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PASSIVE HOUSE REGIONS WITH RENEWABLE ENERGIES

Task 2.1.4/D2.2: First edition of the Success guide

The Success Model of Hanover

The Success Model of Brussels

The Success Model of Tyrol (draft)

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Passive House Regions: A Guide to Success

INTRODUCTION

*In its initial phase, the project ‘Passive house regions with renewable energies’ (PassREg) studies the modes of interaction of all factors which enable effective introduction of the passive house standard in three pilot (“front runner”) European regions - Hanover (Germany), Brussels (Belgium) and Tyrol (Austria). A **comparative analysis** is undertaken in order to identify major trends and to communicate both achievements and failures on the road to success – the so called “**Success Models**”. Based on the conclusions, a “**Success Guide**” is developed for widespread use in EU to encourage and assist other less experienced regions and municipalities to follow the example.*

What does, in fact, ‘success model’ actually mean? Isn’t this **combination of factors** which allows the establishing of **passive house as regular construction practice** in these regions too specific? Is it possible to draw any reliable conclusions? We firmly believe it is: but what is more important, our comparative analysis produced an enormous **wealth of good practices and solutions** which, combined with the professional knowledge gleaned through the project and a pinch of imagination, could really influence construction practices all over Europe.

The achievements in all three regions are remarkable, although the initial conditions and - consequently - approaches, are quite different. We could take a closer look to the relatively top-down approach of Hannover, based on **longstanding political consensus** over the strategic goals of the region, and compare it with the unbelievable **recent explosion of passive house** construction in Brussels as a result of the **ambitious new legislation** and **successful incentive schemes**; we could turn to the great example of **regional and local initiatives** in Tyrol and the role of their **limited profit housing associations**: it all adds up to the conclusion that in all cases, a stable and **coherent legal framework** is a must, but it only works when combined with a **working incentive system**, accessible to all target groups. Very interesting modes of interaction between different **levels of governance** are also to be experienced in the three regions as different approaches have all proved to be successful; but maybe not surprisingly, we wouldn’t bet on any of them to win the race in the “aspiring” regions: top-down initiatives and bottom-up movements all combine into a common scheme of **sustainable networking activities** among stakeholders, public awareness raising campaigns and **local leadership**, which, in some cases, is the missing screw in the mechanism of sustainable development.

This is what we call **‘capacity for change’**. This set of ingredients includes, without any limitations, **all stakeholders**, institutional arrangements, educational establishments and professional networks with their information and knowledge, **skills and abilities**, attitudes and connections. Arrangements could be different: the public dialogue provoked by **Local Agenda 21** in Hannover would not be the same without the **proKlima fund, Climate Protection Agency Hanover region (CPAH)** and the functioning local networks. The rapid growth of low-energy building in Brussels-Capital region would not be possible without the combined efforts of **Brussels Environment** office and the **Exemplary Building** programme, of **PMP** and **PHP**. In Tyrol, national institutions and arrangements as the **Austrian Energy Agency** and **klima:aktiv** would probably not reach their regional targets without, for example, the efforts of **Energie Tirol** and **IG Passivhaus Tirol** or the research work undertaken by **Innsbruck University**.

So the message, even at this early stage, is quite clear: the availability of appropriate national regulatory framework is a favourable condition, but it does not reduce the need for **active involvement of regional and local authorities**. They, in turn, have to be supported/provide support (depending on the administrative structure) by **accessible incentive schemes**. But even if all this is in place, capacity for change still has to be build: the strategic targets cannot be fully achieved without attracting a wide range of **local partners and stakeholders**. The competence of these actors is an important prerequisite for their effective contribution; and this is, in fact, the only way to create new sustainable industries and jobs, supporting – and not obstructing - overall **economic growth**. The challenge is how to go through this path - and our belief is that the “Success Guide” will help to produce many new ideas and solutions **at local and regional level**: the levels, at which change actually happens.

WHY THESE COUNTRIES AND REGIONS?

On one hand, the selection of pilot countries and regions it is based on the remarkable results achieved in the field of passive buildings. On the other, it reveals approaches and solutions formed at various initial conditions and to various national and local legal and economic frameworks.

Germany / Hanover: Born in Germany, the ‘passive house’ concept is implemented in a consistent and sustainable national climate and energy policy that is constantly updated. Hanover is one of the pioneer regions in Germany, where the promotion of ‘passive house’ and the use of renewable energy in buildings began in the mid-80’s of XX century. The ‘success model’ of Hanover is largely built **top-down**, with national strategies consistently integrated into local policies and approaches. However, one of the keys to success in climate protection, energy efficiency and sustainable development is rooted in longstanding consensus of political forces in the region in terms of long-term policy objectives.

Belgium / Brussels: Belgium progressively harmonizes its legislation in the field of buildings, but in terms of the 'passive house' standard achievements are much more limited than those in Germany and Austria. Until recently Brussels was one of the most backward regions as related to energy performance of buildings, and by 2007 there was still not a single passive building. Amid less active national policy, the regional authorities in Brussels formally committed to the 'passive house' standard in the construction of all new public buildings after 2010. As a result, Brussels quickly established itself as a leader in the application of the passive house in Belgium several years ahead of the requirements of the EPBD. The example of Brussels is illustrating an approach in which long-term commitment by regional authorities in the initial stage of the process is a key factor for the success of the region.

Austria / Tyrol. Austria is the country with the highest density of passive buildings world wide - the number of these buildings per capita is five times higher than in Germany or Switzerland. These achievements are the result of years of deliberate national policy for energy efficiency in buildings. Against this background, Tyrol has long been lagging behind in implementing the 'passive house' concept and only at the beginning of the new millennium began **rapidly gaining momentum** to go to remarkable results today. Only 2% of all newly constructed buildings in the region complied with the passive house standard in 2002. In the following years, this percentage shows a rapid growth. The level of energy efficiency for all new buildings rises extensively: from 37,33 kWh/m²a in 2009 (at normative levels at about 54 kWh/m²a) to 29,34 kWh/m²a in 2011. As concerning renovations, the average level for all buildings in 2011 is 47,81 kWh/m²a. Tyrol's example confirms that even in the presence of persistent long-term national policies, regulations and practices in the field of low-energy buildings, active involvement of local authorities has crucial importance.

REGULATIONS VS INCENTIVES

Which comes first – legislation or subsidies? There are still countries in EU in which tend to professionals tend to blame the lack of coherent legislature or sufficient market support for the slow advance of low-energy building practices. In fact, barriers may lie elsewhere...

Each of the three frontrunner regions studied in PassREg reaches the 'passive house' standard in its own way, creatively interpreting and adapting it to local conditions. Their experience shows that the desired result is achieved most effectively through an appropriate combination of mandatory **regulations** and effective **incentives** to encourage passive buildings established at both national and local level. It is interesting to observe whether the pursuit of the three regions to establish the 'passive house' standard will be sufficient for its integration in national definitions of 'nearly zero energy buildings', which would send an important signal to many other European regions and municipalities.

Germany / Hanover: In line with the federal policy and taking advantage of the relative independence of local authorities in Germany, Hannover City Council elaborates and approves a long-term regional Energy Concept. It includes refusal to develop nuclear energy, gives a new role for the local utility company Stadtwerke Hannover AG and creates proper regulation and tools to promote passive buildings. Several policy instruments are used: Local Agenda 21, Hanover Ten Plus, Integrated Resource Planning, Hanover CO₂ Audit. With a new regional regulatory framework three **standards** for all new buildings on municipal land are introduced: Low Energy House (LEH), Low Energy House Plus (LEH-plus) and Passive House (PH). In addition, the municipality approved a set of environmental requirements, covering both buildings and urban plans (building density, orientation to the sun, technical infrastructure, etc.). In the late 90's, Hanover Municipality and Hannover Stadtwerke AG create the unique instrument **proKlima**. The fund proKlima provides annually € 5 million to support the renovation of buildings and to establish the 'passive house' standard and related construction technology. Every Euro of financial assistance provided by proKlima has helped to mobilize € 12.7 of additional investments. Following the example of Graz (Austria), Hanover municipality creates the public-private partnership **Ecoprofit**, which provides technical and financial support to SMEs in their efforts to limit production costs by reducing waste and emissions. In 2003, the city government initiated the program **ImpulsProgramme Passive House** to support the creation and development of SMEs in the field of energy efficiency, in particular passive buildings.

Belgium / Brussels: The new policy framework adopted by the regional authorities in Brussels in 2004 include: mandatory local **regulations** on energy performance of buildings (EPB), introduction of eco-building elements, financial incentives, inter-agency cooperation to promote environmental construction, free technical support for training and professional development. Although creatively interpreted, the main indicators of the passive house standard became the basis for the new regulations. The implementation of a series of **real projects** through the Exemplary Buildings (BatEx) programme (2007-2009) showed that passive building does not increase the cost of renovation and new construction to unacceptable levels. Officials in Brussels first adopt the new standards and rules in their municipal buildings, thus stimulating their penetration. Such a **'lead by example'** approach is essential to Brussels, where the share of public procurement is significant. Local Action Plans for Energy Management (P.L.A.G.E.) are based on this approach, while "Contracts for sustainable neighbourhoods" encourage broader initiatives to update the traditional neighbourhoods. Essential to the success of Brussels are the **financial incentives** available in the form of **tax breaks** (created by the federal government in 2009), **grants** (to cover part of the additional investment required to meet the new standards for energy efficiency in buildings) and **'green' credits / prêt vert social** (for the most vulnerable social groups). When in the middle of 2012 the federal government abolished tax breaks, Brussels regional government decided to double local subsidies to keep the interest of investors, thus reaffirming its commitment to energy efficiency in buildings.

Austria / Tyrol: The Austrian Climate Protection Initiative (*klima:aktiv*) stands out among the national programs, boosting awareness on energy consumption, and supporting energy checks for every household in Austria (2004). It consists of a bundle of regulations, taxes, and subsidies. The klima:aktiv 'passive house' criteria is similar to German 'passive house' standard and it is possible that it will become mandatory for receiving housing subsidies. In 2006 the Tyrol Parliament launched an initiative named **Energy Efficiency and Energy Conservation in Tyrol Households**. Space heating *objectives* for households were established as follows: for new buildings at maximum 25 kWh/m²year (Category A) and for good-quality comprehensive renovation at 50 kWh/m²year (Category B). It is particularly important that the annual number of renovated residential buildings, which currently amounts to less than 1%, shall be increased to at least 3% in order to achieve the 5% share laid down in the Action Plan. Programmes for EE and RES in the building sector introduce a series of **incentive instruments**, such as the **social housing subsidy scheme** (grants being awarded for energy related measures); subsidy schemes for **new buildings**; additional **eco-subsidies**; subsidies for **building renovation** (the highest being available for a renovation according to 'passive house' standard). Housing subsidies (both federal and regional) are widely accessible for a big part of the population, thus strongly influencing market prices of commercial housing and protecting the markets from downturns. Demand side housing allowances are another effective financing incentive, targeted to dwellings, which were constructed with subsidies. In comparison with the other provinces Tyrol is even now capable of ensuring a share of energy of local production of nearly 40%. Nevertheless, Tyrol Energy Strategy 2020 envisages also incentives for the **use of RES** (solar energy, biomass), connected to both level of efficiency and limits for emissions. In this way energy generation from local RES (less transport) will increase to more than 50% of the final energy demand.

CAPACITY FOR CHANGE

If we assume that (regional) regulations and various stimuli are already in place, stemming from the top-down approach that would probably look most convincing in less developed regions, would that be enough to reach the heights described above? Our appreciation is that this would not be the case: there is another set of vital ingredients, which enable the uptake of 'passive house' concept. We call this set of ingredients '**capacity for change**': it includes, without any limitations, **all stakeholders**, institutional arrangements, educational establishments and professional networks with their information and knowledge, **skills and abilities**, attitudes and connections. It is evident from the examples that markets are developed on the base of extended awareness raising, educational and consultation activities, in most cases lead by local/regional authorities but always supported by different interest groups, providing for the accessibility and quality of the information offered.

Germany / Hanover: As early as mid-1990's, Hannover local authorities recognize that implementation of the goals of their ecological and energy policy is unthinkable without

active public support. A broad circle of stakeholders was attracted in the design of Local Agenda 21 and active **public dialogue** on climate protection issues was provoked. The implementation of Agenda 21 is based on the establishing of permanently functioning **networks** (e.g. “Environmental Communications Network), directly involving citizens in the sustainable development of the region. Other instruments include the “Environmental Hot Line”, the “City Forum” and the Planning Ombudsman institution. Specific attention is paid to the involvement of businesses and local industries through PPPs, branch initiatives and consultations. The permanent exchange of environmentally sound technologies is also a main priority, as support efforts for continuing education of professionals in the area of EE and RES are maintained. Specific measures have been taken to ensure participation of women and children in the sustainable development of the city. Hanover Municipality has also improved of its own administrative **capacity**. Its specialized unit “Energy and Climate Protection Section” encourages changes in the end energy users’ behaviour, provides consultations on local energy standards in buildings, participates in energy planning, and supports use of RES. A system of institutions has been developed and coordinated by Climate Protection Agency Hanover region (CPAH), while the programming tasks are implemented in the framework of Climate Alliance Hanover 2020. Locally, the Kronsberg Environmental Liaison Agency (KUKA) performs relations with the broad public and ensures its direct involvement. Additionally, a system of consultation centres for different stakeholder groups (households, investors, builders, etc.) was built in the municipality, and a special national network for professional orientation attracts young people to training opportunities. Hanover municipality is also engaged in active cooperation with PHI, taking advantage of opportunities on specialized trainings for designers, engineers, construction workers, etc.

Belgium / Brussels: The rapid growth of low-energy building in Brussels-Capital region, which followed the high-level political commitment and the resulting new strategic and legislative frameworks, also required a significant change in the institutional arrangement. **Brussels Environment** office multiplied its capacity in terms of experts and financing, which was a necessary step to test the ability of businesses and end-users to realize high-end energy efficient projects. A set of additional **institutional measures** was realized: the Sustainable Building Facilitator Network, the Employment-Environment Alliance, Brussels Enterprise Agency (BEA), Plateforme Maison Passive (PMP) and Passiefhuis Platform (PHP) are working towards smooth transition to more energy-efficient building practices, covering all relevant stakeholders in public, private and non-governmental sectors. Usually offering free consultation services, these institutions exemplify the attempts of regional authorities to support the supply side of passive building. The need to **train building professionals** via universities, vocational schools and training centres was timely realized, and in 2009 Brussels Environment decided to develop a professional development program for designers, engineers, architects, and contracting authorities. Additionally, PMP introduced training for designers in 2005 and for builders in 2007. Today, the training program involves the entire sector (developers, investors and promoters, building managers, property managers,

notaries, maintenance companies, etc.), as a part of the legalization of the 'passive house' standard, also supported by the Professional Reference Centre for Construction. As regards higher education courses, at the Department of Architecture of the Université Libre de Bruxelles, PMP has integrated passive house training, as designers and builders apply the learned concepts into practice, collaborating on real 'passive' projects.

Austria / Tyrol: The institutional arrangement in Austria and in the region of Tyrol did not fall behind strategic and regulatory development. A famous example is the Austrian Energy Agency (AEA), in which federal and provincial administrations and a number of important institutions and companies **cooperate and exchange** knowledge and experience. This way, they are capable to provide information to all target groups, ensuring the engagement of public society and influencing decision-making in public administration and industry. The institutional structure of AEA is itself an illustration of the importance of engagement of all stakeholders: along with politics, AEA brings together the economy (OMV, EVN, TIWAG, etc.), scientific institutions (WIFO, EIV, LEV) and stakeholders' organisations (WKÖ, Fachverbände, AEE, etc.) in three working areas: Innovative Energy Technologies, Energy Efficient Systems and RES. AEA is also strongly supported by a multitude of **training and capacity building** activities. As an example, klima:aktiv provides qualifications in the area of sustainable building and coordinates training and education activities. Consultancy services and trainings are offered by Energie Tirol and its 'Energy Academy', focusing on professional development of planners and construction-related industries. Professional networking is exemplified by Ecoplus Cluster, Standortagentur Tirol and Low Energy Building Cluster Tirol, with the understanding that innovative and economically sound projects between business and research community are becoming increasingly important for the building sector. Training opportunities are also offered by IG Passivhaus Austria and IG Passivhaus Tirol, in close cooperation with PHI and University of Innsbruck.

STARTING HYPOTHESES¹

- The compulsory regulation of passive buildings is effective only if combined with appropriate **promotional tools**.
- The availability of appropriate national regulatory framework is a favourable condition, but it does not reduce the need for active **involvement of regional and local authorities**.

¹ The facts and conclusions presented in this communication are based on interim results of ongoing research and are subject to completion and clarification. The authors express their gratitude to the representatives of proKlima (Hannover), PMP and PHP (Brussels) and IG Passive House (Tyrol) for their special contribution and assistance. In its final form, "Success Models" will be presented in a "Success Guide" (in print and electronic format) easily accessible to municipalities in Europe.

- The role of regional/municipal authorities cannot be fully achieved without attracting a wide range of local **partners and stakeholders**. Competence (capacity) of these actors is an important prerequisite for their effective contribution.
- Sustainable development, including passive and 'green' buildings, creates **new industries and jobs**, and does not contradict to economic growth. However, the **market** for low-energy and passive buildings still needs support and protection in order to gradually cover the entire construction sector.
- Implementing 'passive house' standard in the definition of national standards for '**nearly zero energy building**' is a major opportunity and challenge for each EU member state.

Despite the differences between the 'success models' of Hanover, Brussels and Tyrol, it is firmly believed that, in the end, they will send some clear common messages to all engaged in the process of sustainable development in the area of climate and energy – and beyond

THE SUCCESS MODEL OF HANOVER

CASE STUDY

ENERGY AND BUILDING POLICIES

As early as in the mid-1980'es the Hanover City Council took a decision for rational energy use and energy conservation and for broad introduction of renewable energy sources on the territory of the city. The Municipality and Stadtwerke Hannover Energy Utility worked out jointly a comprehensive energy strategy. In the early 1990'es the City Council achieved a **political consensus** for establishment of sustainable development as a major priority of Hanover Municipality. In implementation of the goals laid down in Agenda 21, approved at the World Summit in Rio de Janeiro, the City Council has decided to reduce by 2005 its CO₂ emissions by 25% as compared to the 1990 levels.

In order to achieve this ambitious target the City Council worked out and started to implement a number of mutually complementary **policy instruments**, including the following: Local Agenda 21, Hannover Ten Plus, Integrated Resource Planning, Hannover CO₂ Audit. The effective use of these instruments made it necessary to enforce an appropriate legal and regulatory framework, introducing three specific standards for all the new buildings constructed on plots municipal property: Low Energy House (LEH), Low Energy House Plus (LEH-plus) and Passive House (PH). In addition, ecological standards were introduced as well in the construction of all buildings in which the municipality had some influence.

For the purposes of successful realization of a whole series of programmes and pilot projects, through which the policy of sustainable development of Hanover was implemented, apart from the establishment of Stadtwerke Hannover, several new institutions were created, namely: Energy and Climate Protection Section (1994), Climate Protection Fund "proKlima" (1998), Climate Protection Agency Hannover (region) – CPAH (2001) and Climate Alliance Hannover (2007).

Political consensus

During the past two decades the coalition of social democrats and the Green has retained lasting and stable majority in the Hanover City Council. It has effectively mobilized the support of the other political parties represented in the Council for achievement of a full political consensus on issues related to the sustainable development of the municipality. Consensus has been reached also about broad application of low-energy standards in the construction of new buildings and renovation of existing buildings on municipal plots.

An additional prerequisite for attainment of the political consensus on the application of the new low-energy standards was the strong support by the Stadtwerke Hannover Energy Utility, which is 3/4 municipal property and was the major donor to the Climate Protection Fund “proKlima”

Long-term integrated climate / energy / development policy

Source:

Integrated Energy and Climate Protection Policy-Hannover (DE) – (hannover_566_en.pdf)

The success of the Hanover policies related to climate protection, energy efficiency and sustainable development is rooted in the long-term consistent integrated efforts of a multitude of local stakeholders. The City Council, the energy utility Stadtwerke Hannover AG, the specialized municipal institutions, representatives of the business community, NGOs and interested citizens united their efforts for achievement of the goals laid down in Local Agenda 21 - *reduction of CO₂ emissions through curtailing of energy consumption and expansion of the use of renewable energy sources*. On the basis of the achieved political consensus concerning the implementation of Local Agenda 21, long-term policy instruments and the regulatory framework for their application have been persistently and systematically worked out. A system of institutional structures was built in the municipality for application of the selected policies. As a result of all that a multitude of projects for sustainable development and energy efficiency were implemented on the area of Hanover, including projects complying with the requirements of the “Passive House” Standard. Despite the serious problems caused by the liberalization of the energy market and the impact of the financial and economic crisis these efforts have stood the test of time and have led to results, which are visible not only in Hanover and Germany, but in the entire Europe.

