storage tank is filled by an air-water heat pump and solar thermal panels. The building envelope is thermal bridge free.

Gasser Gruppe | Multi family dwelling | Chiasso | Chiasso | Switserland | © Gasser Baumaterialien AG

Gasser Gruppe | Multi family dwelling | Chiasso | Chiasso | Switserland | © Gasser Baumaterialien AG

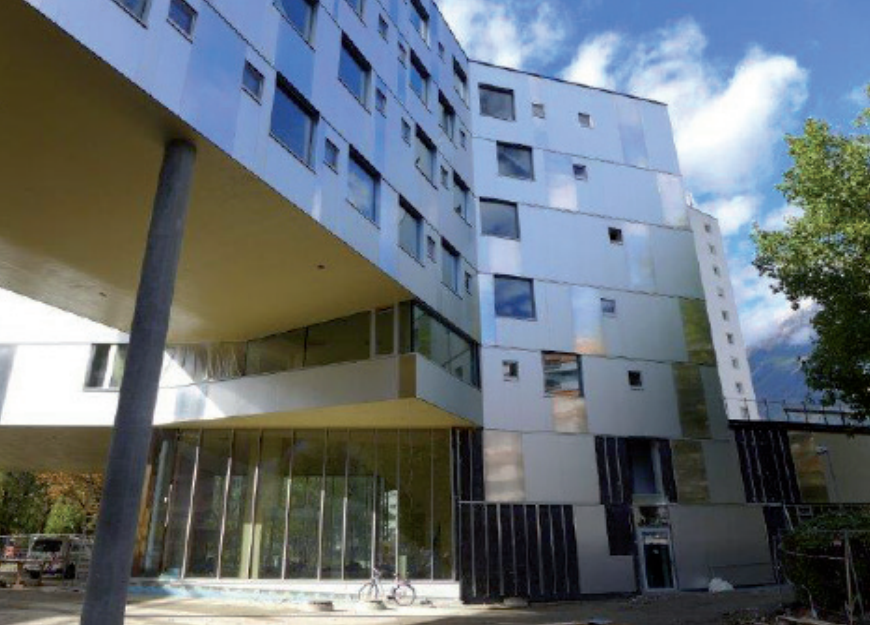
Gasser Gruppe | Multi family dwelling | Chiasso | Chiasso | Switserland | © Gasser Baumaterialien AG

> Beacon: Switserland

The beacon project has received widespread interest from residents, construction professionals, researchers and policy makers. It is a fantastic example of what is possible when retrofitting to the Passive House Standard as it provides feasible and reliable technical solutions to drastically reduce the energy demand and to integrate renewable energy systems into an existing building.

This retrofit stands out as a beacon as it can be replicated in a great variety of cases within the European building stock.

Usable floor area (TFA): 1 373m^2
Heating Demand (according to PHPP): 15 kWh/(m^{2}a)
Heating Load (according to PHPP): 9 W/m^2
Primary Energy Demand (according to PHPP): 92 kWh/(m^{2}a)
Airtightness: n_{50} = 0.35/h (design)
Architect: Gasser Baumaterialien AG
Architect's website: www.gasser.ch
Passive House Database ID: 2923



ARTEC Architekten Bettina Götz + Richard Manahl | Multi family dwelling | Olympic Village | Tirol | Austria | © Herz&Lang GmbH

ARTEC Architekten Bettina Götz + Richard Manahl | Multi family dwelling | Olympic Village | Tirol | Austria | © Herz&Lang GmbH

> Beacon: Austria

Olympic Village

Constructing nearly Zero-Energy Buildings in Tyrol can look back on a long-standing history. 20 years ago, in 1995, the biggest regional social housing company called "Neue Heimat Tirol" applied the Passive House principles to 60 apartments in the city of Innsbruck. This was the first time that a high quality thermal envelope avoiding thermal bridges, windows with triple glazing, a ventilation system with heat recovery and RES (solar thermal collectors) were used in a medium-scale residence building. Just four years later, 289 units at Lohbach residence were built to the same standard. Both projects had been designed by Carlo Baumschlager and Dietmar Eberle, well known architects from Vorarlberg.