Milestones of climate protection process in Hanover

Stand: 24.08.2012

Common Sources (German):

<http://www.klimaschutz-hannover.de/>

Demus, M. Policy Analyse am Beispiel der Klimaschutzpolitik der Landeshauptstadt Hannover. Examensarbeit (1999)

http://books.google.de/books?id=ElbFRyq9g24C&printsec=frontcover&hl=de&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

Common Sources (English):

http://www.hannover.de/de/umwelt_bauen/umwelt/Hannover_on_the_way_to_Sustainability/index.html

Events and policy decisions with significant influence on the climate protection process in Hannover

1972 **Foundation of 1st nationwide Environment Protection Centre**
(Umweltschutz-Zentrum) in Hannover by local initiative "Bürgerinitiative Umweltschutz (BIU)"

Sources:

<http://www.biu-hannover.de/>

1986 **Decision of the City Council: Local Pull-out of nuclear energy**
Forcing Hanover's utility (Stadtwerke Hannover) to denounce a supply contract with PreussenElektra
Background of political decisions was a local initiative with citizen boycott of electricity bills

Sources:

Demus, M. Policy Analyse am Beispiel der Klimaschutzpolitik der Landeshauptstadt Hannover. Examensarbeit (1999)

http://books.google.de/books?id=ElbFRyq9q24C&printsec=frontcover&hl=de&source=gbs_ge_summary_r&cad=0#v=onepage&q&f=false

- 1988** **Development of an innovative energy concept for City Hannover and Stadtwerke Hannover**
- 1st municipal energy concept (primary focus on efficiency of recourses, not climate protection)
- 10 professional publications with focus on potentials of efficiency on buildings
- 1-year process of work – City of Hannover and Stadtwerke Hannover
- 1992** **Decision of the City Council: 25 % CO₂-reduction until 2005 on level**
- 1994** **Decision of the City Council: Contracting for local CHP feed-in compensation by Stadtwerke Hannover**
- 1994** **Foundation of the Climate Protection Unit City of Hannover**
- headed by Hans Mönninghoff (Head of the Directorate of Environmental Affairs)
- 1994** **Energy concept district planning Kronsberg by City of Hannover and Stadtwerke Hannover**
- http://www.hannover.de/data/download/umwelt_bauen/s/mokro32-53.pdf
- 1995** **Decision of the City Council: Local Participation in Agenda 21**
- Local realisation of the main outcome document of Rio Summit 1992
- Establishment of a Local Agenda-21 office City of Hannover
- Signing of the charter of Aalborg
- Source:**
- <http://www.agenda21.de/>
- 1996** **First Climate Protection Programme City of Hannover and Stadtwerke Hannover**
- 1997-2001** **KUKA Kronsberg Environmental Liaison Agency**
- Source :**
- http://www.hannover.de/data/download/umwelt_bauen/s/mokro27-31.pdf
- 1998-2001** **Establishment of Kronsberg-settlement Lummerlund / Local participation in EU-Project CEPHEUS**

- 1998** **Foundation of the climate protection fund proKlima**
- under substantial involvement of Stadtwerke Hannover (CEO Dr. E. Deppe) und City of Hannover (H. Mönninghoff, Head of the Directorate of Environmental Affairs)
- Source:**
- http://www.proklima-hannover.de/downloads/proKlima/partnership_contract_proKlima_as_a_model.pdf
- 1998** **Beginning of electricity market liberalization in Germany**
- 2001** **Foundation of the Climate Protection Agency Region Hannover**
- Source:**
- <http://www.klimaschutzagentur.de/>
- 2004** **Extension of Partnership-contracting proKlima-fund**
- 2007** **Evaluation report of CO2-reduction-goals (1990-2005)**
- First success in CO2-reduction, but main target value 25% was missed. New need for action was formulated.
- 2007** **„Passive House Resolution” of the City Council**
- Document: “Ecological Standards for Building Construction in Municipality’s sphere of Influence”
- Source:**
- http://www.hannover.de/data/download/lhh/umw_bau/Ecological_standards_for_buildings.pdf
- 2007** **Foundation und Kick-off Climate-Alliance 2020**
- Source:**
- <http://www.hannover.de/klimaschutzallianz/english/index.html>
- 2008** **Climate Protection Plan City of Hanover**
- 2008** **Decision of the City Council: 40 % CO2-reduction until 2020 on level 1990**
- Source:**
- http://www.hannover.de/de/buerger/pres_med/RH_pm-2011/RH_pm-2011-12/pm480.html

2011 Decision of the Region Council: 40 % CO₂-reduction until 2020 on level 1990

Climate Protection Programme “Climate package 2020”:

05.2012 Project „Masterplan 100% for Climate Protection“ by Region Hannover and City of Hannover

Main targets until 2050 on level 1990: CO₂-reduction over 95% reduction of energy consumption over 50%

Source:

http://www.hannover.de/de/umwelt_bauen/umwelt/masterplan/index.html

<http://www.kommunaler-klimaschutz.de/f%C3%B6rderprogramme/bmuf%C3%B6rderprogramm/masterplan-100-klimaschutz>

06.2012 Decision of the City Council: Target Value „Masterplans 100% for Climate Protection“**Source:**

<https://e-government.hannover-stadt.de/lhhsimwebre.nsf/SIMFrameset?OpenFrameSet&Frame=NotesView&Src=https://e-government.hannover-stadt.de/lhhsimwebre.nsf/0/166CF567C60BD4F8C1257A06000E1F88?OpenDocument&AutoFramed>

Beginning of Passive House Process Hanover**1989 “Zero-energy house” in Dörpe near Hannover**

Private Initiative of a zero energy house by local club „Ecological Future Workshop for Minimum-energy and Zero-energy Houses e.V“

Club members are later involved in the PH-process.

Sources:

http://passipedia.passiv.de/passipedia_en/basics/the_passive_house_-_historical_review

Hinz, E. et al: Messdatenerfassung und Auswertung beim ökologischen Nullenergiehaus Dörpe, Institut Wohnen und Umwelt, Darmstadt, 1994

as of mid 90s Establishment of Hannover district Kronsberg

ecological beacon project at EXPO 2000

Low Energy House with limited heat demand 55 kWh/(m²a)

Quality assurance and qualification of architects, planners, companies, construction worker were given by extra founded “Kronsberg-Umwelt-Kommunikationsagentur GmbH (KUKA)”

Sources:

http://www.hannover.de/de/umwelt_bauen/bauen/bauen_lhh/oekobauen/omobakr/modkrons/kroliter/rotebuch.html

http://www.hannover.de/data/download/umwelt_bauen/v/vorwaerts_nach_weiter.pdf

http://www.hannover.de/data/download/umwelt_bauen/m/kronseng.pdf

Passive house settlement “Lummerlund”

Innovative sub-project at district H-Kronsberg under substantial involvement of Stadtwerke Hannover (*Manfred Görg, Department energy politics and extra tasks*)

Note: At this time local developers and builders were not convinced to build the project, therefore Stadtwerke Hannover introduced the developer and builder Rasch&Partner. The company was charged by City of Hanover to develop and build the settlement. Rasch&Partner had already experience with a passive house settlement in Wiesbaden, Germany.

The project “Lummerlund” participated as of 1997 at EU-Project CEPHEUS. Measurements and Evaluation was taken by Passive House Institute Darmstadt.

Sources:

http://erg.ucd.ie/pep/pdf/Climate_Neutral_Passive_House.pdf

<http://www.cepheus.de/>

http://passipedia.passiv.de/passipedia_en/operation/operation_and_experience/measurement_results/energy_use_measurement_results

2007

„Passive House Resolution” of the City Council

Document: “Ecological Standards for Building Construction in Municipality’s sphere of Influence”

Source:

http://www.hannover.de/data/download/lhh/umw_bau/Ecological_standards_for_buildings.pdf

2010

Development of zero:e park Hannover-Wettbergen

First European settlement with passive houses and zero emission standard (over 300 single houses)

Sources:

Kirscht, E. The zero:e park: Active with Passive Houses. In: 15th Intern. Passive House Conference Innsbruck 2011.

www.zero-e-park.de

http://www.hannover.de/de/umwelt_bauen/bauen/bauen_lhh/oekobauen/ze_rosiedlung.html

Policy instruments

In 1992 the Hanover City Council approved a decision to reduce by 2005 the CO₂ emissions by 25% as compared to the 1990 level and in 2008 it decided to achieve by 2020 a reduction by 40%. The attainment of these political goals imposes application of specifically developed policy instruments, which can be divided into three major groups. The first group comprises a range of medium-term and long-term programmes and action plans. The second group comprises the integrated approaches applied in planning and management of the measures for climate protection and energy efficiency improvement. The third group comprises the specifically built systems for monitoring of the results from the implemented measures.

The Millennium goals and Local Agenda 21

Sources:

Agenda 21 and the Millennium goals (Agenda_21_and_the_millennium_goals.pdf)

The Local Agenda 21 – for our Children’s Future (Agenda_21_pdf)

As an immediate response to the eight goals of the Millennium, incorporated in Agenda 21 approved in 1992 in Rio de Janeiro, Hanover has undertaken 14 concrete steps, which represent the local contribution of the municipality to the implementation of these global goals.

In mid-1990'es the Hanover City Council approved, with the participation of a broad circle of partners, including the local businesses, its own Local Agenda 21), which provides the necessary programming base for climate protection and reduction of energy consumption through construction of low-energy and passive buildings. This comprehensive programme contains a total of 40 chapters, grouped in four sections, which formulate in detail the following: (i) the socio-economic requirements; (ii) preservation and management of

development resources; (iii) functions of the main stakeholders; and (iv) required funding for implementation of the programme.

Hannover Ten Plus

Source:

Hannover plus Zehn – Working for a Young and Innovative City, 2005-2015 (Hannover__10.pdf)

In 2004 the Hanover City Council approved a 10-year programme (2005-2015) aimed at development of the city as a place for innovations with broad participation of the citizens in that development. In the ten points of the programme a special emphasis is laid on education, research and culture, whereat the main focus is on children, the family and integration in the community. A separate point is devoted to climate protection and protection of the natural environment, which comprises a series of projects for construction and development of the open and green spaces in the city.

Integrated planning process

Sources:

Hannover-Kronsberg, Assessments (imagine_sem2007_hannover_kronsberg_mgeorg.pdf)

Integrated Energy and Climate Protection Policy-Hannover (DE) (hannover_566_en.pdf)

In the course of more than two decades the Hanover City Council has been applying an integrated approach to the general planning and management of the activities in the municipality, including climate protection and reduction of energy consumption. This approach unites in the first place the efforts of all stakeholders, where at in the case of Stadtwerke Hannover AG an optimal balance between the interests of the energy supplier and the respective consumers has always been sought. In the second place, this approach seeks always intentionally an integrated and hence maximally efficient use of all resources (material, financial and human). In the third place, this approach uses a rich range of policy instruments and a broad spectrum of projects, in which all the stakeholder groups are actively involved – from the big companies operating on the area of the municipality to the individual citizens. EXPO 2000 played an important role for the development and successful application of that approach, since it took place on the territory of Hanover and integrated the efforts at all levels – global, national, regional and local.

The Hanover City Council regards urban planning as a key element of the integrated approach in the administration of the city and seeks persistently the required balance between the three main elements of the city: the urban structure, its social and cultural contents and the environment. Under this type of balance a complex mutual linkage of all the three elements is indispensable. The social mix achieves its practical realization in the

urban structure. Optimization of energy production and consumption imposes the need of maximally effective utilization of urban spaces, while the high living standard is unthinkable without the respective social, transport and engineering infrastructure.

Integrated Resource Planning

Sources:

Ecological Standards for Building Construction within the Municipality's Sphere of Influence

(Ecological_Standards_for_Building.pdf)

Agenda 21 – Status report (Hannover_Agenda_21_Activities_Report.pdf)

The Hanover authorities apply diligently an integrated approach in the planning of local resources. This approach affirms energy saved as the cleanest and the cheapest energy resource, which minimizes the need of energy production and supply. On the other hand, expansion of the use of the practically inexhaustible renewable energy sources curtails additionally the need of conventional energies and reduces CO₂ emissions.

The municipal authorities in Hanover are particularly persistent in the application of the integrated approach in the planning and management of land resources as well. Irrespective of who possesses the ownership rights on it, land is a resource, which serves many generations and each of them is obliged to protect it from pollution, excessive build-up and undermining of its ecological and landscaping properties. To this end the municipality applies strict standards, that minimize the negative environmental effect, including gradual reduction of the build-up coefficient. Irrespective of the high requirements of the currently enforced standards, they are open to development with a view to future changes in the citizens' requirements and the anticipated higher criteria for land and soil protection. Important instruments to that effect are keeping of an up-to-date land registry and application of appropriate indicators for monitoring and assessment of land resources.

Integrating environment and development in decision-making

Sources:

Ecological Standards for Building Construction within the Municipality's Sphere of Influence

(Ecological_Standards_for_Building.pdf)

Agenda 21 – Status report (Hannover_Agenda_21_Activities_Report.pdf)

CO₂ audit 1990-2005 (bilanzengl.pdf)

In the Municipality of Hanover environmental protection and sustainable development have always been in the focus of every economic and political decision. This has imposed the need in the process of formulation of the respective policies to denounce the clerical approach of the past and to seek involvement of all the stakeholder groups. Abiding steadily to this approach the Hanover Municipality has worked out and begins to apply three major

instruments: periodical environmental audit by the municipal administration; drafting of a specialized report on the state of the environment in the municipality (every three years) and working out of environmental assessment of the areas, which are the object of urban planning.

The achievement of Hanover's ambitious target to reduce by 2020 its CO₂ emissions by 40% as compared to the 1990 level requires application of a highly accurate system for monitoring of these emissions during the entire programming period. The most important instrument of this monitoring is the periodical audit of CO₂ emissions, which takes differentiated account of the different harmful emissions from the energy sector and those from transport. Beside the total reduction of CO₂ emissions on the area of Hanover, direct effects of this audit are also reduced energy consumption for space heating, broad penetration of the *renewable energy sources* and increased number of decentralized plants for *combined* heat and power generation (co-generation).

Legal framework

The application of the new political approaches and instruments as described above requires also creation of a new legal framework, which may guarantee achievement of the high targets for reduction of energy consumption and hence reduction of harmful emissions. To this end the Hanover Municipality has introduced three local energy standards for new buildings:

- Since 1995 - Low Energy House (LEH) - "Kronsberg-Standard": Space Heat Demand max. 55 kWh/(m²a)²
- Low Energy House Plus (LEH-plus) max. Heat losses thermal envelope 30% under law standard³
- Passive House (PH)

These standards are applied for (a) all new municipal buildings (both residential and public) and (b) for all new residential buildings constructed on municipal plots. In the second case the application of these standards is ensured through the contract for purchase of municipal

² http://www.hannover.de/data/download/umwelt_bauen/s/mokro32-53.pdf

³ http://www.hannover.de/data/download/lhh/umw_bau/Ecological_standards_for_buildings.pdf

land or through the building permit. Taking due account of the good results achieved in the pilot projects, implemented in connection with EXPO 2000, a number of investors, including retail chains and banks, have decided voluntarily to apply the new standards. The municipal administration, on its part, approved its own Action Plan, which comprises 30 measures oriented towards renovation of all the public municipal buildings and of the street lighting in the city in accordance with the new standards, as well as mandatory application of the new standards in all public procurement orders of the municipality.

Low Energy House (LEH)

Source:

Hannover-Kronsberg – Assessments (imagine_sem2007_hannover_kronsberg_mgeorg.pdf)

In connection with EXPO 2000 at the end of the 1990'es started the construction of a new housing estate in the Kronsberg neighborhood (Hanover). It was there that the Low Energy House (LEH) Standard, known also as the "Kronsberg Standard", began to be applied for a first time. This new standard⁴ achieves reduction of thermal energy consumption for space heating by 25% as compared to the Heat Insulation Regulation (WsVO 1995⁵) norms in force at that time. The Low Energy House Standard has established itself as the most massively applied low-energy standard for that part of Hanover. Simultaneously, in one of the quarters of the Kronsberg Housing Estate several buildings were built under the Passive House (PH) Standard. Investors, who apply that standard, are motivated by the municipal authority through different incentives, including with financial support from proKlima.

Low Energy House Plus (LEH-plus)

Source:

Hannover-Kronsberg - Assessments (imagine_sem2007_hannover_kronsberg_mgeorg.pdf)

As a logical follow-up of the initially applied in Kronsberg new Low Energy House (LEH) Standard, which ensures reduction of heat losses by hardly 25% as compared to the Heat Insulation Regulation (WsVO 1995) in force till that point of time, the Hanover Municipality introduced later the new Low Energy House-Plus (LEH-Plus) Standard. The latter provides for reduction of space heating costs by nearly 40%. Under the LEH-Plus Standard still remains the need of additional heating, which is provided most efficiently by the municipal district heating network. For this reason, wherever there are no objective barriers, connection to

⁴ „German Directive for heat protection (legal force 1995 - 2002)“

⁵ Wärmeschutzverordnung 1995

that network is mandatory. This standard defines the mandatory minimum of requirements for all new buildings in Hanover, which are constructed on municipal plots. The municipality, on its part, is obliged to provide the necessary consultations to entrepreneurs, who apply the new standard

Passive House (PH)

Source:

*Ecological Building in Hannover: The Passive House – a house for the future
(EcologicalBuildinginhannover.pdf)*

For full renouncement of the need of external heat supply to the buildings Hanover Municipality has introduced the latest local standard - Passive House (PH)- which is also called "Healthy Comfort House". Under it heat losses are approx. 80% (on basis ENEC 2009) lower as compared to the standards in force in the country. In such buildings installation of a ventilation plant with heat recovery, which replaces entirely the additional heat supply, is mandatory. This is far less than what may be achieved under the Low Energy House Plus (LEH-Plus) Standard, but as yet it cannot be avoided, especially when the ventilation system is switched on. Because of the higher initial capital investments this standard is as yet not mandatory for application on the area of Hanover, but the municipality encourages entrepreneurs to apply it in the event of purchase of municipal land and assignment of public procurement orders. The application of this standard is also supported financially by proKlima.

Ecological standards for building construction

Source:

*Ecological Standards for Building Construction within the Municipality's Sphere of Influence
(Ecological_Standards_for_Building.pdf)*

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. The selection of any of these standards is subject to negotiations between the municipality and the contractors prior to signing of the respective contract for sale of municipal land or prior to the issue of the respective building permit. Parallel with it, connection of the new buildings to the environmentally most efficient district heating system is ensured. In the majority of cases that is the system of Stadtwerke Hannover AG, which uses a significant number of small co-generation plants and renewable

energy sources. These ecological requirements are applied in the construction of residential buildings, as well as of commercial sites and facilities.

Policy institutions

The application of the policies for climate protection and energy efficiency improvement and the updating of the regulatory framework impose the necessity of setting in place and development of adequate institutional structures. Specialized units are created within the municipal administration and efforts are made for building their capacity. Public-private partnerships are set up, in which a balance among the interests of the different participants is sought. Networks are built by stakeholders having different status and public positions, which ensure horizontal binding and coordination of actions. In this way all interested parties unite their efforts and resources and orient them jointly towards achievement of the desired goals

(For more information about the institutions please refer to Section 3: Key Stakeholders Involved)

ECONOMY AND FINANCING

Climate protection and energy efficiency improvement, including the use of RES and construction of low-energy buildings, are relatively new but rapidly developing economic fields. They attract the attention of ever growing number of investors and ever more significant financial resources, which, parallel with the economic growth, creates also new jobs in the region. Taking account of it, as early as at the end of the 1990'es Hanover Municipality and Stadtwerke Hannover AG created the unique financial instruments proKlima. It became the main initiator and motor of the practical realization of Local Agenda 21 and the ensuing multitude of energy efficiency projects in the Hanover region. Some time later, following the example of Graz (Austria), Hanover Municipality created the public-private partnership Ecoprofit, which provides consultancy and financial support to small and medium-sized enterprises in their efforts to curtail their production costs through reduction of waste and harmful emissions. In 2003 Hanover Municipality initiated the "ImpulsProgramme Passive House" Programme, through which it had been providing support for the creation, advance and development of small and medium-sized enterprises operating in the field of energy efficiency and more particularly passive houses. Along with proKlima, financial support for the construction of low-energy buildings on the area of

Hanover is provided also by the KfW Bank (Kreditanstalt für Wiederaufbau)⁶, Bundesamt für BAFA (Bundesamt für Wirtschaft und Ausfuhrkontrolle⁷) and the Hanover Region.

Practice has demonstrated that promotion of sustainable development and energy efficiency contributes to the general social and economic development of the region by creating new jobs and improving the competitiveness of the local enterprises in the Hanover Region.

Climate Protection Fund “proKlima”

Source:

Case study: The “proKlima” partnership contract as a model for cooperative climate protection on community level (Case study proKlima.pdf)

The proKlima Fund operates on the basis of public-private partnership, in which the municipality and Stadtwerke Hannover AG play a key role together with 5 more neighbour municipalities. The proKlima Fund provides annually Euro 5 million, thus supporting the energy renovation of buildings, introduction of the Passive House Standard, as well as the introduction of energy efficient technologies and renewable energy. Alone in the period 1998-2003 the Fund has supported 9,000 projects and initiatives, as of 2012 there are 20,500 measures subsidised and over 49 M Euros allocated. Every Euro financial support, allocated by proKlima, helps mobilize Euro 12.7 in investments, which is the most convincing evidence of the high effectiveness of this instrument. *(See more in the Set of Solutions)*

Ecoprofit partnership

Source:

Case study: Ecoprofit – a local public-private partnership program for sustainable development

In order to mitigate CO₂ emissions and achieve more efficient energy use Hanover Municipality established close operating collaboration with the business community and more specifically with the small and medium-sized enterprises (SMEs) in the region. To this end it built a local public-private partnership for sustainable development Ecoprofit. It is based on a tripartite co-operation between the municipality, SMEs and experts and is oriented towards raising the knowledge and preparedness of the enterprises for curtailing their energy consumption and reduction of the volume of solid waste produced by the production processes. Along from the general environmental effect and reduction of CO₂

⁶ <http://www.kfw.de/kfw/en/index.jsp>

⁷ <http://www.bafa.de/bafa/en/index.html>

emissions this leads to minimizing of the production costs of the enterprises and improvement of their competitiveness. In the framework of this partnership a series of *workshops* was conducted. Under the “learning by doing” method the participants acquire elementary knowledge about the reduction as well as the full liquidation of harmful emissions and production waste. In this way, with the financial support of Ecoprofit a contribution is made to the economic strengthening of SMEs in the region. (*See more in the Set of Solutions*).

Hannoverimpuls

Source:

www.hannoverimpuls.com

In 2003 the local public-private partnership *Hannoverimpuls* was initiated for promotion of and support for creation, development and restructuring of SMEs in six key economic sectors in the region of Hanover, among which also the energy sector (*Energy Solutions*). In the framework of that sector is implemented also the *ImpulsProgram Passive House*, oriented towards assistance for SMEs, which apply the *Passive House (PH)* standard in the construction of new buildings in the Hanover region.

Financial support for passive houses – subsidy programs

Sources:

Ecological building in Hannover (EcologicalBuildinginHannover.pdf)

2008 Environment Report (Environment report 2008_englisch.pdf)

Construction of passive buildings with the use of renewable energy sources often requires additional initial investments, which discourage some investors. For overcoming of that barrier Hanover Municipality applies combined schemes for financial support, in which along with the proKlima-energcity-Fund are involved other institutions as well. These are, for instance, the KfW (Kreditanstalt für Wiederaufbau), BAFA (Bundesamt für Wirtschaft und Ausfuhrkontrolle) and the Hanover Region. For families with children below 16 years of age, for instance, a special scheme for financial support is applied, which leads to reduction of the price in the event of purchase of municipal land by 10% to 40% depending on the number of children.

KEY STAKEHOLDERS INVOLVED

In order to achieve its strategic goal – to reduce by 2020 its CO₂ emissions by 40% through construction of low-energy buildings with broad use of renewable energy sources – the Hanover Region involves actively all the stakeholders and takes effectively advantage of their potential. The participation of Stadtwerke Hannover AG (enercity), which is the major energy producer and supplier on the area of the region, is of key significance. In partnership with it the municipality created also the main instrument for implementation of its policy in the field of climate and energy efficiency – the Environmental Protection Fund proKlima. A system of institutions and public-private partnerships, which unites and coordinates the efforts of the individual participants, has been developed. The chief coordinator in this system is CPAH (Climate Protection Agency Hannover region), while the programming objectives and tasks are formulated and implemented in the framework of the Climate Alliance Hannover 2020. Kronsberg has established itself as the centre of the process, in which KUKA (Kronsberg Environmental Liaison Agency) performs its relations with the broad public and ensures its direct involvement in the implementation of the climate protection measures. Specific attention is paid to the involvement of the businesses and local industries through public private partnerships, branch initiatives and supporting consultations.

Stadtwerke Hanover Energy Utility (enercity)

Stadtwerke Hannover AG (enercity) is the major energy supplier for the Hanover Region. It has a leading position in the supply of heat and electricity to the municipality. Since the major part of the enterprise is municipal property (75%), it plays a key role in the efforts of the municipality to reduce energy consumption by optimizing heat and power production and supply and by promoting the introduction of energy generation from RES and construction of low-energy buildings. The company is also the biggest donor to proKlima.

Climate Protection Fund “proKlima”

The Climate Protection Fund “proKlima”, set up in 1998, is the outcome of the perfect collaboration and interaction between the Hanover Municipality and Stadtwerke Hannover AG. This unique policy instrument plays a key role in the practical implementation of a series of projects (mainly in Kronsberg) by providing financial support for the design and construction of low-energy buildings and for overcoming of certain inevitable market barriers.

(See more in Part 2. ECONOMY AND FINANCING and in Solutions – Working package 4)

Energy and Climate Protection Section

Since the early 1990's Hanover Municipality has been orienting its efforts towards improvement of its own administrative capacity. To this end in 1994 it set up a specialized unit for practical implementation of the new political priority – climate protection and energy efficiency improvement. The unit is part of the Environmental Protection Division and is called Energy and Climate Protection Section. It encourages the changes in the end energy users' behaviour, provides consultations on the application of the local energy standards in buildings, participates in local energy planning and in auditing of the level of CO₂ emissions, supports the introduction of RES.

Climate Protection Agency Hannover Region (CPAH)

Source:

Local climate-action-program and passive house standard

(WP2_20120507_Local_Climate_concepts_Region_Hannover_U_Scherer.pdf)

The rapid increase and territorial expansion of the activities for climate protection and energy efficiency improvement in Hanover at the start of the new Millennium imposed the setting up in 2001 of the Climate Protection Agency Hannover (region) - CPAH, whose objective is to cover the entire region and to take up the new challenges, related to energy conservation and broader use of renewable energy sources. CPAH plays an important role in multiplying the experience of Hanover and in promoting Passive Houses and renewables. It organizes several campaigns⁸ a year and local Passiv House Days.

CPAH is focused on the region, but also works in proklima area. CPAH and ProKlima cooperate on the base of a mutual agreement. ProKlima supports the agency with expert knowledge, printed materials and subsidies (when performed in "proklima-fund area), while CPAH organizes campaigns and events, serving as a "communication network agency". Jointly they organize common events, like solar festival, CHP-Campaigns, common newsletter, etc.⁹.

⁸ An example is the campaign "Start well advice", which aims at timelimited street by street energy consulting to reach out for energy savings with modernization of old buildings.

⁹ For more information see: <http://www.klimaschutz-hannover.de/KlimaInfos-gemeinsam.1898.0.html> and http://www.klimaschutz-hannover.de/e_coBizz_Energieeffizienz_fu.1876.0.html

Presently the Agency has established itself as a leading not-for-profit organization in the region, which coordinates the implementation of the Climate Protection Action Plans – CAP. Involved in them under different forms are all stakeholders, among which are the municipality of the city of Hanover (the capital of the region), the Hanover Region, as well as two energy suppliers, 6 other companies and the supporting public.

Climate Alliance Hannover 2020

Source:

A Strong Alliance for Climate Protection (broshuereengl.pdf)

In 2007 Hanover Municipality decided to reduce its CO₂ emissions by 40%. In connection with that the same year the Climate Alliance Hannover 2020, was founded. Its objective is to unite the efforts of some 80 public institutions and private companies for implementation of this strategic task. The partners are representatives of industry and the services sector in Hanover, of the municipal administration, the energy and other utilities, etc. The Hannover City Council and Stadtwerke Hannover AG city energy utility again united their powers and became the major drivers of the new association, which on 12 September 2008 launched the ambitious Climate Protection Action Programme for the period 2008-2020. According to that programme by 2020 the CO₂ emissions in the Hanover region will diminish by 40% as compared to their 1990 level, which means that the region will emit every year 1.8 million tons greenhouse gases less. The implementation of the programme is performed in the framework of the three main networks, which are the pillars of the Climate Alliance Hannover 2020 - Energy Efficiency Network, Partnership for Climate Protection and Opinion Leaders' Network. (see more 3. KEY STAKEHOLDERS INVOLVED)

Kronsberg Environmental Liaison Agency (KUKA)

Source:

Sustainable urban development – the ecologically exemplary new settlement of Hannover- Kronsberg (Hannover_Kronsberg_engl_builder_6_06.pdf)

http://www.hannover.de/data/download/umwelt_bauen/s/mokro27-31.pdf

The local authorities in Hanover recognize the significance of the broad involvement of the citizens and of the public support for climate protection and energy efficiency improvement in the newly constructed housing estate in Kronsberg. For this reason they initiated the founding of the local agency KUKA (Kronsberg Environmental Liaison Agency) (1998 -2001). It informed the housing estate residents and involved them directly in public control on the implementation of the project and achievement of its environmental objectives. Step by step

the Agency contributed to realization of a change in the residents' behaviour in the course of the regular operation of the sites by making them more committed to the objectives related to mitigation of climate change.

KUKA provided and initiated information and qualification for architects, planners, construction workers and housing companies. Also qualify assurance was supported.

Strengthening the role of business and industry

Source:

Agenda 21 – Status report (Hannover_Agenda_21_Activities_Report.pdf)

Using the fruits of the perfect and rich-in-results collaboration with Stadtwerke Hanover AG Hanover Municipality makes targeted efforts for involvement and direct participation of businesses and in particular of the local industry in the practical implementation of the measures for reduction of CO₂ emissions and for improvement of energy efficiency. Depending on the concrete circumstances it applies different approaches for enhancement of the role of the business community. For instance, a public-private partnership for development of the retail network of the city has been initiated in connection with the construction of the Seelhorster Garten housing estate. To this end a special concept was developed. For the purposes of providing adequate support and consultancy advice to the local companies the local authority maintains direct and operating contacts with many of them.

PLANNING AND DESIGN CAPACITY

The local authorities in Hanover are aware that in order to succeed to reduce by 2020 the CO₂ emissions by 40% (as compared to the 1990 level | all the stakeholders should acquire adequate knowledge and skills. The city administration had to build its own adequate capacity for formulation of the most appropriate policies and working out of programmes and plans for their implementation. To this end an appropriate organization was set in place and acquired knowledge and experience in how to coordinate and control and evaluate the results from their implementation. The realization of a number of programmes and projects for reduction of CO₂ emissions through energy efficiency improvement has required adequate training of the designer and construction companies, as well as of the producers and suppliers of the necessary equipment and energy. The building of this capacity passes through professional orientation and direction of young people towards renewable energy

sources and low-energy buildings in the course of their elementary vocational training and the follow-up upgrading of their skills. The building of the necessary capacity has made it necessary to ensure topical information and professional consultations to all the stakeholders. In this direction had been oriented also the efforts for building of local, national and international networks for transfer of environmentally-sound and energy efficient technologies.

Capacity building in the city administration

Source:

Local Agenda 21 – Status report (Hannover_Agenda_21_Activities_Report.pdf)

In order to realize the urgent measures for climate protection through reduction of energy consumption and the use of renewable energy sources the city administration of Hanover was reformed. As a result of it the municipal services and professional consultations were brought closer to their users and permanent monitoring was ensured of their needs and behaviour. Measures were undertaken for development of the officers in the city administration. Special attention was paid to enhancement of their leadership capacities, while the level of remuneration was tied up to the achieved results.

Education and training

Source:

Local Agenda 21 – Status Report (Hannover_Agenda_21_Activities_Report.pdf)

In addition to the general awareness level of the stakeholders, the implementation of the programmes related to climate protection and energy efficiency in Hanover requires specific approach to each of them. To this end a system of centres for specialized information and consultations for the different stakeholder groups (households, investors and builders) was built in the municipality. Through the specially built national network for professional orientation the municipality attracts young people to the training opportunities and orients them towards construction of low-energy buildings and renewable energy sources. A series of courses and professional handbooks ensure specialized qualification of those employed in the sector.

Environmentally-sound technology transfer

Source:

Local Agenda 21 – Status Report (Hannover_Agenda_21_Activities_Report.pdf)

Hanover Municipality takes active part in the permanent exchange of environmentally-sound technologies. There is explicit interest in technologies related to reduction of CO₂ emissions, curtailing of energy consumption and even full liquidation of waste production. In this connection the municipality participates in regional, national and international networks for innovative services and technology transfer. Moreover, the local authorities aim at enhancing the role of trade unions and workers in the sustainable development of the region and in particular in the construction of low-energy buildings and renovation of the existing buildings in compliance with the new energy standards. Regular local forums and exhibitions¹⁰ in the context of efficient buildings construction and renovation contribute to these efforts.

CONSTRUCTION AND TECHNOLOGIES

In order to achieve its goals concerning climate protection and energy efficiency Hanover Municipality specified construction and new building technologies as a major priority of its policy. The new housing estate in Kronsberg, built in connection with EXPO 2000, had a significant contribution to the establishment of that priority. One year before the opening of the exhibition started the implementation of the Passive House Programme for new construction and of the 'Energiepass' Programme for upgrading of existing buildings. This development established Kronsberg as a model of sustainable urban development. On its area the two new standards - Low Energy Houses („Kronsberg Standard“) and Passive house (PH) - were applied simultaneously for a first time. Beside residential buildings, under the new energy efficient and nature-friendly methods are being built also child care facilities, schools and sports facilities. The energy supply in Kronsberg is performed through broad use of renewable energy sources. Nature-friendly building materials are used in construction and energy efficient appliances for furnishing of the households. On the basis of the positive results achieved in Kronsberg the city authorities decided to construct the new housing estates "ZERO: E-park In der Rehre" and Kronsberg-Nord, in which the Passive House (PH) Standard was applied. After a detailed analysis of what has been achieved, since 2007 Hanover Municipality has been introducing new ecological standards in the construction of all the new buildings, which are under municipal influence. Beside the energy performance of the buildings, these standards affect also the soil and rainwater.

¹⁰ Such as, e.g. *Energie-Spartage* (see more at <http://www.heckmannmbh.de>)

Programmes and Models

Energy Efficiency Programmes

Source:

Integrated Energy and Climate Protection Policy-Hannover (DE) (hannover_566_en.pdf)

All the projects for low-energy building construction in Hanover Municipality are based on concrete target programmes and policy decisions. After the launching of the Passive House Program for new buildings (1999) and the ‘Energiepass’ Programme for existing buildings (2003), two new programmes were initiated – “Factor 10-Programme” for energy efficient renovation of existing buildings and “ImpulsProgramme Passive House” Programme for promotion of and support for SMEs, which start or reorient their activity towards construction of passive buildings. On the basis of these two programmes the municipality has decided to introduce full application of the Passive House Standard in the design and construction of the new housing estates “ZERO: E-park In der Rehre” and Kronsberg-Nord.

Hannover-Kronsberg - a model for sustainable urban development

Source:

Kronsberg, Hannover: Component of a Factor 10 Strategy (Kronsberg_components.pdf)

Two favorable factors are usually put forward for the establishment of Kronsberg as a model of sustainable urban development. One of them is undoubtedly the fact that Hanover was the venue of EXPO 2000. The second one is the fact that 80% of the area of the housing estate is municipal property. These two factors, along with the strong support from Stadtwerke Hanover AG and the newly created Climate Protection Fund proKlima, enabled the municipality to apply on a large scale the new standards for low-energy buildings. In addition, the energy supply to the housing estate has been optimized through the construction of a new hydro-power plant, two new wind power plants, considerable amount of photovoltaic capacities, as well as a system of decentralized co-generators. Parallel with the efforts for optimization of energy supply and consumption, innovative solutions are being implemented for evacuation of rainwater, for protection of the properties of the soil and for processing and utilization of solid urban waste. The results in Kronsberg have become an example worth replication not only in the framework of Hanover Municipality, but also all over Germany and beyond its frontiers.

Energy efficient construction

Source:

Passive House Study Tour, 06 May 2012, Hannover, Germany (Kronsberg_components.pdf)

The penetration of the low-energy standards in construction, including the Passive House (PH) Standard, on the area of Hanover took place gradually and in a planned manner through a series of pilot and demonstration projects for residential and public buildings. After the construction of the first 32 terraced houses in Kronsberg to the PH Standard, 330 new individual residential buildings were constructed in “E-park in der Rehre” to the same standard. The Daycare Center in Wiesengrunde and the Primary school in der Steinbreite are pilot projects for public buildings designed and constructed entirely to the Passive House (PH) Standard.

Terraced houses Sticksfeld

In Sticksfeld (Kronsberg), also called “Lummerlund” settlement, are being constructed the first houses, in which the Passive House (PH) is applied in its entirety, as a result of which the need of traditional space heating by means of radiators has become absolutely redundant. It is replaced by a new type of ventilation-based heating system. The reduced need of external heat supply is ensured by means of a wind generator

ZERO: E-park in der Rehre

On the basis of the results achieved during the construction of the first passive houses in Kronsberg, a new step on a much bigger scale was made in “ZERO: E-park in der Rehre”, involving full application of the Passive House (PH) Standard. It is manifested not only in the larger number of residential buildings, but also in the almost zero CO₂ emissions, related to the external heat supply. This is achieved thanks to the harnessing of the most powerful renewable energy source – solar energy. (See more in *Beacon Projects*)

Daycare Center Große Pranke – Hanover-Marienwerder

This is a pilot project for one of the most common types of public buildings – daycare centers – implemented entirely to the Passive House (PH) Standard, Daycare Center Große Pranke¹¹

¹¹ Bär, Stefan. *New building of two day nurseries in Hannover in the Passiv House standard. In: Proceedings 10th Int. Passive House Conference Hannover, 2006*

was the first Passive House Daycare Center build by city of Hanover in 2007 by decision of council of City of Hannover in 2005. In addition to the applied highly efficient heat insulations and triple glazing of windows, considerable attention has been paid to the solar orientation of the building for the purposes of passive use of solar gains.

As a consistent further development of the PH standard with experience of the first projects the Daycare Center Im Wiesengrunde (owner is municipal housing cooperation GBH www.ghb-hannover.de) is one of the newest realized examples. An adequately arranged inner yard improves additionally the energy efficiency of the building and enriches its functional opportunities. (See more in *Beacon Projects*)

Primary school In der Steinbreite

This school is also a pilot project implemented to the Passive house (PH) Standard. It is the first Passive House School Project in Hannover. It was build upon the financial model Public Private Partnership (PPP). Here also are used highly efficient heat insulation and triple glazing and the traditional space heating system is replaced by a special ventilation-based heating system. The heat supply for the entire building is provided by two gas-fired boilers. When the school is not in session the school forum and the gym may be used by external visitors as well, mainly the residents of the neighborhood. (See also in *Beacon Projects*)

Energy efficient technologies

Source:

Ecological Building in Hannover (EcologicalBuildinginHannover.pdf)

Parallel with the new construction technologies and technical equipment applied in the buildings constructed to the Passive House (PH) standard, reduction of CO₂ emissions is sought also through the use of renewable energy sources, nature-friendly building materials and highly efficient household appliances.

New technologies for renewable energy

In close interaction with Stadtwerke Hannover AG Hanover Municipality has been making systematic and consecutive efforts for reduction of the share of carbon energy sources in the

http://www.despanqarchitekten.com/html/first_click_options/playing_passivhaus.htmlhttp://www.baunetzwis sen.de/objektartikel/Tageslicht-Kindertagesstaette-in-Hannover_777358.html

energy mix of the region and for their replacement by renewable energy sources – water, solar energy and wind. For the purposes of achieving this goal the local authorities seek partnerships with private investors as well.

Environmentally friendly building materials

Different types of materials are used in the construction of buildings – for the construction itself, for interior decoration and for maintenance during regular operation. The municipality encourages the use of environmentally-friendly and healthy materials, which cause no damages to inhabitants and the environment. Preference is given to materials, whose manufacture is environmentally-sound and sparing as regards natural resources, and which till the end of the building life cycle would leave a minimal ecological footprint. Also encouraged is the use of materials, whose second hand application is possible, like wood for instance. Special attention is paid to the impact of building materials on occupants' health. In order to comply with all these requirements the municipality requires that the attitude towards the building materials shall be defined as early as in the process of planning and design.

Energy saving household appliances

Household appliances have a significant contribution to the joint efforts for reduction of CO₂ emissions and for energy efficiency improvement. The Municipality of Hanover provides incentives for renouncement of the use of electric water heaters and centralized DHW supply. It encourages the use of low-energy household appliances and luminaries, as well as of aerators for minimizing DHW consumption.

New legal framework

Ecological standards for buildings

Source:

Ecological Standards for Building Construction within the Municipality's Sphere of Influence
(*Ecological_Standards_for_Building.pdf*)

Since the low-energy standards Low Energy House-Plus (LEH-plus) and Passive House (PH) have proven their effectiveness in a series of pilot projects, launched for a first time in Kronsberg, in 2007 Hanover Municipality decided to start massive application of these standards in all buildings, which are municipal property, and in all buildings constructed on municipal plots. In the second case the application of these standards by other investors is regulated in the contract for sale of municipal land to a private investor or in the building

permit. The new standards regulate not only the efficient energy use, but also the utilization of rainwater and soil protection.

(See more in Part 1: ENERGY AND BUILDING POLICIES / Legal framework / Ecological standards for building construction)

VISIBILITY AND PUBLIC SUPPORT

Source:

Local Agenda 21 – Status Report (Hannover_Agenda_21_Activities_Report.pdf)

The local authorities in Hanover recognize the fact that implementation of the goals of their ecological and energy policy is unthinkable without active public support and without involvement of all the stakeholder groups of the community. As early as in mid-1990's they attracted a broad circle of stakeholders in the design of Local Agenda 21 and provoked public dialogue on climate protection issues. The implementation of Local Agenda 21 requires building of permanently functioning networks, in the framework of which the citizens are directly involved in the sustainable development of the region. In the framework of these networks have emerged numerous initiatives, aimed at bringing about a change in consumers' behaviour and in this way helping to reduce the consumption of energy and other natural resources, to minimize solid urban waste and permit its more effective processing and utilization. The implementation of this task passes through broad public awareness and commitment, appropriate training, consultations and advice to all the stakeholders. The local community is provided with useful information about the state of the natural environment in the region and about the key solutions, initiatives and strategic focal points of the local authority's actions for climate protection. A variety of measures have been worked out for enhancement of the role and participation of women and children in the sustainable development of the city and the surrounding area.