Nearly 20 years ago, the availability of Passive House Components was at a very low level. Some components, such as ventilation systems, were merely prototypes at the time. This lack of experience in designing and constructing nearly Zero-Energy Buildings meant that a lot of lessons had to be learned.

ARTEC Architekten Bettina Götz + Richard Manahl | Multi family dwelling | Olympic Village | Tirol | Austria | © Herz&Lang GmbH

> Beacon: Austria

As of early 2015, "Neue Heimat Tirol" has built more than 2,000 units to the Passive House Standard and other housing companies followed suit. The most recent project, Innsbruck's Lodenareal, is a perfect illustration of how Passive House and RES can be successfully applied to a wide variety of building designs and construction methods.

The state government of Tyrol has recognised the potential of Passive House using RES for both reaching the EU climate targets and reducing the dependency on fossil energies. It thus offers a very attractive housing subsidy, covering all additional construction costs resulting from this high energetic performance.

Usable floor area (TFA): 7,406 m^2
Units : 118
Heating Demand (according to PHPP): 14,3 kWh/m^2a
Heating Load (according to PHPP): 26 W/m^2
Primary Energy Demand (according to PHPP): 95 kWh/(m^2a)
Airtightness: n50 = 0.6/h (design)
Passive House Database ID: 4329
Architect: ARTEC Architekten Bettina Götz + Richard Manahl
Architect's website: http://www.artec-architekten.at/

"In a time of recession and crisis, rational use of energy, energy efficiency, the application of new green technologies and renewable energy sources is an imperative but also a challenge and impulse for economic development, opening new workplaces and a brighter perspective for our young generations."

Marijan Maras, M. Electrical Engineer
City of Zagreb, Head of Office for Energy, Environment and Sustainable Development

> Beacon: Croatia

M6 House

M6 is a single-detached Passive House building in the Zagreb County Area, designed by architect Ljubomir Miščević. Located in the Gornji Stupnik area, south-west to the city centre of Zagreb, it has a usable floor area (TFA) of 334 square metres. According to the most recent census figures, Gornji Stupnik is currently home to approximately 1800 citizens living in over 500 households. The Passive House building thus blends in perfectly with this environment, engaging directly with the beautiful landscapes surrounding the property. The spacious green area around the building is an integral part of the basic concept and identity of M6.

M6 was one of the first structures built with a reinforced concrete base plate to achieve very high standards of thermal insulation. The basement and ground level floors are made of reinforced concrete. The stairs and all remaining vertical wall constructions were made using layered wooden columns and beams.

Ljubomir Miščević | Detached single family house | M6 | Zagreb | Croatia | ©Dubravko Matinić

"Project PassREg is extremely necessary and reasonable platform for the realization of the objectives for energy efficiency and sustainability according to the scenarios of the European Union for 2020 and 2030. Previous project crosslinking promoter of the passive house construction standards in the EU (PASS-NET), was successfully carried out with the University of Zagreb, Faculty of Architecture and City of Zagreb support."

Prof. Ljubomir Miscevic, B. Sc. ing architect.
Head of the Passive House Consortium Croatia

> Beacon: Croatia

M6 can be separated into three levels: basement, ground-floor and first floor. The basement and main vertical staircase are made of concrete. The first floor as well as the attic are wooden constructions built by using state of the art construction techniques. The building envelope was conceived as a wooden door system ensuring integration and easy access to the central chambers. This Passive House building is an exemplary project as it demonstrates how well the plan and systems of a building can be adjusted to meet Passive House requirements. M6 already complies with the EU Directive on the Energy Performance of Buildings (EPBD), which will fully go into effect in 2020.

Usable floor area (TFA): 334 m^2

Ljubomir Miščević | Detached single family house | M6 | Zagreb | Croatia | ©Dubravko Matinić

> Beacon: Spain

Family House

This beacon represents a contemporary approach to a traditional Andalusian patio house with only one façade. The aim of the project was to develop a very cost-effective Passive House building that incorporates both traditional cooling strategies and evaporative cooling using vegetation.

The building is equipped with an automatic glass ceiling, which is closed during winter in order to create a greenhouse effect, and open in summer time in order to create a cold wall effect. It demonstrates the remarkably low cooling load that can be achieved through the Passive House Standard, even in climates with very warm summers. It is thus an exemplary project for both the municipal and regional energy efficiency and renewables agenda.