Local Agenda 21 - from city-wide dialogue to concrete action

Local Agenda 21 offers a perfect opportunity for involvement of the broad public in attainment of the goals of the municipal policy with respect to climate and energy efficiency. In practical terms this creates conditions for application of the "bottom-up" approach, in

which all the stakeholder groups of the community, including women, youth and immigrants, get involved in the public dialogue. In the framework of the so-called Agenda Forum representatives of these groups meet for exchanging information and experience. The specialized unit Agenda Bureau, which is part of the “Environmental Protection” Department of the city administration, provides the organization and coordination of this forum.

New institutions to mobilize social support

For coordination of the large number of stakeholders in the sustainable development of the city Hanover Municipality has created the Environmental Communications Network. Topical information and advice are provided to all the stakeholders on the specifically set up ‘Environmental Hot Line’. The Planning Ombudsman institution was also set up for the purposes of providing support to the different initiatives and projects in the municipality. It takes advantage of the so-called City Forum, in the framework of which any issues related to urban planning may be discussed in a broad public format.

Public behavior initiatives in Hanover

As a result of the involvement of more than 40 organizations in the implementation of Local Agenda 21 a large number of initiatives, aimed at bringing change in public behaviour, have been realized. They have undoubtedly contributed to the achievement of actual results in mitigation of CO₂ emissions through reduction of energy consumption, as well as through water savings and curtailing of solid urban waste production through its adequate processing and utilization.

Promoting public awareness

Promoting public awareness of and commitment to climate protection is a key prerequisite to energy efficiency improvement and broad use of renewable energy sources. In order to meet that condition local authorities seek for diverse ways and formats – from change in the behaviour patterns of children in childcare facilities and schools to providing “door to door” advice and consultations. An important contribution to that effect is the broad incorporation of the environmental and climate protection issues in the school curricula.

Information for decision making

In order to ensure wider public support for the sustainable development of the city and the region the local authorities have been working out strategic focuses, aimed at identification of specific opportunities for urban development in the future - “Social city”, “Young city” and

“City of gardens”. A separate strategic focus is oriented towards “Initiatives for employment”.

Involvement of children and youth

The role and the place of children and young people in sustainable development have a significant place in Local Agenda 21. For that reason in the Local Agenda 21 of Hanover have been incorporated a number of projects for active involvement of children in activities for minimizing solid urban waste and creation of environmentally-sound environment in childcare facilities. Measures have been envisaged for supporting young people facing social hardships, as well as for provision of housing to young people, so that they would be able to embark by themselves on their path of life.

Involvement of women

Women and their role in sustainable and equitable development are assigned a specific place in Local Agenda 21. Emphases are laid on equality between the sexes in the field of employment and education, on the combat against male violence against women and on the measures for supporting women, who wish to start their own business. The “Equal Opportunities” Department in the city administration is charged with the responsibility to coordinate these measures and tasks.

Environmental information

The local authorities in Hanover are striving to offer all the citizens topical information about the environment and climate change, as well as about the programmes and projects for reduction of GHG emissions. The most reliable source of such information is the regional Internet portal. Since 2008 the city administration has been periodically conducting studies of the citizens’ satisfaction with the work of the various departments of the city administration and of their access to information.

QUALITY ASSURANCE

Good-quality, timely and comprehensive implementation of the large number of energy efficiency programmes, plans and projects in Hanover imposes the need of setting in place a system for monitoring of the achieved results. This system comprises the following:

- Periodical audits of CO₂ emissions produced by the energy sector and transport;
- Periodical reports (every three years) about the state of the environment on the area of the municipality, which trace selected sustainable development indicators;
- A system for environmental management Eco audit, oriented towards improvement of environmental protection and minimizing of the related costs;
- Quality assessment of the energy efficiency of new and renovated buildings.

The results from the operation of the elements of that system serve as the basis for correction of the operating programmes and plans and are the starting point for development of new programming documents. The assessments concerning the achieved level of energy efficiency of buildings are used as a unique tool for repair of omissions and for approximation to the monitored indicators.

CO₂ audit 1990-2005

Source:

CO₂ audit 1990-2005, Emissions from energy generation and transport (bilanzengl.pdf)

The chief instrument of the system for monitoring of the achieved results is the periodical audit of CO₂ emissions, which takes account of the differentiated influence of the energy sector and transport. The first comprehensive audit of CO₂ emissions in Hanover was conducted for the period 1990-2005 r. It established that the predetermined target for reduction of CO₂ emissions by 25% till 2005 had not been achieved. That imposed the need of review of all programmes and plans in order to clarify the reasons for the failure to meet the targets. As a result of it in 2008 the Climate Alliance Hannover 2020 approved a still more ambitious programme for reduction of GHG emissions by 40% till 2020. This is a convincing evidence for the strategic importance of that specific-in-its-nature audit

Hannover Environment Report

Source:

2008 Environment Report (Environment report 2008_englisch.pdf)

Two years after the first audit of CO₂ emissions in Hanover (2006) the Hannover Environment Report (2008), due every three years, was also published. According to the law passed in 2006 this report was made public and subjected to broad public review, which involved an even larger number of new groups of the local population in implementation of the measures for protection of the environment and the climate. As a consequence of the increased public activeness during the same year the City Council approved also the so-called 'Ecological standards for building in areas within the local authority sphere of

influence'. This report depicted the reserves for achieving the more ambitious targets for reduction of CO₂ emissions and motivated the Climate Alliance Hannover 2020 to approve (that same year) the programme for reduction of CO₂ emissions by 40% till 2020.

Environmental sustainability indicators for the city of Hannover

Source:

2008 Environment Report (Environment report 2008_englisch.pdf)

After two years of efforts and consultations with other cities in Germany and Europe in 2000 Hanover Municipality approved a series of indicators for assessment of the sustainable development on its territory. The first practical test of these indicators was realized in the Hannover Environment Report 2002. The report demonstrated that these indicators were an excellent tool for permanent monitoring of all the sensitive and vital elements of the environment and were a practical device for measuring the level of the achieved results in its protection and in the sustainable development of its elements. The application of these indicators at the national and supra-national level makes possible to compare and compete with other cities on an equal footing as partners

Hannover Eco audit

Source:

2008 Environment Report (Environment report 2008_englisch.pdf)

On the grounds of EU Regulation No. 761/2001 (Eco-audit, EMAS) и International ISO 14001 standard, Hanover Municipality introduced the system for environmental management Eco audit. The major objective of this system is two-sided:

- i) Improvement of environmental protection; and
- ii) Cost saving;

The achievement of this two-sided objective is a normal result in the event of savings of water, energy and heat energy for space heating. The biggest savings are achieved, however, in the case of improved waste management and optimization of fuel costs. On the territory of the Municipality of Hanover 33 Eco audit systems are applied in a decentralized manner. The officers of the city administration acquire special training to that effect, which in certain cases requires external certification.

Energy efficiency assurance

Source:

Ecological Building in Hannover (EcologicalBuildinginHannover.pdf)

Every new or renovated building on the territory of the Municipality of Hanover may be evaluated from the point of view of the achieved indicators for energy efficiency. The specifically set up for that purpose Quality Assurance Bureau gives, in addition to the comprehensive expert assessment, also concrete recommendations and instructions in the cases of failure to achieve the design-based indicators. In the event of application of the Low Energy House Plus (LEH-Plus) and Passive house (PH) standards this evaluation might be conducted with financial support from proKlima.

MARKET FORMATION / PENETRATION

Since the end of the past century and the beginning of the new Millennium the energy market in Germany has been liberalized. Today it is a key factor in the efforts for reduction of CO₂ emissions. Therefore the programmes, plans and projects, aimed at climate protection, energy efficiency and RES on the territory of Hanover Municipality, are currently implemented under the conditions of a free market. For that reason the city administration in Hanover has been developing and implementing a series of measures for support and development of the market for construction of low-energy buildings, including of passive houses. Parallel with these measures of the administration, the public-private partnerships created on the area of the municipality also contribute to the development of the market for low-energy buildings. They disseminate know-how and good practices in the field of energy efficiency, provide financial support for introduction of innovative low-energy technologies and contribute to upgrading of the knowledge and experience of small and medium-sized enterprises and for development and strengthening of their competitiveness through minimizing of their production costs, including their energy costs.

Contribution of city administration

Source:

A Strong Alliance for Climate Protection (broshuereengl.pdf)

In the course of more than two decades the local authorities in Hanover have actively promoted the development of the market for low-energy buildings. Implementation of the medium- and long-term programmes worked out by them they develop adequate legal framework and introduce a number of instruments for encouraging the application of the

low-energy standards in new construction, as well as in renovation of existing buildings. Construction of low-energy buildings is imposed by the new spatial development plans of the territory of the municipality. A specially set up department grants expert assessments of the level of achieved energy efficiency in new and renovated buildings. This, on one hand, helps achieve the high energy efficiency standards, and, on the other hand, it ensures equal starting positions for all the companies operating on the market for low-energy buildings.

Contribution of public-private partnership

Sources:

Case study: The “proKlima” partnership contract as a model for cooperative climate protection on community level (Case study proKlima.pdf)

A Strong Alliance for Climate Protection (broshuereengl.pdf)

For the development of the market of low-energy buildings on the territory of Hanover Municipality contribute also a number of public-private partnerships . The contribution of the Climate Protection Fund proKlima is the most substantial. Apart from the financial incentives for application of the low-energy standards, the Fund conducts also broad market campaigns for promotion of the passive house. The Climate Alliance Hannover 2020, on its part, also conducts an active market campaign for reduction of energy consumption in the construction and renovation of industrial and commercial buildings. Ecoprofit has a specific contribution to the development of the market for low-energy buildings as well. It supports SMEs to improve their management capacity aimed at reduction of energy and raw materials consumption and in this way minimizing of their production costs and enhancement of their competitiveness.

SOME LESSONS LEARNED

Source:

*Manfred Georg. Hannover-Kronsberg, Assesments
([imagine_sem2007_hannover_kronsberg_mgeorg.pdf](#))*

The below listed summaries and lessons learned have been formulated on the basis of Manfred Georg's¹² report "Hannover-Kronsberg, Assessments", delivered at the IMAGINE Workshop, conducted in 2007 in Saline Royal, France¹³.

Success factors for development policy

As a result of the many years of democratic traditions in the administration of Hanover Municipality several major prerequisites for the success of the city's policy in the field of climate, energy efficiency and RES have been created:

- Political consensus has been achieved to shift sustainable development to the top of the agenda as a major priority of the local authority
- A complex approach is been applied, in which citizens' requirements are placed in the focus of attention
- An integrated planning process is introduced
- The "bottom-up" approach is applied in decision-making and implementation of the approved decisions
- Arrangements concerning municipal land are realized with a view to the long-term public interests

Success factors for energy policy

The aspects of decisive importance for the accelerated penetration of the low-energy standards on the territory of Hanover are as follows:

- Persistent political support for all the pilot and demonstration projects, related to the Passive House
- Financial support on the part of the financing institutions in Germany and the EU

¹² To provide brief information about Manfred Georg and his position in Hanover

¹³ To state the link to the website of the initiative

- Application of energy efficient technologies
- Building a system of public-private partnerships
- Effective institutional support by the city administration
- Strong commitment and direct involvement of Stadtwerke Hannover AG.

Problems and failures

The observations have depicted the following more significant disparities between the expectations and the actual results;

(a) End-users had hoped that their space heating bills would diminish proportionally to the reduction of energy consumption. The conflict between consumers and the district heating utility was triggered by the high values of the fixed components in heat energy prices and by the considerable losses during heat transportation, which had turned to be disproportionately high as compared to the strong reduction of heat requirements. These failures are linked with inadequate awareness-raising activity among consumers.

(b) All in all, electricity savings have turned out to be smaller than expected. The conclusion is that the planned saving may be achieved in a more long-term horizon. Until that time it is necessary to provide significant incentives and consultancy support to end-users.

(c) A number of residents have strongly objected to the installation of ventilation systems without heat recovery. Their dissatisfaction had gradually grown into resistance against all types of ventilation systems, which had created many problems to the housing cooperative.

(d) Reported as failures are the results from the use of solar energy for space heating under the "Solar City" Programme. This is also a consequence of the initial overestimation of the expected results.

Driving forces for low energy standards' penetration

The Hanover case reveals that the factors of decisive importance for the introduction of the low-energy standards in the construction of new buildings and renovation of existing ones are as follows:

(a) The strong support and direct involvement of the energy supplier in the city *Stadtwerke Hannover AG* played a decisive role for the broad introduction of renewable energy sources on the territory of the municipality, for the construction of a large number of co-generation plants and for improvement of the efficiency of the district heating systems.

(b) With its founding and activities the *Climate Protection Fund proKlima* turned into a main driving motor of all projects related to the Passive House Standard. While the experience involving Stadtwerke Hannover AG might turn out not to be applicable everywhere, the public-private partnership in proKlima is applicable at other locations in Germany and beyond its boundaries.

(c) The success model of Hanover contains interesting initiatives and different modalities of *financial support* for climate protection and energy efficiency improvement, which might be replicated at the local level, provided there is sufficient market freedom. This market freedom requires the respective national legal framework, ensuring a higher degree of decentralization and “municipalization”.

Obstacles

The introduction of the standards for low-energy buildings had stumbled on the following major barriers:

(a) Generally speaking, the subject of low-energy buildings (in particular Passive Houses) is not readily accepted by architects and urban planners. This situation is somewhat overcome through the creation and activities of specific working groups, through KUKA and through close cooperation. Undoubtedly, dissemination of appropriate information about success models, as well as specialized training, will be suitable instruments for overcoming of that barrier.

(b) All in all the standards for low-energy buildings (LEH) and Passive Houses (PH) are not well known to the majority of the designers and builders. This barrier may be overcome through appropriate skills upgrading for each of these two groups, as well as through energy audits of already constructed low-energy buildings (LEH). Investors and construction companies outside the region, particularly in the case of passive houses, might be invited to perform the building works.

(c) The initial introduction of the “Kronsberg Standard” was met by strong opposition and strikes on the part of the construction companies. In order to overcome that pressure the city authorities offered additional subsidies for buildings of social designation and permitted up to 10% deviation from the standard.

Key recommendations for other cities

The climate change challenges and the end of the cheap oil and natural gas era require ambitious goals concerning the energy future of European cities:

- (i) To create “climate-neutral” schemes for new buildings and settlements
- (ii) To achieve 80-90% reduction of CO₂ emissions (“Factor 10”) as compared with the historically established building practice

Nowadays society possesses the required tools for achievement of these goals in a cost-effective and socially acceptable way. In order to achieve these goals it is necessary to:

- (iii) Study the specific local and regional conditions and resources and formulate specific strategies (“Road maps”) and quantitative targets and timeframes.

- (iv) Make available to the citizens adequate technologies for sustainable energy future, instead of studying what they should be doing in their everyday life in order to save energy.
- (v) Convince people that energy efficient technologies and RES make life more comfortable, more secure, healthier and cheaper; these “side effects” are of key importance for attracting the interest of the majority of the citizens – in this way they would be able to do something for their children’s future.
- (vi) Demonstrate with the design projects for passive houses (“lighthouse projects¹⁴”) that the climate-neutral buildings are not an idea of what might be realized in the future, but rather a “must” of the present: it is possible to create “islands of sustainability” today and to illustrate the numerous advantages they can offer.
- (vii) The European Union and the Member States should formulate landmarks and incentives for the cities related to working out of local and regional schemes, development of “light house projects“ (???) and support for their replication at the local and regional level.
- (viii) The cities should create local or regional energy or climate protection agencies and funds similar to proKlima.

INSTEAD OF CONCLUSION

Hanover 2012 - Starting Point Regarding Passive House

By proKlima

The passive house standard has a long tradition in Hannover: In 1998 the passive house estate Lummerlund was built in the Kronsberg district¹⁵ and for the first time exclusively postheating of the fresh air necessary was used; only the bathrooms have small radiators. At the same time climate neutrality related to the utilization phase of the 32 terraced houses was demonstrated: The CO₂ emissions caused by the annual energy consumption for space heating, hot water and electricity demand was covered by sustainable energy sources. A 1,278 € share was included in the sales price of each house. This financial share equals 2.6

¹⁴ The term “Lighthouse projects” is used in the sense of “exemplary” / “beacon” projects

¹⁵

http://www.hannover.de/de/umwelt_bauen/bauen/bauen_lhh/oekobauen/oemobakr/modkrone/index.html

kWh and an electricity production of 36 kWh/(m²a) to compensate the small annual CO₂ emissions of the passive house estate. *proKlima* was involved in the process by supporting the EU-project CEPHEUS.

With the “ecological standards for building construction within the municipality’s sphere of influence” decided by the City Council of Hannover in September 2007 climate protection priorities in master plans were set to lay the structural foundations for small heat requirement and use of solar energy.

The standard is part of the “climate-alliance-hanover-2020”¹⁶ which aims CO₂-reduction by 40% until year 2020 compared to the level of 1990. A very new local project “Masterplan 100%”, performed by City of Hanover and Region Hanover, started in May 2012. The project is founded by Federal Ministry for the Environment. The aim is to reach out for CO₂-reduktion of 95% until 2050 on level 1990.

An prominent example of energy-optimized master planning is the new building area zero:e park¹⁷ in Hannover-Wettbergen, a nearly zero emission district with planning of more than 330 Passive House units.¹⁸ To compensate the small CO₂ emissions a new hydroelectric power plant (Döhrener Wolle) is to serve.

Beyond that buyers of real properties of the City of Hannover assume the duty to build a low energy building. Buyers who will erect passive houses are preferred.

Clients in Hannover are offered a big variety of information:

- Each year in November the days of the open passive house take place. Inhabitants and planners invite the public to visit their houses.
- Lectures about the passive house standard and buildings services are held regularly.
- The department of climate protection of the City of Hannover and *proKlima* offer independent consultancy regarding passive houses.

¹⁶ <http://www.hannover.de/klimaschutzallianz/english/index.html>

¹⁷ <http://www.zero-e-park.de/>

¹⁸ Kirscht, E. *The zero:e park: Active with Passive Houses*. In: *Proceedings 15th Int. Passive House Conference Innsbruck 2011*. Passive House Institut, Darmstadt, 2011.

- Lists of qualified passive house companies are published.
- The Climate Protection Agency Region Hanover runs several campaigns to support high efficient building modernization by offering energy counselling. proKlima supports the campaigns technically and financially.

proKlima supports building operations (residential and non-residential), newly built in passive house standard and modernization with passive house components, under the precondition that an independent quality assurance is carried out. The quality insurance comprises both plausibility checks of the planning (PHPP, minimizing of thermal bridges, airtight junctions, concept of ventilation and heating) and onsite checks with airtightness testing and setting the balance of the ventilation system. Due to the increasing demand it is important that enough architects, engineers and skilled workers with specific passive house knowledge are available. The local company target offers a broad variety of training courses.

The City of Hannover erects new buildings consistently according to the passive house standard. In the next years 14 new buildings with approximately 37,000 m² are under construction, e.g. numerous nurseries. The passive house standard is already the common standard for public buildings in Hannover, for residential new buildings the market share is 10 to 15 %. The new funding program for non-residential buildings has the target to motivate investors of commercial properties.

While the new building activity is only approximately 250 units a year in Hannover, investments are growing for modernization of the existing 50,000 buildings erected before 1978. Within the 'old building' program proKlima makes about 1.5 million € available each year for the energy-related modernization of residential and association buildings. The program has been consistently focused on establishing passive house technology since 2008. Building owners receive funding to implement high-efficiency insulation standards in outer walls, the topmost ceiling, and the roof; to install passive house windows; and to install comfort ventilation systems with heat recovery. Furthermore consulting, planning and construction supervision services provided by 'energy pilots' are subsidized. These are planners who have experience with modernization and have either already dealt with passive house components or received the Passive House Planner Certificate from the Passive House Institute in Darmstadt. They work together with the building owner to develop a modernization concept that harmonizes various measures and includes and combines all possible funding options.

THE SUCCESS MODEL OF BRUSSELS

ENERGY AND BUILDING POLICIES

In less than 7 years, the Brussels-Capital 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. Nonetheless, convincing the market to move in that direction has not been easy.¹⁹

Behind Brussels’ success lays a pragmatic decision of Brussels authorities to be cautious in pushing for energy policies, and to use accompanying support measures. Thus, people who lived in passive houses become ambassadors of the passive standard. Most of them low-income residents, they debunk the myth that passive buildings are a luxury only reserved for the rich. Other key ingredients for success are long-term vision, good training, and guidance and support initiatives. Data collection has a crucial place in the process, as it provides tangible reference for future endeavors.²⁰

Such progress is remarkable and worthy of attention, not least because Brussels took considerably less time to move ahead than other front-runner regions. As a matter of example, the energy efficiency success model of Hanover was initiated in the 1980s - it took the Hanover region more than 25 years to become a front-runner. In contrast, the Brussels model developed much more rapidly, starting in 2004. In view of the above, a question looms before aspiring regions: which model should they follow, the slow one (Hanover) or the fast one (Brussels)? The decision will depend on each case, as particular conditions and success factors may vary greatly across aspiring regions.²¹

¹⁹ Doulkeridis, Christos. 2012. “Who Wants a Passive House?” Making Frontrunners Visible, Supporting Future Frontrunners (Part 2).” Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

²⁰ Doulkeridis, Christos. 2012. “Who Wants a Passive House?” Making Frontrunners Visible, Supporting Future Frontrunners (Part 2).” Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

²¹ Genchev, Zdravko. 2012. “Welcoming words,” *PassREg 2nd International Workshop, Brussels* (October 5).

Nearly Zero Energy Building Policy Legislation

The evolution of low energy building legislation in the Brussels-Capital Region is in line with Directive 2002/91/EC of the European Parliament, which requires Member States to apply legislation relating to the energy performance of buildings (EPB) based on 4 key pillars:²²

- Establishing a methodology to calculate the energy performance of buildings;
- Setting minimum performance requirements which all new buildings, as well as existing buildings undergoing major renovation, must meet;
- Offering energy performance certification if buildings are sold, rented, or new;
- Implementing a regular inspection system for boilers and air conditioning systems in buildings, as well as an assessment of the entire heating installation under certain conditions.

In order to transpose EU Directive 2002/91/EC into Belgian law, on June 7, 2007 the Brussels regional authorities passed the Energy Performance and Indoor Climate of Buildings Order (OPEB/*Ordonnance relative à la performance énergétique et au climat intérieur des bâtiments*). The general principles of OPEB are:

- To promote the improvement of the energy performance of buildings, taking into account outdoor climatic and local conditions, as well as indoor climate requirements and cost effectiveness;
- To promote the improvement of the indoor climate of buildings;
- To minimize primary energy requirements;
- To reduce CO₂ emissions;
- To determine a certification procedure for the energy performance of buildings.

More than a simple transposition of EU law, OPEB goes beyond the requirements of the EU Directive in several areas. For instance, while the Directive imposes energy performance requirements for new and renovated buildings over the 1000 m² threshold, OPEB incorporates two additional conditions that apply to buildings of less than 1000 m². Furthermore, the feasibility study stipulated in the EU Directive is extended in OPEB to the energy design of buildings, specifically to overheating and passive cooling studies. It also applies to major renovations over 5000 m². Basic renovations are subject to heat insulation and ventilation requirements. Finally, OPEB includes requirements that apply specifically to new technical installations (new construction or major renovation), and lays down energy-saving requirements: boiler burner, insulation of heat and cold distribution pipes,

²² See “2007 Energy Efficiency Action Plan for the Brussels-Capital Region,” pg. 20, www.medemip.eu

partitioning, and distribution system regulation obligations.²³

Therefore, current legislation in the Brussels-Capital region outstrips by 6 years the EU directives for low energy construction.²⁴ Yet paradoxically, in 2007 Brussels was still nowhere close to the lead in energy-efficient construction. Not a single building in the region complied with the passive standard. Companies, industries, architects and end consumers perceived low energy housing as a luxury item, and were deeply skeptical of it.²⁵ Nonetheless, Brussels is a front-runner in eco-construction today.

The following paragraphs will trace the roots and evolution of Belgian federal and Brussels regional legislation, culminating in the adoption of passive construction standards. The analysis will show that in the Brussels-Capital Region, political action on the regional (and not necessarily on the Federal) level has been the catalyst behind the rapid progress in low-energy policymaking. In theory, the Federal government and the regions share responsibilities for environmental matters. In practice, however, eco-building has remained a regional competence, and progress in this area continues to depend on regional governments. Two key factors: a firm political commitment of the regional authorities, and a fruitful exchange of best practices with other EU regions (particularly Franche-Comté), are the reasons for Brussels' progress in matters of low energy legislation.

In the 1990's, Brussels authorities considered integrating sustainability into regional development. Consequently, the Region initiated a broad sustainability program. In 1998, Brussels-Capital joined Energy Cities, the European Association of local authorities for sustainable energy. Energy Cities is a European Union initiative aiming to connect local governments, to promote and support sustainable energy initiatives, to influence policymaking, and to serve as a forum for exchanging ideas in the area of sustainable energy.²⁶ For Brussels-Capital, joining Energy Cities proved to be a milestone in the development of low energy building legislation. The idea for the Exemplary Buildings project, which is at the base of today's legislation, was a result of cross-regional exchange of best practices within Energy Cities (for details, see **2.1 "Exemplary Building" (BatEx) Program**).²⁷

²³ See "2007 Energy Efficiency Action Plan for the Brussels-Capital Region," pg. 20, www.medemip.eu

²⁴ <http://www.bepassive.be/viewer/07/fr/> pg. 24

²⁵ <http://www.xpats.com/en/features/home-eco-housing>

²⁶ <http://www.energy-cities.eu/>

²⁷ <http://www.energy-cities.eu/Brussels-leader-in-the-race-to>

Simultaneously, in the early 2000's, Belgium's Federal government issued the "2nd Federal Plan for Sustainable Development 2004-2008." This policy framework expressed a Federal commitment to the 2000 Millennium Development Goals, and the decisions of the World Summit on Sustainable Development (2002), particularly in the areas of living environments, energy and climate change. The plan was subsequently extended to 2009, and contained provisions on energy and environmental protection.²⁸ Such a policy shift towards energy-efficiency is noteworthy, especially in light of Belgium's very limited potential for renewable energy use. Belgium lacks large hydro resources and lands for biomass plantations, and its coastline is small (which constrains wind resources). Despite these challenges, Belgian policymaking since the early 2000s reflects a growing interest in renewable energy use.²⁹

In the early 2000s, building insulation in Brussels-Capital was still among the poorest in the European Union. In 2001, the energy loss through walls in the Brussels-Capital Region amounted to 250 MJ/m² per year, the worst performance in Western Europe.³⁰ However, a concern about high consumption of energy, particularly its impact on the air quality in the urban areas of Brussels, was growing within policy circles. It was this preoccupation with air quality that led to the adoption of the first structural air quality improvement plan, *Plan d'amélioration structurelle de la qualité de l'air et de lutte contre le réchauffement climatique 2002-2010* (or Plan Air-Climat)³¹ on November 13, 2002. Plan Air-Climat contained several provisions that dealt with energy efficiency and demand management, thus giving a push to policymaking in these areas.³²

Despite these slow developments, energy issues did not firmly make it onto the regional policy agenda until 2004, when a new Regional government took office. The political discussions at that time did not include energy issues, however there was a realization that climate change is real, and that energy prices were about to skyrocket. There was a desire to act on energy efficiency, but not a clear idea of what is there to do. So, the government set facilitation services for anyone who had questions about energy (public and private companies, etc.).³³

²⁸ http://diplomatie.belgium.be/en/policy/policy_areas/striving_for_global_solidarity/sustainable_development

²⁹ See "Renewable Energy Policy Review, Belgium: May 2004," www.erec.org/

³⁰ Daoud, Ismaël. 2012. "Brussels goes passive: Adoption of Passivhaus as the Brussels EPB standard in 2015." Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

³¹ For the full text, see www.documentation.bruxellesenvironnement.be

³² See "2007 Energy Efficiency Action Plan for the Brussels-Capital Region," pg. 13, www.medemip.eu

³³ Hermans, Thibaud. 2012. Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

Thus, 2004 saw the adoption of a new regional policy that incorporated energy and environmental issues into the building sector. This new policy framework was directly motivated by a consensus among regional authorities that:

- Energy consumers were still not convinced of the significance of energy efficiency;
- Those that did wish to invest in energy efficiency did not always have the technical information required for demand-side management;
- Professionals who were called on were not fully competent to meet energy efficiency demand;
- Even if investment were viable, it still was not enough of a priority in resource allocation;
- Technical solutions that made use of renewable energy sources were still not well-known, and remained relegated to obscurity due to poor economic viability.³⁴

As a result, the 2004 Brussels energy policy aimed to develop an energy-saving culture, to stimulate demand for energy efficiency, to provide expert technical support, as well as financial aid to consumers, and above all, to lead by example in matters of energy efficiency, and the use of renewable energy resources. The 2004 framework included: the legal framework for Energy Performance of Buildings (EPB), the integration of eco-construction elements (such as green roofs) into the building sector, financial incentives, public inter-agency cooperation to instill norms of eco-construction, free technical support, and a reference centre for technical training and professional development.³⁵ In order to implement the new policy, regional budgets were increased from € 3.6 billion in 2004 to € 16.7 billion in 2007, and the financial aid scheme from € 1 billion to € 11 billion between 2004 and 2007.³⁶

As part of the 2004 policy framework, regional authorities initiated large-scale experiments to determine the ability of businesses, public services and citizens to realize highly energy-efficient projects.³⁷ Without such high level political commitment, the existing potential to embrace the passive standard may have gone unnoticed. Thus, the sustained engagement of the Brussels authorities at the initial stages of the process is a key factor in the Brussels model.

³⁴ See “2007 Energy Efficiency Action Plan for the Brussels-Capital Region,” pg. 13, www.medemip.eu

³⁵ http://www.bruxellesenvironnement.be/uploadedFiles/Contenu_du_site/Particuliers/02_Th%C3%A8mes/Climat_en_construction/04_Les_engagements_internationaux_de_la_R%C3%A9gion/03_Le_pacte_des_Maires/LF_CoM_ExemplaryBuildings_EN.pdf pg. 2

³⁶ See “2007 Energy Efficiency Action Plan for the Brussels-Capital Region,” pg. 13, www.medemip.eu

³⁷ http://eusew.eu/component/see_projectview/?view=see_projectdetail&projectid=7491&catId=5&pageNum=0&index=1

The Region officially committed to the passive standard only after having experimented with the first three calls for proposals for Exemplary Buildings. The success of the Exemplary Buildings program showed that passive standards are affordable, and do not raise renovation and construction costs to unacceptable levels.³⁸

In 2006-2007, there were major climate disasters, such as hurricane Katrina, which sparked public awareness initiatives. In this context, the Brussels-Capital Region government decided to push for even further development of the local market. The effort was specifically targeted to younger professionals from the construction sector.

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.³⁹

Based on three rounds of successful trials with Exemplary Buildings (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 2015.⁴⁰ 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.⁴¹

The legislation installs:

- A net heating requirement of less than 15/kWh/m²/yr
- A net cooling requirement less than 15/kWh/m²/yr (only for offices and schools)
- An air tightness of 0,6 volume .h⁻¹
- An overheating over 26°C time -limited to 5%
- A primary energy consumption limited to:
 - 45 kWh/m²/yr for housing (heating, hot water, ventilation, pumps and fans);

³⁸ http://documentation.bruxellesenvironnement.be/documents/BxVilleDurable_ANGL.PDF pg. 5.

³⁹ Hermans, Thibaud. 2012. Presentation at the PassREg 2nd International Workshop, Brussels (October 5).

⁴⁰ Region de Bruxelles-Capitale – Brussels Hoofdstedelijk Gewest, Ministerie Van Het Brussels Hoofdstedelijk Gewest N. 2011 — 2445 [C – 2011/31430], May 5, 2011. See Article 5a and 6a. www.emis.vito.be. See also <http://www.ejustice.just.fgov.be/cgi/article.pl>

⁴¹ Daoud, Ismaël. 2012. “Brussels goes passive: Adoption of Passivhaus as the Brussels EPB standard in 2015.” Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

- 90 – (2,5 x compacity) for offices and schools.

For newer buildings with a better exposition (i.e. with easier access to natural light), it is easier to apply the passive standard. But this is not the case for older buildings with insufficient solar gains, too much solar shadow, bad compacity, etc. Thus, the rules for construction in the Brussels-Capital region have been adapted to reflect the situation of these disadvantaged buildings. The passive standard, adapted to reflect the particular situation of buildings with bad compacity or a bad orientation is under review at the time of writing, and should be approved by the Brussels government by the end of 2012.⁴²

The calculation takes account of renewable energy devices installed in buildings (thermal and photovoltaic panel, heat pump, geothermal system, and biomass).

This new piece of legislation is the last piece of the strategy. Boosting the demand for passive building from the top down, and improving the supply (through such actors as the Employment-Environment Alliance) was a top priority. The second step was to move to a more horizontal model, encouraging grassroots solutions first with public buildings and secondly with regulation. Finally, the legislation served as a timely warning for all developers, architects, and design firms who were preparing their applications for planning permission after December 31, 2014.⁴³

At first, the market did not embrace the idea of going passive in 2015 – professionals thought the policy was moving too fast. There was insecurity and fear about certain aspects. For instance, real estate companies were very worried about airtightness tests. But in the end, all buildings submitted and successfully passed the airtightness tests.⁴⁴

Despite a rocky start and a few obstacles in-between, the new “passive” legislation was eventually well received by the key stakeholders in the Brussels-Capital region. To appease rising fears and smooth out the implementation process, regional authorities relied in large part on their collaboration with the Employment-Environment Alliance (for details, see [3.2 The Employment-Environment Alliance](#)).⁴⁵

⁴² Daoud, Ismaël. 2012. “Brussels goes passive: Adoption of Passivhaus as the Brussels EPB standard in 2015.” Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

⁴³ <http://www.bepassive.be/intl/special01en/> pg. 18.

⁴⁴ Hermans, Thibaud. 2012. Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

⁴⁵ <http://www.bepassive.be/viewer/12/fr/> pg. 16.

Brussels officials explain that further advancements in low energy legislation will surely allow for different definitions of “energy-efficient building,” depending on urban and rural settings, as well as on the type of building.⁴⁶

The shift towards nearly zero energy legislation does not by itself explain how the Brussels-Capital region became a front-runner in low energy construction. The legislation changes were accompanied by a series of financial, consulting, and public support programs that offered a series of incentives to investors interested in saving energy. These will be described in detail in the following paragraphs.

Local Action Plans for Energy Management (P.L.A.G.E.)

A key premise of the Brussels model is that the first to adopt proper energy efficiency measures and practices should be the authorities. Such a “lead by example” approach is of particular importance in Brussels, where the share of public purchasing is significant. 15% of the Belgian GDP is allotted to public purchasing, and the Brussels-Capital Region alone generates 20% of the GDP.⁴⁷ Thus, without a *de facto* switch to passive building in the public sector, the overall success of the low energy construction legislation would remain highly questionable.

The Local Action Plans for Energy Management (P.L.A.G.E.) illustrate how authorities lead by example. P.L.A.G.E. programs are specifically targeted to public and private buildings with very high energy consumption that will not be renovated soon. The main underlying premise is that, according to recent research, the energy performance of certain buildings can be improved by 20-30% even without major investment. Thus, P.L.A.G.E. programs have the following objectives:

- To provide information on energy efficiency;
- To organize internal management around energy-efficient maintenance of facilities;
- To identify the potential energy savings and the priority actions, in particular through building audits;
- To raise awareness amongst occupants of how to behave;
- To involve energy efficiency in investment choices (new construction and renovation, refurbishment of facilities);
- To ensure transparency of information through the publication and promotion of a regular summary of results.⁴⁸

⁴⁶ <http://www.bepassive.be/viewer/12/fr/> pg. 16.

⁴⁷ http://documentation.bruxellesenvironnement.be/documents/BxlVilleDurable_ANGL.PDF pg. 10.

⁴⁸ See “2007 Energy Efficiency Action Plan for the Brussels-Capital Region,” pg. 15, www.medemip.eu

Since 2006, P.L.A.G.E. has funded energy reduction measures and training of building administrators in the passive standard. The Region covers 50 to 100% of the expenses incurred for up to 3 years.⁴⁹ All P.L.A.G.E. applications are reviewed by a jury, consisting of:⁵⁰

- 1 representative of Brussels - Environment;
- 1 representative of the Minister of Energy;
- 1 representative of the Secretary of state for housing;
- 1 representative of the Brussels Regional Housing Authority (SLRB) (for social housing project applications only);
- 1 external expert.

P.L.A.G.E. projects follow four phases of execution, which may be carried out simultaneously:⁵¹

- Create an energy consumption cadastre of the building complex. Thus, it is possible to identify the more problematic buildings, which clarifies the priorities for action.
- Establish a concrete action plan for those buildings that are considered top priority (usually because they are large energy consumers with an equally large potential to save energy).
- Carry out the action plan above.
- Follow up with the regional authorities by reporting on progress in project implementation.

Energy consumption is closely monitored during project implementation. In addition, a *Responsible Energie* (energy consultant) is available to help with project implementation. It is the responsibility of the energy consultant to provide:⁵²

- Methodological support;
- Assistance in putting together the energy cadastre;
- Help in setting up an energy accounting system;
- Assistance to staff members with energy audits;

⁴⁹ http://documentation.bruxellesenvironnement.be/documents/BxVilleDurable_ANGL.PDF pg. 10-11.

⁵⁰ See "PLAGE SISP 2011-2015: information (.ppt)," pg. 24, available at: <http://www.bruxellesenvironnement.be/Templates/Professionnels/informer.aspx?id=32601>

⁵¹ See PLAGE Communes Info-Fiche, pg. 2, available at: <http://www.bruxellesenvironnement.be/Templates/Professionnels/informer.aspx?id=32601>

⁵² See "PLAGE SISP 2011-2015: information (.ppt)," pg. 14, available at: <http://www.bruxellesenvironnement.be/Templates/Professionnels/informer.aspx?id=32601>

- Facilitation of best practice exchanges;
- Assistance to managers on how to use the tools provided by Brussels Environment.

Thus far, 15 municipalities, 5 hospitals, 2 collective housing organizations, and the schools of the mandatory education system have benefitted from P.L.A.G.E. programs.⁵³

The first round of P.L.A.G.E. projects was launched in 2006. In 2006-2009, seven municipalities participated: Anderlecht, Berchem-Ste-Agathe, Ixelles, Molenbeek-St-Jean, Schaerbeek, St-Gilles, and Watermael-Boisfort. The municipalities received a subsidy ranging between € 36.000 and € 130.000 (depending on the particularities of each application), divided amongst a total of 70 buildings.⁵⁴ The overall results from these seven municipalities in 2005-2009 are:⁵⁵

- 15,82% less gas consumption;
- 4.3% less electricity consumption;
- € 1.326.000 saved;
- 2.574 tons of CO2 emissions avoided.

In 2007, five hospitals, representing a building complex of 483.000 m², also received P.L.A.G.E. funds. Although project implementation was uneven across the board, the results were promising. The hospitals managed to lower electricity consumption by 0.6%, gas consumption by 14.3%, and to avoid 4.000 tons of CO2 emissions. These results are equivalent to 4.400 Brussels homes reducing their total consumption by 20% over three years.⁵⁶

In 2008, collective housing buildings also received P.L.A.G.E. funds through the Public Social Action Centre (*Centres Publics d'Action Sociale*, or CPAS).

Given the potential for energy savings in schools, in 2009 the Region decided to disburse the funding needed for the implementation of P.L.A.G.E. projects in compulsory education establishments. The school projects are expected to run for a period 4 years. All school systems are represented, and could employ one or more energy consultants to help with project implementation. A limited but representative number of schools were initially selected. Provided these pilot projects go well, the initiative will be expanded. The goal is

⁵³ http://documentation.bruxellesenvironnement.be/documents/BxlVilleDurable_ANGL.PDF pg. 10-11.

⁵⁴ See PLAGÉ Communes Info-Fiche, pg. 1, available at:
<http://www.bruxellesenvironnement.be/Templates/Professionnels/informer.aspx?id=32601>

⁵⁵ See PLAGÉ Communes Info-Fiche, pg. 5, available at:
<http://www.bruxellesenvironnement.be/Templates/Professionnels/informer.aspx?id=32601>

⁵⁶ See PLAGÉ Hopitaux Info-Fiche, pg. 1, available at:

that, in time, all compulsory education schools in the region (around 600 establishments, spread over 800 sites) will also become pioneers in energy savings.⁵⁷

In 2011, a new P.L.A.G.E. call for proposals targeting social housing was launched. The campaign focuses on the 33 Public Service Housing Associations (SISP) of the Brussels-Capital Region. Six full-time energy consultants will work with the selected SISPs, introducing a medium-term approach to active participation in energy savings in the social housing sector.⁵⁸

To provide additional assistance, Brussels Environment has created a P.L.A.G.E. manual for building managers, as well as another one for energy consultants. Both manuals are accessible through the Brussels environment website.⁵⁹

Brussels Regional Development Agency (Société de Développement pour la Région de Bruxelles Capitale, SDRB)

Created in 1974, the Brussels Regional Development Agency (SDRB) has a mission to facilitate the establishment of high value-added services to companies in the Brussels-Capital Region by providing real estate infrastructure at attractive prices. The SDRB acquires plots of land, which it makes viable and offers to businesses in the form of long-term leases. The organization also re-purposes former industrial sites as multi-purpose premises for economic activities that meet the needs of businesses, and puts them on the market at attractive rates. Currently, the SDRB manages a total area of nearly 200 ha with over 270 companies that provide approximately 18,000 jobs.⁶⁰

In the past 25 years, the SDRB has emerged as a major actor in promoting eco-friendly construction. Through public-private partnerships, the SDRB builds housing for average-income families in neighbourhoods with a shortage of residential buildings. These families can thus obtain housing at 30% below the real estate market price.⁶¹

All houses the SDRB builds are either passive or low energy. Sustainable construction is a pillar of SDRB activity: the agency holds an Ecodynamic Company label since 2001 (for

⁵⁷ <http://www.bruxellesenvironnement.be/Templates/Professionnels/informer.aspx?id=32601>

⁵⁸ <http://www.bruxellesenvironnement.be/Templates/Professionnels/informer.aspx?id=32601>

⁵⁹ <http://www.bruxellesenvironnement.be/Templates/Professionnels/Informer.aspx?id=32601>

⁶⁰ <http://www.pro-realestate.be/ecbp/ecbp.aspx?id=136&L=>

⁶¹ <http://www.pro-realestate.be/ecbp/ecbp.aspx?id=136&L=>

details, see **6.1 “Ecodynamic Company” Label**).⁶² SDRB is also one of the two principal financing institutions of the “Exemplary Buildings” program.⁶³

Brussels Regional Housing Authority (Société du Logement de la Région de Bruxelles-Capitale, SLRB)

A regional umbrella organization for 33 Public Service Housing Associations (SISPs), the Brussels Regional Housing Authority (SLRB) is in charge of low cost housing.⁶⁴ Its mission is to reduce the cost of occupancy (i.e. the sum of rent and energy bills), thereby providing the lowest possible cost to future occupants. Since 2010, the SLRB has incorporated sustainable development and low energy building standards as a major points in its strategic plan. Together with the SDRB, the Brussels Regional Housing Authority is a major financing institution of the “Exemplary Buildings” program.⁶⁵

The following are some of SLRB’s passive or low energy building projects:⁶⁶

Project 1: A double-duplex building at 42 rue Loossens.