The regional government of Andalusia has implemented new directives on energy efficiency and sustainable construction. This beacon project thus acts as a perfect example of how nearly Zero-Energy Buildings can be based on the Passive House Standard while also incorporating traditional cooling strategies.

JUAN MANUEL CASTAÑO SALVADOR | individual building | Patio House | Seville | Spain | © Juan Manuel Castano

> Beacon: Spain

The City of Seville is part of the EU-funded Sinfonia project, which aims to deploy large-scale, integrated and scalable energy solutions in mid-sized European cities. As a result, this traditional building will not only provide guidance for future projects in the region, but also help to overcome skepticism about building to the Passive House Standard in the warm-temperate climate of the Mediterranean.

The significant reduction of the cooling load led to an innovative cooling concept. The ventilation system decides whether to draw air from the patio or from the outside, thus improving the efficiency of the heat recovery exchanger. It is planned to install a photovoltaic array to achieve a net zero energy balance.

Usable floor area (TFA): 211.5 m^2
Heating Demand: 13 kWh / (m^2a)
Heating Load: 11 W/m^2
Cooling demand: 10 kWh / (m^2a)
Cooling load: 16 W/m^2
Primary Energy Demand: 95 kWh / (m^2a)
Passive House Database ID: 4162
Airtightness: planning target 0.6 r/h
Architect: Juan Manuel Castaño Salvador
Architect's website: www.arquitectocastano.com
Costs (€/m^2): Group(200 – 700) 840€/m^2 group(300-400), 770 €/m^2

JUAN MANUEL CASTAÑO SALVADOR | individual building | Patio House | Seville | Spain | © Juan Manuel Castano

Toledo y heras arquitectos - tarquitectos.com | Tenerifa South | Tenerife | Spain | © Anne Vogt

Toledo y heras arquitectos - tarquitectos.com | Tenerifa South | Tenerife | Spain | © Toledo y heras arquitectos

> Beacon: Spain

Patio House

Detached single family house at 200m from the ocean designed following the Passive House principles in a traditional concrete and brick construction with exterior insulation. The design does also take into account renewable energies by using solar panels. ARCHITECT: Toledo y Heras arquitectos Spain and De Poorter Holdrinet designers Belgium QUANTITY SURVEYOR: Toledo y Heras project management STATIC ENGINEER: Jorge Heras PHPP CALCULATIONS AND PH ASSESSMENT: Nuria Díaz, Anne Vogt, VAND arquitectura, Madrid

Usable floor area (TFA): 140,5m^2

Imprint

Coordinator:

Passive House Institute

Partner:

www.passivehouse-international.org

www.igpassivhaus-tirol.at

www.passiefhuisplatform.be

www.lvif.gov.lv

www.maisonpassive.be

www.comune.cesena.fc.it

www.eneffect.bg

www.nobatek.com

www.dnaindebouw.nl

www.bre.co.uk

www.zagreb.hr

www.proklima-hannover.de

www.eerg.it

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Further information

www.passivehouse-international.org

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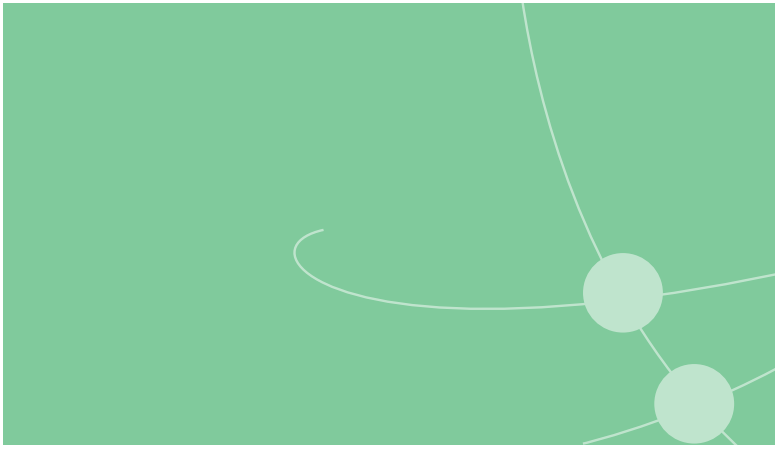

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