This project was a BatEx laureate in 2007. It envisions the construction of two large, “passive” apartments (both 4-5 rooms each). Heat losses are reduced to such an extent that, due to the insulation and airtightness of the building area, it can do without conventional heating. To meet the minimal heating needs (12 kWh/m²), a double-flow ventilation system with heat recovery, and a small heating battery, are enough. The only radiator in the bathroom is electric. The façades and roof are isolated with 40 cm of extruded polystyrene, the foundation is wood with triple glazing, and a sliding panel prevents overheating in summer. To make the building autonomous, there are 20 m² of solar panels to satisfy hot water needs, and 70 cm² photovoltaic panels to cover electricity needs. Each accommodation has a storage of hot water integrated into the bathroom. The project is considered to be a zero CO₂ emission building.

Project 2: A 12-apartment complex at rue Georges Moreau.

This project contemplates building 12 passive homes facing the street, as well as three low energy houses around an interior courtyard. Following a budget review, it was decided that the interior homes would be build in line with the “low energy” standard, due to the

⁶² <http://www.brussels.irisnet.be/about-the-region/regional-bodies/societe-de-developpement-pour-la-region-de-bruxelles-capitale-sdrb>

⁶³ http://documentation.bruxellesenvironnement.be/documents/BxVilleDurable_ANGL.PDF pg. 15.

⁶⁴ <http://www.slrbe.be/la-slrbe/nos-missions>

⁶⁵ http://documentation.bruxellesenvironnement.be/documents/BxVilleDurable_ANGL.PDF pg. 15.

⁶⁶ [HTTP://WWW.SLRB.BE/PUBLICATIONS/ARTICLES/SLRB-INFO-EN-LIGNE/NB062/AT_DOWNLOAD/FILE](http://www.slrbe.be/publications/articles/slrbe-info-en-ligne/nb062/at_download/file) PG. 15-18.

disproportionate additional costs that passive standards would require in this case. As regards the dwellings facing the street, the façades boast a partially prefabricated wooden skeleton, which ensures a reduction in installation and drying time. The building facing the street follows all the usual “passive” criteria. As to insulation, the timber frame façades are isolated with 30 cm of cellulose, the flat roof with 30 cm of mineral wool, and the floor above the porch, with 16 cm of extruded polystyrene. The triple glazing and frames will be selected in such a way as to ensure a superior performance. The risk of overheating will be reduced by the judicious placement of balconies and open spaces. A system of ventilation with heat recovery, and 40 m² of solar panels for part of the production of hot water, will also be installed.

Project 3: Construction of an 8-unit building at 5-25 rue de la Plume.

The project consists of two separate buildings on a residual plot of land. It allows the creation of four private gardens for the ground floor dwellings, as well as an opening in the urban area (bringing light to the school located in the back). Each building contains four units: two duplexes on the ground floor parallel to the street, and two more on the floors perpendicular to the street. The four duplex superiors boast roof terraces, and extensive green roofs. The plot surface is almost entirely green, and provides a natural habitat for biodiversity. It also helps infiltration into the soil and the decongestion of sewers. In addition to this "green" aspect, the buildings meet the passive standard. To achieve this standard, the project focuses mainly on insulation. A 25-cm façade insulation, a 30-cm roof insulation and a high-performing frame allow the reduction of heat loss by 70%. Very small heaters will be installed in the living rooms in order to ensure thermal comfort. 50% of the hot water needs are covered by solar panels. Double flow ventilation with heat recovery, a condensing boiler, collective solar protection, and a rainwater recovery system complete this project.

Project 4: Construction of an 8-unit apartment building at 4-10 rue de Deux Tours.

This project responds both to the passive standard and the eco-construction standard. The eco-construction standard is achieved by paying particular attention to the choice of materials. Thus, the wood siding is made of locust, the façade siding is brick, the base is blue stone, and the supporting walls are sand-lime blocks. The project boasts gardens, extensive green roofs, and green walls. The “passive” aspect was achieved thanks to the installation of 16 cm of façade insulation, 22 cm of roof insulation, double-flow ventilation with heat recovery, a large thermal inertia of materials, and sunscreens against overheating. Heating energy consumption is limited to 14 kWh/m²/year. Solar panels cover 30% of hot water needs.

The SLRB was initially lagging behind at first in terms of regional energy policy.⁶⁷ From 2004 to 2009, there were big improvements. In 2009, a formal contract was signed between the SLRB and the Brussels Regional Government. As social housing constitutes approximately 8.3% of Brussels Capital Region housing overall, the goal of the Brussels authorities is to reduce the energy consumption of social housing tenants. To do so, the Region has devised a strategy in the form of a Management Agreement with the SLRB. According to the management agreement, the social housing sector must adopt passive house standards for all new construction, and low energy standards (60kWh / m² / year) for retrofit. Heritage projects can also be included in the low energy retrofit requirement. Project designers are obliged to use a book of standard specifications. PHPP calculation is imposed upon social housing projects. Initially, government policy met with resistance from the social housing sector, but eventually this problem was overcome.

The goals of the Regional Housing Plan are to create 5.000 new homes (3.500 of social housing and 1 500 middle). So far, the energy outcomes of the 62 Regional Housing Plan projects are, as follows:⁶⁸

- EPB standard: 12 projects, 580 homes
- Low energy standard: 9 projects, 866 homes
- Passive house standard: 41 projects, approx. 2.360 homes
- Price of low energy and/or Passive House new construction (gross area above ground): 1.250 €/m² reference price (housing surface, common zone, access).

Sustainable Neighbourhood Contracts

In 1993, the Brussels-Capital Region initiated a policy of targeted interventions to renovate and improve traditional Brussels neighbourhoods. Since 2009, this initiative bears the name “sustainable neighbourhood contracts.” Using a participatory approach, the regional authorities stimulate grassroots solutions to the environmental, social and economic challenges that are typical for Brussels’ old quarters. Residents and neighbourhood users come together to propose, design, and carry out initiatives that improve their living environment. Among the types of implemented projects are: construction of public parks,

⁶⁷ Brussels Regional Housing Authority (SLRB). 2012. Speed talks about “top down” measures in Brussels. Presentation at the PassREg 2nd International Workshop, Brussels (October 5).

⁶⁸ Brussels Regional Housing Authority (SLRB). 2012. Speed talks about “top down” measures in Brussels. Presentation at the PassREg 2nd International Workshop, Brussels (October 5).

production of low energy housing, energy savings, waste reduction and air quality initiatives, rationalization of consumption, and promotion of the neighbourhood heritage.

The first sustainable neighbourhood was bought in 2004 and low-energy homes were built on it. It took 6 years to obtain all the right licenses. As a result of this experience, the authorities noticed two promoters in the Region who were really interested and believed in passive building. This was a stepping stone for launching the BatEx program 3 years later. Today, there is a large sustainable neighbourhood project underway, where 450 accommodation units will be built. Thanks to the experience authorities gathered with *BatEx*, they imposed maximum limits on urban and architectural requirements of construction projects.⁶⁹

Since 2010, over € 60 million per year have been invested in such contracts, whereby the terms of references impose passive standards for new buildings and low to very energy standards for renovated buildings.

At the same time, since 2008 Brussels Environment has been promoting “Sustainable Neighbourhoods” call for proposals, which are addressed to inhabitants, and aim to stimulate local sustainable improvement initiatives. Each year, the top five proposals are awarded € 15,000 each.⁷⁰ The winners receive not only funds, but also a “basket of services” (e.g. nine training and awareness activities), an organiser (a specialist), and help with project follow-up and coordination. Brussels Environment also helps the winners promote their projects and raise awareness within the neighbourhood, as well as in the Region. By the end of 2012, the Sustainable Neighbourhoods Network will have 20 members.

To participate, neighbourhoods must respond to Brussels Environment’s “Sustainable Neighbourhoods” call for proposals, which the regional authorities have organized since 2008. Each year, the top five proposals are awarded € 15,000 each.⁷¹ Since 2010, over € 60 million per year have been invested in such contracts. The winners receive not only funds, but also a “basket of services” (e.g. nine training and awareness activities), an organiser (a specialist), and help with project follow-up and coordination. Brussels Environment also helps the winners promote their projects and raise awareness within the neighbourhood, as well as in the Region. By the end of 2012, the Sustainable Neighbourhoods Network will have 20 members.

⁶⁹ The SDRB. 2012. “Speed talks about “top down” measures in Brussels.” Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

⁷⁰ <http://www.sustainablecity.be/content/news-brussels/call-proposals-more-sustainable-neighbourhoods>

⁷¹ <http://www.sustainablecity.be/content/news-brussels/call-proposals-more-sustainable-neighbourhoods>

To take the initiative even further, regional authorities also provide a “Sustainable Neighbourhoods Facilitator,” to support the construction of new neighbourhoods on vacant urban land.⁷²

ECONOMY AND FINANCING

Compared to 2004, the current regional budget for helping households adopt energy saving measures is ten times larger.⁷³ The following figure details the regional energy policy budget:

Figure 1: Brussels Regional Budget and Energy Subsidies

Brussels means 2012

Annual regional budget	3.600.000.000 €	
Regional energy bill (2009)	2.015.000.000 €	
Regional energy bill for building	1.346.000.000 €	
Regional Energy Policy budget	60.000.000 €	2004 1.769.000 €
Regional Energy budget	60.000.000 €	
Intern Costs – public body Team : 115 people	8.000.000 €	2004 Team : 5 people
Support means (expert, study, tools, subsidies)	19.500.000 €	
Regulation system Gas - electricity	5.000.000 €	<u>Paid by the G & E consummers</u>
Alliance with private sector	1.500.000 €	
Exemplary building	6.000.000 €	
Energy subsidies	20.000.000 €	



The €60 million in financial assistance that the Brussels-Capital Region puts aside each year is deducted from the total energy bill of all energy consumers in the year. The private companies (energy providers) receive about €1.5 billion per year, of which they are obliged

⁷² <http://www.sustainablecity.be/themas/sustainable-neighbourhoods>

⁷³ <http://www.xpats.com/en/features/home-eco-housing>

to return approx. 0.04% of the total energy bill amount to the Brussels Government. It is from that money that the financial help for environmental measures comes.⁷⁴

The following section describes the main financial incentive instruments that Brussels regional authorities use to stimulate the market for low energy construction.

“Exemplary Buildings” (*BatEx*) Program

The “Exemplary Buildings” program (*Bâtiments Exemplaires*, or *BatEx*) is the main financial incentive instrument of the Brussels regional authorities to encourage demand for very high energy efficient construction. Since 2007, the region has organized five annual calls for proposals (with the exception of 2010), disbursing □€ 5 million per year. By September 2012, 44 projects had been completed, representing 88.000 m², and 44 projects were under construction, representing 99.000 m². 15 projects have been rejected. During the fifth call for proposals in 2012, the regional authorities plan on disbursing €18 million in premiums, which correspond to an investment of €500 million of the construction sector.⁷⁵ The following paragraphs will outline the origins, development, and particulars of the *BatEx* program.

In 2006-2007, there were major climate disasters, such as hurricane Katrina, which sparked public awareness initiatives. In this context, the Brussels-Capital Region government decided to push for even further development of the local market. The effort was specifically targeted to younger professionals from the construction sector.

The change of government in 2009 was a real opportunity to launch the *BatEx* project. Brussels authorities worked very hard on fostering demand by designing a proper program, and providing adequate training to architects and other construction specialists.⁷⁶

The exemplary building concept is not Brussels-born. It is a result of successful networking and policy exchange among regional authorities across the European Union. In 2006, Grégoire Clerfayt, manager of Energy, Air, Climate, Sustainable Construction and Economy at Brussels-Capital, recalls participating in in the IMAGINE initiative of Energy Cities. There, an official from the Franche-Comté region introduced Clerfayt to the principle of calls for proposals in the sustainable building sector. Clerfayt liked the concept of promoting the

⁷⁴ Moreno-Vacca, Sebastian. 2012. Welcoming words: “Making Frontrunners Visible, Supporting Future Frontrunners (Part 2).” Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

⁷⁵ <http://www.bepassive.be/viewer/12/fr/> pg. 17.

⁷⁶ Hermans, Thibaud. 2012. Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

passive standard by an open competition. The idea was also embraced by Evelyne Huytebroeck, Minister of the Environment of the Brussels-Capital Region, who has subsequently become one of the most important political activists for energy efficient construction. Thus, in 2007 the Passive Buildings idea started to take shape in Brussels, but not on such a high technical level as in Germany. This approach was good, because had Brussels applied the German model literally, it would not have worked. Thus, as a result of the “Brusselization” of an idea borrowed from Germany, the *BatEx* program emerged.⁷⁷

The long-term objective of the *BatEx* program is twofold. On the one hand, Brussels-Capital wished to stimulate the supply for eco-construction (that is, to push the building sector towards producing more energy-efficient buildings). On the other hand, the authorities also aimed to increase the market demand. The short-term objective was to reach an initial critical mass of energy efficient buildings, which would be easily replicable and serve as an example for the future. To achieve these goals, Brussels-Capital works simultaneously on three fronts, as follows:⁷⁸

- **Financial assistance:** providing funds for new construction and retrofit in line with the passive standard;
- **Technical assistance:** expert help for organizations involved in building or refurbishing passive houses;
- **Increased visibility:** raising the public profile of passive building owners and their designers.

At the time of launching the first *BatEx* call for proposals in 2007, the authorities had no clear idea of how the market would respond. Hence, the first edition of the calls for proposals served to test the capacity of the market. The intent was to avoid experimental architecture: the proposals had to be simple, efficient and above all affordable. No minimum performance standard was set in the first call for proposals – only a cap, and indicative targets. The authorities wanted to see what the market could do, and compare the results.⁷⁹

⁷⁷ Hermans, Thibaud. 2012. Presentation at the PassREg 2nd International Workshop, Brussels (October 5).

⁷⁸ http://www.bruxellesenvironnement.be/uploadedFiles/Contenu_du_site/Particuliers/02_Th%C3%A8mes/Climat_en_construction/04_Les_engagements_internationaux_de_la_R%C3%A9gion/03_Le_pacte_des_Maires/I_F_CoM_ExemplaryBuildings_EN.pdf pg. 1.

⁷⁹ <http://www.bepassive.be/intl/special01en/> pg. 50-51.

Since 2007, Brussels-Capital has organized four annual calls for proposals (one per year, except in 2010).⁸⁰ So far, 294 candidates have submitted proposals, and 192 have been approved. Financed projects cover 470 000 m² of construction or renovations, of which 250 000 m² are fully passive.⁸¹

Each year, the quality of *BatEx* applications has improved, and the goals have become more ambitious. For instance, while only 21% of the laureates in 2007 and 2008 complied with the passive standard, in 2009 63% of *BatEx* winners were fully “passive.”⁸² Upon completion of each edition of the calls for proposals, the technical requirements were reviewed, improved, and updated for the next one.⁸³ This way, the lessons learned have been systematized, and used to constantly urge *BatEx* laureates to carry out superior performance projects.

The fifth (and most recent) call for proposals closed on June 28, 2012. 49 applications were received,⁸⁴ 28 of which were for new buildings, and 21 for retrofit. As for the types of buildings, 13 applications were for residential housing (3.181 m²), 17 applications were for collective housing (59.660 m²), 6 applications were for the tertiary sector (88.349 m²), and 13 applications were for other housing with collective purposes (schools, childcare centres, senior homes, etc.)⁸⁵

To be eligible for *BatEx* funds, projects must be located within the Brussels-Capital region, and comprise new buildings, retrofit, or a combination of the two. Furthermore, the buildings must have one of the following uses:⁸⁶

⁸⁰ <http://www.bruxellesenvironnement.be/Templates/Particuliers/Niveau2.aspx?id=4626&langtype=2060>

⁸¹ Daoud, Ismaël. 2012. “Brussels goes passive: Adoption of Passivhaus as the Brussels EPB standard in 2015.” Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

⁸² <http://www.livios.be/fr/build/dozz/build/lowe/9907.asp?content=Bruxelles%20d%C3%A9gage%20une%20enveloppe%20de%205%20millions%20pour%2041%20projets%20en%20vue%20d%E2%80%99%C3%A9conomiser%20l%E2%80%99%C3%A9nergie>

⁸³ http://www.bruxellesenvironnement.be/uploadedFiles/Contenu_du_site/Particuliers/02_Th%C3%A8mes/Climat_en_construction/04_Les_engagements_internationaux_de_la_R%C3%A9gion/03_Le_pacte_des_Maires/I_F_CoM_ExemplaryBuildings_EN.pdf pg. 3.

⁸⁴ <http://www.bepassive.be/viewer/12/fr/> pg. 10.

⁸⁵ <http://www.bepassive.be/viewer/12/fr/> pg. 53.

⁸⁶ http://www.bruxellesenvironnement.be/uploadedFiles/Contenu_du_site/Particuliers/02_Th%C3%A8mes/Climat_en_construction/04_Les_engagements_internationaux_de_la_R%C3%A9gion/03_Le_pacte_des_Maires/I_F_CoM_ExemplaryBuildings_EN.pdf pg. 2.

Housing: house, apartment, collective housing, or other;

Teaching facilities (schools, preschools, childcare centres, etc.);

- Offices;
- Health facilities;
- Hotels;
- Seminar and cultural facilities;
- Sports facilities;
- Exhibition halls with systems for regulating the interior climate;
- Covered swimming pools.

To be approved, a proposal must adhere to four specific criteria:

- All new construction and renovation must be informed by passive standard guidelines (it must strive to be a zero-emission building);
- The project must prioritize the use of eco-friendly construction materials, and to consider natural cycles and biodiversity;
- The project must demonstrate a high architectural quality, good visibility, and a satisfactory level of integration into existing stock;
- Rather than a “high tech solution,” the project must be simple and feasible in technical and financial terms, with reasonable payback timelines.⁸⁷

The *BatEx* project review procedure is as follows:

- External technical experts review all application files.
- A jury then evaluates all projects in view of the four eligibility criteria outlined above. The jury may request additional feedback from the technical experts.
- Successful candidates must sign a contract with Brussels Environment, which outlines commitments and obligations.
- The subsidies are paid out after the inauguration of the project.
- During the first 5 years, the winners of *BatEx* funds are obliged to submit regular energy consumption reports to Brussels Environment Administration.⁸⁸

Approved candidates have 4 years to finish their projects. After construction is over, an inspection follows to evaluate the energy efficiency of the building, and the site is officialy

⁸⁷ http://documentation.bruxellesenvironnement.be/documents/BxlVilleDurable_ANGL.PDF pg. 4.

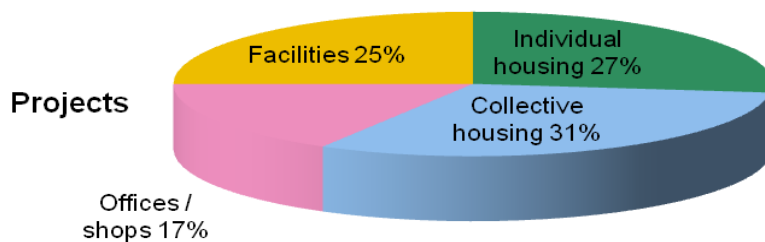
⁸⁸ www.housingeurope.eu/www.housingeurope.eu/uploads/file/_agenda.pdf pg. 1.

labeled an exemplary building.⁸⁹ Winners also receive technical assistance and increased public visibility of their initiatives.⁹⁰

The planned duration of the BatEx program is May 2007-December 2014, with a total budget of € 45 million.⁹¹ Approved projects are awarded a subsidy of 100 €/m², which is divided between the contracting authority (90 €/m²) and the developer (10 €/m²).⁹² There is a subsidy cap of € 500.000 and € 100.000 for the contracting authority and the developer, respectively.⁹³

So far, *BatEx* projects amount to € 24 million, invested into 354,000 m² of new or refurbished passive buildings.⁹⁴ By October 2012, there were 52 finished projects, and 44 are under construction. Statistical data shows that by the end of 2010, 65% of *BatEx* funds had been invested in new construction, and 35% in retrofit. A look at the division of exemplary buildings per sector reveals that the tertiary sector has clearly won the largest amount *BatEx* funds, outstripping other types of housing:

Figure 2: Types of BatEx buildings



Source: Hermans, Thibaut. 2012. "Exemplary Buildings: Success Stories From Brussels." Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

⁸⁹ <http://www.bepassive.be/viewer/12/fr/> pg. 51.

⁹⁰ http://www.bruxellesenvironnement.be/uploadedFiles/Contenu_du_site/Particuliers/02_Th%C3%A8mes/Climat_en_construction/04_Les_engagements_internationaux_de_la_R%C3%A9gion/03_Le_pacte_des_Maires/I_F_CoM_ExemplaryBuildings_EN.pdf pg. 1.

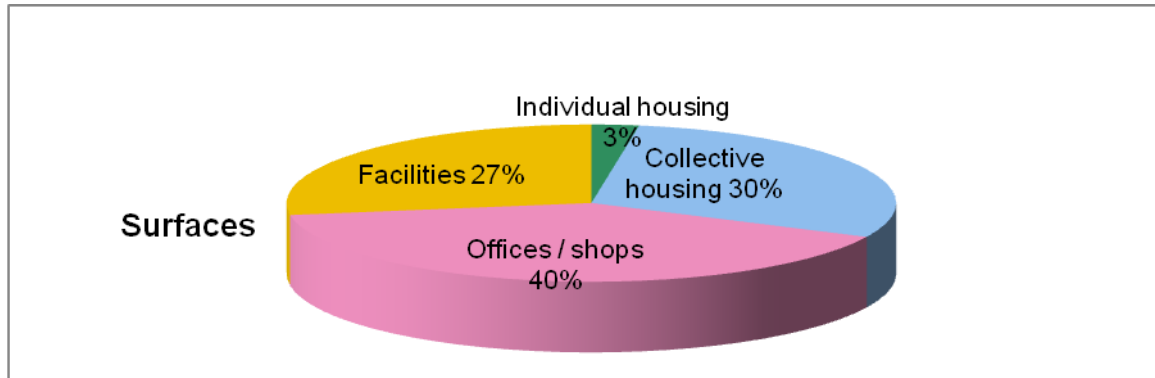
⁹¹ http://www.bruxellesenvironnement.be/uploadedFiles/Contenu_du_site/Particuliers/02_Th%C3%A8mes/Climat_en_construction/04_Les_engagements_internationaux_de_la_R%C3%A9gion/03_Le_pacte_des_Maires/I_F_CoM_ExemplaryBuildings_EN.pdf pg. 1.

⁹² www.housingeurope.eu/www.housingeurope.eu/uploads/file_/agenda.pdf pg. 1.

⁹³ <http://www.bepassive.be/viewer/12/fr/> pg. 55.

⁹⁴ <http://www.sustainablecity.be/content/news-brussels/39-new-%E2%80%9Cexemplary-buildings%E2%80%9D-brussels-region>

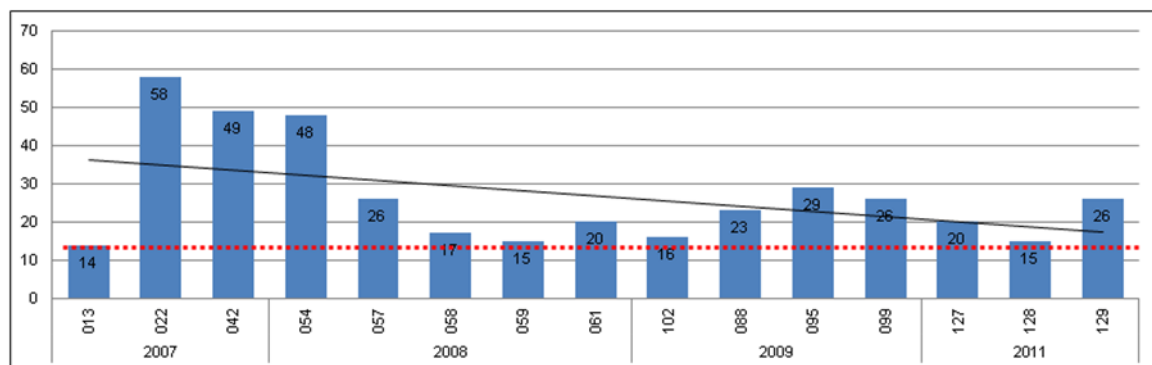
Figure 3: Surface Shares of BatEx buildings



Source: Hermans, Thibaut. 2012. “Exemplary Buildings: Sussess Stories From Brussels.” Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

The table below illustrates the evolution of passive building in the 2007-2011 period. By 2014, Brussels will have grown from 0 m² in 2007 to well over 500,000 m² of passive house construction.

Table 1: Evolution of Passive Building, 2007-2011



Source: Hermans, Thibaut. 2012. “Exemplary Buildings: Sussess Stories From Brussels.” Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

Interestingly, the most economically disadvantaged municipalities are among the most active in applying for *BatEx* funding.⁹⁵ Statistics show that the *BatEx* program is better known in low-income neighbourhoods where the residents are usually younger, than in

⁹⁵ http://documentation.bruxellesenvironnement.be/documents/BxIVilleDurable_ANGL.PDF pg. 8.

richer and “older” communities.⁹⁶ At first glance, this may appear contradictory, not least because energy-efficiency renovations are expensive, and the benefits are not immediate. A significant proportion of end users have little incentive to invest in energy improvements. Most people in Brussels are either renting, or are “need buyers” (that is, buyers for whom purchasing a house comes out cheaper than paying rent, yet they are left with no additional funds for any energy-saving renovations). For these users, renovations may amount to 10% of the housing costs, but the lower energy bills will only come after 7-10 years. Understanding the need to reach these “need buyers” is a key success factor in the Brussels model.⁹⁷

After the success of the first few *BatEx* calls for proposals, Studies have been launched to see if it is possible to build a passive skyscraper in Brussels.⁹⁸

Energy Subsidies

Another key financial incentive instrument of the Brussels-Capital authorities is the energy subsidies system. It started with financial aid for solar panels in 2002, and was extended to close to 20 types of subsidies in 2007. The subsidies aim to cover part of the initial expenses necessary to make the transition to passive standards. 80% of the beneficiaries are individuals, but groups and businesses that wish to renovate buildings to reduce energy consumption and CO2 emissions are also eligible for these funds.⁹⁹ To ensure equity among candidates, with a special focus on low-income families, the subsidies are adjusted according to household income.¹⁰⁰

Below is a detailed description of the regional subsidies available in 2007, when the subsidy system was in its prime. Note that since 2012, the federal tax breaks, outlined in many of the subsidies below, have been eliminated (for details, see [2.5 Federal Tax Reductions for Passive Construction](#)).

⁹⁶ <http://www.bepassive.be/viewer/12/fr/> pg. 57.

⁹⁷ <http://www.xpats.com/en/features/home-eco-housing>

⁹⁸ Daoud, Ismaël. 2012. “Brussels goes passive: Adoption of Passivhaus as the Brussels EPB standard in 2015.” Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

⁹⁹ http://documentation.bruxellesenvironnement.be/documents/BxlVilleDurable_ANGL.PDF pg. 12

¹⁰⁰ <http://www.sustainablecity.be/themas/sustainable-building>

Residential Subsidies¹⁰¹

Subsidy 1: Roof insulation for households

In general, most heat is lost through the roof. Therefore, careful effective insulation means a shorter heating season, reduced heating installation power, and a higher temperature of the interior walls. Consequently, energy bills can be significantly reduced and comfort increased while protecting the environment. There is a € 12 subsidy per m² of insulated surface, with a € 1 000 ceiling per dwelling. It is also possible to benefit from a 40% tax deduction under certain conditions.

Subsidy 2: Roof insulation with green roofing for households

A green roof allows a building's temperature and humidity to be regulated naturally. It increases the building's thermal inertia and can improve its insulation. It provides a significant thermal effect in summer through evaporation meaning that occupants are not tempted to fit air conditioning. There are two types of green roofing: the intensive roof (or roof garden) and the extensive green roof (or vegetated roof). For extensive green roofing, the subsidy is € 7.5 per m² of insulated surface, with a minimum of 10 m² and a maximum of 100 m² per dwelling. For intensive green roofing, the subsidy is € 15 per m² of insulated surface, with a minimum of 10 m² and a maximum of 100 m² per dwelling.

Subsidy 3: Insulation of external walls for households

After the roof, most heat tends to be lost through the walls. It is not always easy to insulate walls and it is sometimes better to enlist the help of a professional to assess and carry out the work. In existing constructions, there are three main ways to improve wall insulation: filling of existing cavity walls with an insulating material, wall insulation from the outside and wall insulation from the inside. There is a € 25 subsidy per m² of insulated surface, with a € 2 500 ceiling per dwelling.

Subsidy 4: Floor insulation for households

The choice and laying of floor insulation are often a matter for an expert. There is a € 25 subsidy per m² of insulated surface, with a € 2 500 ceiling per dwelling.

Subsidy 5: Super-insulating glazing for households

Despite their relatively small surface area compared to walls, windows are nevertheless a major source of heat loss. Compared to single glazing, efficient double-glazing reduces heat loss from glazed walls by more than two thirds. As the properties of the frame (in particular the material) also have a significant effect on the window's energy efficiency, the glazing and frame unit must be taken into account. There is a € 50 subsidy per m² of double-glazing, with a € 2 500 ceiling per dwelling. At federal level, it is also possible to benefit from a 40%

¹⁰¹ See "2007 Energy Efficiency Action Plan for the Brussels-Capital Region," pg. 26-30, www.medemip.eu

tax deduction for the cost of fitting double-glazing under certain conditions.

Subsidy 6: Mechanical ventilation with heat recovery for households

All houses must have adequate ventilation if you want the air inside to be healthy, to avoid the risk of condensation and, in certain cases, to have a sufficient quantity of air to ensure correct operation of combustion equipment. The subsidy is equivalent to 50% of the bill for supply and installation of the mechanical ventilation system, capped at € 3 000 per dwelling.

Subsidy 7: Passive/low energy housing (households)

The "passive house" concept applies to new dwellings in which the heat insulation is so effective that a conventional heating system becomes almost or even completely superfluous. The "passive house" does not exceed 15 kWh/m² per year for heating the premises. The "passive house" concept also applies to renovation. However, in this case, as the existing situation does not allow for correction of building orientation and structure problems, the energy requirements will be less strict. In this case, we talk about "low energy house", where the performance level is set at 60 kWh/m² per year of energy consumption for heating the premises. Generally speaking, there is a subsidy per dwelling of € 100 per m² of floor area up to 150 m² and of € 50 per m² of floor area above 150 m². This subsidy cannot be added to the 6 subsidies mentioned above.

Subsidy 8: External solar protection for households

Good protection against sunlight in summer, combined with appropriate ventilation, may avoid the need to fit air conditioning and increase comfort. The ideal solution is to install a solar protection system on the outside of glazing in the form of a blind or a shutter. The subsidy is 20% of the cost for supply and installation of the solar protection, capped at € 400 per dwelling.

Subsidy 9: Low-temperature (HR+)/condensation (HR TOP) gas boiler for households

A low temperature boiler is characterized by operation within water temperature ranges lower than for a traditional boiler, thus reducing energy losses and gas consumption. The condensation boiler, on the other hand, recovers a large proportion of the calories still available in the fumes, thus generating an even greater energy gain. The subsidy relates to boilers used for heating and mixed heating/hot water and amounts to 50% of the cost for supply and installation of the boiler, capped at € 150 per HR+ low temperature gas boiler and at € 500 per HR TOP condensation gas boiler. At federal level, it is also possible to benefit from a 40% tax deduction for the amount of the boiler installation under certain conditions.

Subsidy 10: Instantaneous gas water heater for households

Savings are possible, in particular through the use of instantaneous bypass gas water heaters with no pilot light, in which the gas flow automatically adjusts to hot water demand. The subsidy is 50% of the cost for supply and installation of the water heater, capped at € 200

per installation.

Subsidy 11: Thermal control in households

Thermal control is a key component of a heating system. Thermal control ensures that a comfortable temperature is maintained as and when required in different rooms. Incorrect or inappropriate adjustment is a major source of loss of thermal comfort and energy waste. There are various equipment options for thermal control: air thermostat with clock, thermostatic valves and external sensor. The subsidy is equivalent to 50% of the cost of supplying and installing the control devices, capped at € 500 per dwelling. In addition to this subsidy, the Federal Government grants a 40% tax deduction of the cost of installing a control system (thermostatic valves, air thermostat, external sensor) under certain conditions.

Subsidy 12: Heat pump for domestic hot water in households

The heat pump is a machine that transfers the calorific energy of a cold environment to a warmer environment through the intervention of mechanical energy (compressor). Rather than producing heat by burning fossil fuels, the heat pump exploits the heat present in the environment: in the water, the ground and the air. Heat is most often distributed in the dwelling by a system of low temperature underground pipes (30-35 °C), which requires all walls to be well insulated. The subsidy is 50% of the cost for supply and fitting of the heat pump, with a cap of € 2 500 per dwelling for installation of a domestic hot water heat pump and € 5 000 per dwelling for heating of the premises. Alongside this subsidy, the State grants a tax deduction of 40% of the total for the installation of a heat pump under certain conditions.

Subsidy 13: Solar water heater for domestic hot water/for additional installation of central heating in households

Thermal solar collectors transform sunlight into heat. They are used with the solar water heaters to transfer the solar energy to the water. Combined systems are also available, which enable domestic hot water and some of the heating water to be produced with the solar collectors. This system does however need a larger surface area of panels. The radiators also need to have a larger emission surface area, because it is a low temperature system (55 °C). The subsidy amounts to 50% of the total cost for supply and installation of the solar water heater with a maximum of € 3 000 per dwelling for the installation of domestic hot water heating and a maximum of € 6 000 per dwelling for installation of domestic and additional water heating for central heating of the premises. In addition to the subsidy, the end user can not only benefit from a tax deduction of 40% of the total for installation of a solar water heater (without exceeding a ceiling and under certain conditions), but also from a municipal subsidy.

Subsidy 14: Photovoltaic electricity production system for households

Photovoltaic solar collectors directly transform light into electricity. Given that the sun does

not shine at all times, it is appropriate to either use a storage system or be connected to the grid to ensure a permanent supply. This second option is more appropriate to our urban environment: when electricity production is lower than consumption, current is taken from the grid and, conversely, the grid is supplied when demand is lower than production. To do this, the installation must meet certain technical conditions of compatibility and security. The subsidy is 50% of the cost for supply and installation of the photovoltaic system, capped at € 3 000 per dwelling. At federal level, there is also a tax deduction of 40% of the total for the installation of photovoltaic panels (up to a given ceiling). Moreover, for each MWh produced, a green certificate (CV) may be obtained. Green certificates are issued annually, by fraction and on a flat rate basis for panels less than 4 m² according to the estimated electricity production.

Subsidy 15: A++ refrigerator (including combined) for households

Each household appliance is sold with a label or information sheet indicating the electricity consumption category (from A to G) to which the appliance belongs. Therefore, consumers are given objective, standardized information allowing them to choose equipment that has better energy efficiency. A category A household appliance is economical, while a category G appliance is not very economical. A "+" is added to category A to distinguish appliances that are even more economical. Category A++ designates a new generation of refrigeration equipment more economical than that in category A. This subsidy will partially cover the additional cost involved with buying an A++ appliance compared to category A. The subsidy is € 200 per A++ refrigerator.

Subsidy 16: A++ freezer for households

Category A++ designates a new generation of refrigeration equipment more economical than that in category A. This subsidy will partially cover the additional cost involved when buying an A++ appliance compared to category A. This subsidy is € 200 per A++ freezer.

Subsidy 17: Category A electric/gas tumble dryer for households

Drying laundry inside the home may cause humidity and hygiene problems. Heating the air and cooling it requires a lot of energy. It is not surprising therefore that tumble dryers are high energy-consuming machines. The vast majority of models have energy label C. Some more economical models are coming onto the market. Tumble dryers with label A are rather uncommon. The subsidy therefore seeks to make this more efficient category more accessible. Moreover, there are tumble dryers which operate on natural gas and which are much more efficient than electric tumble dryers. The amount of the subsidy will depend on the type of tumble dryer. Thus, € 200 will be granted for each category A electric tumble dryer and "400 for each gas tumble dryer.

In addition to the subsidies outlined above, under renovation subsidies arranged by the Housing Department of the Territory and Housing Planning Administration, the Region offers subsidies, in the event of renovation of a building used for housing, for heat insulation, for

work done to the building shell (rendering, cladding, frames and doors) and for installation of heating and hot water production systems. The content and amount of the subsidies are defined in Articles 8 to 10 of the ministerial decree relating to the conditions for application of the decree of the Government of the Brussels-Capital Region of 13 June 2002 on granting subsidies for housing renovation.

Collective Housing Subsidies¹⁰²

Collective housing subsidies are available to the following stakeholders with an operating base, registered office, main establishment or management office in the Brussels-Capital Region: Public Service Real Estate Company (SISP), Communal Land Management Agency (RFC), CPAS (Public Social Action Centre), Social Real Estate Agency (AIS), and Joint Building Ownership with or without legal personality. Eligible buildings must have at least two dwellings. Eligible studies and investments must affect the whole of the building.

Subsidy 1: Energy audit for collective housing

The energy audit is a method that assesses the energy features of a building and its installations or those of a production process. The aim is, after creating a report of the energy consumptions of a building or a process taking into account its characteristics and its uses, to identify areas for energy efficiency improvement depending on technical and economic possibilities. The subsidy amounts to 50% of the cost of the study.

Subsidy 2: Feasibility study for collective housing

The feasibility study seeks to determine the design and the technical, energy and economic characteristics of a specific energy-saving investment without making any reference to a type or a specific brand relating to this investment. Specific investment is taken to mean any investment which does not correspond to equipment and installations currently in use and which requires a specific design study. Traditionally, this is a technical and economic study that assesses the benefit of installing a specific technology compared to a traditional or pre-existing technology. The subsidy amounts to 50% of the cost of the study.

Subsidy 3: Energy design study for a future collective housing building

An energy design study is an analysis of future energy consumptions of the building, prior to its construction, including any possible variations. It is carried out in particular by computer simulation. Its purpose is to optimize the characteristics of the building structure and the equipment installed as well as their suitability. It incorporates an assessment of future operating costs, so that the contracting authority may make choices based on overall costs

¹⁰² See “2007 Energy Efficiency Action Plan for the Brussels-Capital Region,” pg. 31-34, www.medemip.eu

(investment and operating costs). The subsidy amounts to 50% of the cost of the study.

Subsidy 4: Energy accounting for collective housing

Energy accounting enables energy consumption of a building to be monitored over time and clarification of the decisions to be made in terms of energy management of this building. It is an accounting system for energy fluxes, firstly to create a tool for making energy management decisions in particular through the collection, processing and communication of information relating to energy vectors consumed by each technical operation unit, by department or by use, secondly to establish consumption ratios and thirdly to raise the alarm where necessary and enable control of energy consumption deviations. The scale of the arrangements must be assessed according to the size of the building and its installations. The subsidy amounts to 50% of the cost for supply and installation of the equipment.

Subsidy 5: Cogeneration facility

The investments permitted are for high-quality cogeneration facilities, including the electrical connection required for the needs of a building or several neighbouring buildings. Trigeneration is not eligible. It is useful to consult the electricity distribution system operator on the technical connection and metering conditions applicable to private electricity generation facilities. All the equipment and implementation thereof must comply with applicable technical provisions that are available from Sibelga. The subsidy amounts to 20% of the total investment for high-quality cogeneration (including installation studies).

Subsidy 6: Relighting of collective housing communal areas

Relighting is a rational use of energy (RUE) technique to improve the lighting system of a room according to its use. Using this technique, users will have better lighting, will consume less energy, will need to use air conditioning less and will reduce their polluting gas emissions. In other words, their energy consumption will be improved. The subsidy amounts to 30% of the invoice total.

Subsidy 7: ventilation/cooling for collective housing

All work involved with installing a speed regulator on ventilation compressors, pumps and systems benefits from this subsidy, which amounts to 20% of the cost for supplying and fitting the frequency regulator, with a cap of € 5 000 per substation.

Subsidy 8: Insulation of the building roof for collective housing

This subsidy works in the same way as Subsidy 1 for the residential sector. There is a € 12 subsidy per m² of insulated surface, with a € 1 000 ceiling per dwelling.

Subsidy 9: Green roofing for collective housing

This subsidy works in the same way as Subsidy 2 for the residential sector. For extensive green roofing, the subsidy is € 7.5 per m² of insulated surface, with a minimum of 10 m² and a maximum of 100 m² per dwelling. For intensive green roofing, the subsidy is € 15 per m²

of insulated surface, with a minimum of 10 m² and a maximum of 100 m² per dwelling.

Subsidy 10: Insulation of external walls for collective housing

This subsidy works in the same way as Subsidy 3 for the residential sector. There is a € 25 subsidy per m² of insulated surface, with a € 2 500 ceiling per dwelling.

Subsidy 11: Floor insulation for collective housing

This subsidy works in the same way as Subsidy 4 for the residential sector. There is a € 25 subsidy per m² of insulated surface, with a € 2 500 ceiling per dwelling.

Subsidy 12: Super-insulating glazing for collective housing

This subsidy works in the same way as Subsidy 5 for the residential sector. There is a € 50 subsidy per m² of double-glazing, with a € 2 500 ceiling per dwelling.

Subsidy 13: Mechanical ventilation with heat recovery for collective housing

This subsidy works in the same way as Subsidy 6 for the residential sector. The subsidy is equivalent to 50% of the cost for supply and installation of the mechanical ventilation system, capped at € 3 000 per dwelling.

Subsidy 14: Passive/Low energy collective housing construction

This subsidy works in the same way as Subsidy 7 for the residential sector. Per dwelling, there is a subsidy of € 100 per m² of floor surface up to 150 m² and € 50 per m² of floor surface over 150 m². There are various limitations to this subsidy.

Subsidy 15: External solar protection for collective housing

This subsidy works in the same way as Subsidy 8 for the residential sector. The subsidy is 20% of the cost for supply and installation of the solar protection, capped at € 400 per dwelling.

Subsidy 16: Pipe insulation for collective housing

There is a subsidy of up to 20% of the cost with a cap of € 5 000 per building.

Subsidy 17: Condensation boiler for collective housing

All work involved with installing a condensation gas boiler is eligible for the subsidy. The subsidy is € 10 per kW of rated power installed with a minimum of € 400 and a ceiling of € 10 000.

Subsidy 18: Instantaneous gas water heater for collective housing

This subsidy works in the same way as Subsidy 10 for the residential sector. The subsidy is 50% of the cost of supply and installation of the water heater, capped at € 200 per installation. The subsidy is aimed at the installation of individual instantaneous gas water heaters in collective housing. The subsidy is multiplied by the number of dwellings.

Subsidy 19: Thermal control for collective housing

This subsidy works in the same way as Subsidy 11 for the residential sector. The subsidy is equivalent to 50% of the cost of supply and installation of the control devices, capped at € 1 000 per boiler room.

Subsidy 20: Heat pump for collective housing

This subsidy works in the same way as Subsidy 12 for the residential sector. The subsidy is 50% of the cost of supplying and fitting the heat pump, with a cap of € 2 500 per dwelling for installation of a domestic hot water heat pump and € 5 000 per dwelling for heating of the premises.

Subsidy 21: Solar water heater for collective housing

This subsidy works in the same way as Subsidy 13 for the residential sector. The subsidy is 50% of the total costs for supply and installation of the solar water heater with a maximum of € 3 000 per dwelling for the installation of domestic hot water heating and a maximum of € 6 000 per dwelling for installation of domestic and additional water heating for central heating of the premises.

Subsidy 22: Photovoltaic collective electricity production system for collective housing This subsidy works in the same way as Subsidy 14 for the residential sector. The subsidy is 50% of the cost of supply and installation of the photovoltaic system, capped at € 3 000 per dwelling.

Tertiary Sector Subsidies¹⁰³

The subsidies for the tertiary sector and industry are available to the owners of public sector buildings in Brussels, non-commercial bodies, undertakings and the self-employed in the Brussels- Capital Region and federations representing a sector of activity.

Subsidy 1: Energy audit for the tertiary sector

This subsidy works in the same way as Subsidy 1 for collective housing. The subsidy amounts to 50% of the cost of the study.

Subsidy 2: Feasibility study for the tertiary sector

This subsidy works in the same way as Subsidy 2 for collective housing. The subsidy amounts to 50% of the cost of the study.

¹⁰³ See “2007 Energy Efficiency Action Plan for the Brussels-Capital Region,” pg. 38-40, www.medemip.eu

Subsidy 3: Energy design study for a future tertiary sector building

This subsidy works in the same way as Subsidy 3 for collective housing. The subsidy amounts to 50% of the cost of the study.

Subsidy 4: Energy accounting for the tertiary sector

This subsidy works in the same way as Subsidy 4 for collective housing. The subsidy amounts to 50% of the cost for supply and installation of the equipment.

Subsidy 5: Cogeneration facility for the tertiary sector

This subsidy works in the same way as Subsidy 5 for collective housing. The subsidy amounts to 20% of the total investment for high-quality cogeneration (including installation studies).

Subsidy 6: Use of renewable energy tertiary sector

Investments eligible for the subsidy are for installations using energy from renewable sources and which are designed above all to meet the needs of the building. Renewable energies are understood to mean any energy source, other than fossil fuels and nuclear fission, the consumption of which does not limit its future use, in particular hydraulic energy, solar energy, geothermic energy, biogas, organic products and waste from agriculture and forestry arboriculture and the organic biodegradable fraction of the waste. This also includes the use of heat pumps insofar as there is a net gain in primary energy over the annual result of the installation. Before any private generation installation that can function in parallel, contact must be made with the electricity distribution network operator regarding the technical connection and metering conditions. The installation (equipment and implementation) must comply with applicable technical provisions (available from Sibelga). The subsidy is 40% (including studies) for the use of renewable energy sources.

Subsidy 7: Installation of a heat network for tertiary sector buildings

The subsidy is 30% of the cost of making an investment (including studies).

Subsidy 8: Heat insulation of tertiary sector building walls

This subsidy applies for all work carried out to achieve overall heat transmission coefficients for the walls lower than or equal to the reference threshold values. In addition, any investment in insulation must be accompanied by an analysis of the wall's future hygrothermal behaviour and information relating to the relative future humidity of the insulated premises (with potential suggestions for improving ventilation). The subsidy is 30% of the cost of making an investment (including studies).

Subsidy 9: Replacement or improvement of any tertiary building heating system

The system must fall within one of the following categories:

- Condensation boilers;
- Partitioning work on the heat distribution system (zone heating);

- Thermostatic valves suitable for the type of usage of the premises;
- Control systems;
- Any other work relating to heating installations that is designed so that the heating system (boiler, heat distribution and control) is particularly efficient, namely a system which, on the one hand, develops a higher level of energy efficiency than a traditional system and, on the other hand, enables heat distribution and control adapted to the principles of rational use of energy for the building's different uses.

The subsidy is 30% of the cost of making an investment (including studies).

Subsidy 10: Lighting systems for the tertiary sector

In order to benefit from the subsidy, replacement of the lighting system must meet certain conditions. On design, the choice of the lights and fittings to be fitted should be such that it cannot lead to an average level of lighting more than 20% higher than the requirements of Belgian standard NBN EN 12464-1 (NBN EN 12193 for sports facilities).

The subsidy is 30% of the cost of making an investment (including studies).

Subsidy 11: Optimization of the lighting system operation in the tertiary sector

Investments eligible for the subsidy are those relating to timers, possible associated with sensors, in passageways, corridors and toilets; on-off or continuous control of the light level according to the natural lighting of the room; dual circuits for reduced lighting. The subsidy is 30% of the amount invested (including studies).

Subsidy 12: Rotating electrical equipment for the tertiary sector

This relates to any rotating electrical equipment (pumps, fans, compressors) with a motor fitted. As regards heating, ventilation or refrigeration installations, it must be fitted with automatic control suitable for the actual needs of the building and its occupants.

The subsidy is 30% of the amount invested (including studies).

Subsidy 13: Any ventilation and cooling equipment for the tertiary sector

The equipment must fall within a given category. The subsidy is 30% of the amount invested (including studies).

Subsidy 14: Any equipment or system for improving energy efficiency in the tertiary sector

The equipment must be particularly efficient, i.e. any equipment or system which develops a higher level of energy efficiency than normal and must fit with the principles of rational use of energy for the different uses of the building in question. The subsidy is 30% of the amount invested (including studies).

Subsidy 15: Energy efficiency actions in the tertiary sector

Any professional federation representing a particular Brussels sector may submit an application for a grant to cover 100% of any action that seeks to improve energy efficiency

and the use of renewable energy sources for the benefit of a large number of institutions or stakeholders in their sector in Brussels. This may involve organization of a seminar or training session, conducting research, a support mission, creation of an information brochure, etc. The aim is to improve the energy efficiency, namely the reduction of primary non-renewable energy consumption to meet the final energy needs.

Evolution of the Subsidy System

In the past three years, the subsidy system has evolved, based on constant review and analysis of market adaptations and practices. For example, in 2010 Brussels regional authorities decided to reduce the subsidies for solar panels. The reasons for this decision were practical. On the one hand, 2009 saw a peak in applications for solar panel subsidies, yet the panels were often installed on badly isolated buildings, which significantly decreases performance. On the other hand, the cost of solar panels decreased with time. As a result, Brussels authorities decided to reduce (but not to eliminate) the solar panel subsidies. Instead, the idea is to place more emphasis on construction improvements, such as insulation subsidies.¹⁰⁴

On July 19, 2012 the Brussels Regional government decided to augment some regional energy subsidies, effective immediately. The decision came in response to the abrupt move on behalf of the Federal Government to eliminate tax breaks for energy-efficient buildings.¹⁰⁵

The policy change affects the following subsidies:¹⁰⁶

- The exterior wall insulation subsidy was doubled, reaching 110 €/m²;
- The double glazing subsidy was tripled, reaching 130 €/m²;
- The condensing boiler subsidy was doubled, reaching 1 600 €;
- The heat pump subsidy was doubled, reaching 4 750 €;
- The solar water heater subsidy was increased by 50%, reaching 3 500 €.

¹⁰⁴ <http://www.livios.be/fr/build/dozz/build/lowe/9681.asp?content=Bruxelles%20croit%20en%20la%20construction%20passive>

¹⁰⁵ <http://www.bruxellesenvironnement.be/Templates/news.aspx?id=31981&langtype=2060>

¹⁰⁶ <http://www.lalibre.be/actu/bruxelles/article/750948/de-nombreuses-primas-energies-vont-etre-doublees-a-bruxelles.html>

The recent increase in energy subsidies, aimed at avoiding a crisis in passive construction, once again illustrates one of the key success factors in the Brussels model: a high-level commitment of the regional government.

Green Loans

Also part of the 2004 policy framework package, the green social loan (*prêt vert social*) is a zero-interest loan provided to individuals who wish to isolate their homes, thereby reducing energy consumption in line with the passive standard criteria. CREDAL, a credit cooperative based in Brussels, provides the funds, while Brussels Environment acts as an intermediary.

The loans are specifically targeted to low-income families, for whom the burden of increased renovation costs is the heaviest.¹⁰⁷ For low-income families, house renovations to improve energy efficiency are not an attractive investment, because the initial costs are high, and the benefits (in the form of a lower energy bill) are slow to come. In this context, the green social loan aims to offset some of the initial insulation costs. Both homeowners and leaseholders can apply for loans in the range of 500 € to 20,000 €.

Green loans are granted for two types of house renovations:¹⁰⁸

- 1) Insulation: roof, exterior walls, sun, super-insulating windows, and controlled mechanical ventilation;
- 2) Effective heating: gas-condensing boilers, gas instantaneous water heaters, and thermal regulation devices (thermostatic valves, room thermostats).

The specific conditions to apply for a green loan are as follows:¹⁰⁹

- 1) To possess a net monthly income of 1.088 € for individual candidates / 1.484 € for couples; or brute annual income of 30.000 € for individual candidates / 60.000 € for couples;
- 2) To accept the granting conditions of Brussels Environment;
- 3) To repay the loan within the following periods, depending on the amount of the loan¹¹⁰:

¹⁰⁷ <http://www.sustainablecity.be/themas/sustainable-building>

¹⁰⁸ See the green social loans flyer, available through <http://www.bruxellesenvironnement.be/Templates/Particuliers/informer.aspx?id=3026>

¹⁰⁹ See the green social loans flyer, available through <http://www.bruxellesenvironnement.be/Templates/Particuliers/informer.aspx?id=3026>

- 500 € - 18 months
- From 501 € to 2.500 € - 24 months
- From 2.501 € to 3.700 € - 30 months
- From 3.701 € to 5.600 € - 36 months
- From 5.601 € to 7.500 € - 42 months
- From 7.501 € to 10.000 € - 48 months

As an instrument especially tailored to ensure buy-in from the most vulnerable social group, the green social loan is an integral element of the Brussels success model.

Federal Tax Reductions for Passive Construction

In 2009, the Federal Government offered tax breaks for efficient buildings. Thus, a building defined as “low-energy” obtained a tax reduction of € 420, a passive building - € 850, and a zero-energy building € 1.700. The tax breaks were valid for a period of 10 years, and were renewable annually, provided that the building continued to adhere to passive construction guidelines.¹¹¹

However, in November 2011 the Federal Government eliminated federal tax breaks for low energy buildings. Consequently, the probability for passive construction in the Brussels-Capital Region plummeted. By June 2012, the demand for energy subsidies was 50% lower, in comparison with the previous year.¹¹² Aiming to compensate for the loss of federal subsidies, the regional government of Brussels doubled certain energy subsidies (see **2.3 Evolution of the Subsidy System**).

¹¹⁰ http://www.credal.be/index.php?option=com_content&task=view&id=51&Itemid=64

¹¹¹ <http://www.questionscapitales.be/2011/que-vous-rapporte-fiscalement-une-maison-passive/>

¹¹² <http://www.7sur7.be/7s7/fr/3007/Bruxelles/article/detail/1473072/2012/07/20/Des-primas-energie-revues-a-la-hausse-a-Bruxelles.dhtml>

KEY STAKEHOLDERS INVOLVED

Sustainable Building Facilitator Network

For those individuals, groups or businesses that wish to build or renovate in line with passive standards, the Region has provided a network of support specialists (facilitators) since 2008. Since 2011, this specialist network service has been centralized under Brussels Environment under a new name: Sustainable Building Facilitator Network (*Facilitateur Bâtiment durable*).¹¹³

All facilitators are renowned professionals with ample experience and an established expertise in the area of energy efficiency. Their mission is to offer impartial, independent consulting services on energy consumption management, rational use of energy (RUE) and promotion of renewable energy, at every stage of a project.¹¹⁴ While they do not replace the architect, the design office or the installer, they provide free-of-charge guidance and recommendations in all areas related to management, renovation or construction of passive buildings.¹¹⁵

The facilitators are experts in the following areas:

- Tertiary building sector;
- Collective housing;
- Eco-construction;
- Renewable energy;
- Cogeneration;
- The legal framework for Energy Performance of Buildings (EPB);
- Passive building.

Facilitators offer the following services:¹¹⁶

- Technology and supplier information;

¹¹³ <http://www.ceraa.be/index.php?rub=le-facilitateur-eco-construction-de-la-region-de-bruxelles-capitale>

¹¹⁴ See “2007 Energy Efficiency Action Plan for the Brussels-Capital Region,” pg. 15, www.medemip.eu

¹¹⁵ http://documentation.bruxellesenvironnement.be/documents/BxlVilleDurable_ANGL.PDF pg. 12.

¹¹⁶ See “2007 Energy Efficiency Action Plan for the Brussels-Capital Region,” pg. 16, www.medemip.eu

- Identification and assistance in compiling administrative files for financial aid;
- Top-level technical expertise with permanent telephone and e-mail support, critical review of specifications, supervision of research and specific guidance (namely closer monitoring of certain project sponsors);
- Information on energy-related tools;
- Guidance at the different stages of an "energy" strategy;
- Help with energy analysis of buildings;
- Supervision of construction and renovation projects;
- Comparison of commercial offers for any energy installation.

Facilitators are classified according to their mission and activities, as follows:¹¹⁷

- **Collective housing facilitators:** deal with managers of collective public housing, apartment blocks or co-ownerships. In addition to the services mentioned above, they provide: comparison of bids for lighting, heating and domestic hot water production systems, review of feasibility studies, and review of specifications.
- **Tertiary sector facilitators:** deal with private or public institutions (hospitals, rest homes, office buildings, swimming pools, schools, businesses, service companies, etc.)
- **Cogeneration facilitators:** deal with large buildings: offices, swimming pools, hotels, collective housing, etc. It provides methodological assistance in project management, cogeneration design and financial viability assessment. In Brussels, there is particularly cost-effective and underexploited potential.
- **Renewable energy facilitators:** provide assistance with renewable energy tools and services, especially for large projects (for instance, a thermal solar installation with more than 25 m² of panels). Smaller projects consult with the non-profit organisation APERE (*Association pour la Promotion des Énergies Renouvelables*).
- **Green building facilitators:** highly specialized experts that target the construction sector. Green building facilitators offer consulting in all areas of eco-construction. Their mission is to promote the green building tools of Brussels Environment, to raise awareness of green building, and to push green building forward by identifying obstacles and proposing adequate solutions.

¹¹⁷ See "2007 Energy Efficiency Action Plan for the Brussels-Capital Region," pg. 16, www.medemip.eu

- **Eco-district facilitators:** offer consulting to a wide range of public and private actors (architects, designers, investors, as well as municipalities), on making their district sustainable.

For a list of past and future facilitator seminars and presentations, see:

<http://www.bruxellesenvironnement.be/templates/news.aspx?id=33400&langtype=2060&site=pr>

The Employment-Environment Alliance

The Employment-Environment Alliance (*Alliance Emploi-Environnement*, or AEE) is an example of how the Brussels government stimulates the market from the top, yet all the way placing a premium on bottom-up solutions. The creation of AEE embodies the decision of the regional authorities to adopt a new working method. Instead of defining priorities and imposing respective solutions from the top, the government calls on key stakeholders to propose solutions.¹¹⁸ The AEE comprises professional organizations, unions and other organizations working in the area of environmental protection. It operates on the basis of a participatory approach. The members draft open collaboration proposals while sharing information and best practices.¹¹⁹

AEE arose as a response to the exploding demand for eco-construction in the Brussels-Capital Region.¹²⁰ It acts on two levels: one intended to stimulate demand (in progress), the other intended to support the development of supply.¹²¹

To this end, AEE mobilizes and coordinates the activities of public, private, and non-governmental actors along a shared goal: the development of economic industries related to the environment. Sustainable construction is one of the three major work axes of the Alliance.¹²² The overarching goal of AEE is to stimulate the most promising economic sectors in terms of growth and employment, and to support them in their transition towards more sustainability, thereby improving the competitiveness of companies and enhancing the

¹¹⁸ See Evelyne Huytebroeck's speech from October 14, 2010, available at: www.evelyne.huytebroeck.be

¹¹⁹ http://documentation.bruxellesenvironnement.be/documents/BxlVilleDurable_ANGL.PDF pg. 14.

¹²⁰ <http://www.sustainablecity.be/themas/sustainable-economy>

¹²¹ http://www.bruxellesenvironnement.be/uploadedFiles/Contenu_du_site/Professionnels/Themes/Emploi_et_%C3%A9conomie/07_Alliance_Emploi_Environnement/ficheactions_fr.pdf pg. 13.

¹²² <http://www.brusselsgreentech.be/en/component/k2/item/136>

employability of Brussels residents, including low-skilled workers.¹²³ Quality job creation in sustainable construction, mainly for masons, chapistes, façade builders, roofers, carpenters, glaziers, heating and sanitation specialists (installation and maintenance), electricians, architects, and technical engineers, is one of the organization's main goals. Specifically, the Alliance strives to generate 2.500 new jobs.¹²⁴

The work of AEE can be divided into three different stages:¹²⁵

- **Stage 1: Analysis.** At this first stage, the goal is to identify the potential total employment, on the basis of available studies, current projects and contacts with field operators.
- **Stage 2: Development.** During the development phase, joint public-private working groups will be established. They will focus on priority projects estimated in this sector.
- **Stage 3: Implementation.** During the implementation phase, planned actions will be carried through. The process includes a review by a monitoring committee.

AEE's Action Plan for 2012 outlines the main areas of action and working methodology of the organization, as follows:¹²⁶

Professionalization: The first conversion propeller of the sector towards more sustainable construction is the acquisition by entrepreneurs, managers and workers alike, of a higher level of professionalization. In this area, the Employment-Environment Alliance is to take the following actions:

- Develop benchmarks of more environmentally friendly techniques, and materials for the construction sector;
- Create a "one-stop-shopping" webpage, making information on all aspects of sustainable construction available to all interested parties;
- Expand the professional development training offer, particularly for independent persons, very small enterprises, and other collaborators;

¹²³ http://www.bruxellesenvironnement.be/uploadedFiles/Contenu_du_site/Professionnels/Themes/Emploi_et_%C3%A9conomie/07_Alliance_Emploi_Environnement/ficheactions_fr.pdf pg. 3.

¹²⁴ <http://www.bruxellesenvironnement.be/templates/news.aspx?id=28961&langtype=2060&site=pr>

¹²⁵ <http://www.res-sources.be/bruxellesallianceemploi-environnementaxed%C3%A9chetscestparti>

¹²⁶ http://www.bruxellesenvironnement.be/uploadedFiles/Contenu_du_site/Professionnels/Themes/Emploi_et_%C3%A9conomie/07_Alliance_Emploi_Environnement/ficheactions_fr.pdf pg. 15-19.

- Elaborate a training module on insulation-airtightness-ventilation, targeting sector professionals;
- Constitute a value chain of companies able to meet market demands;
- Establish and support clusters (vertical and horizontal) of companies able to meet the quality requirements of the market environment;
- Customize and make more more accessible the support services of Brussels Region Public Employment Organization (ACTIRIS) to companies, especially in matters of employment;
- Strengthen and improve regional assistance for companies already active or engaging in sustainable construction;
- Mobilize Social Economy regarding promising niches of low-qualified work in the field of sustainable construction;
- Organize the improvement of services offered by social economy enterprises.

Employee training: To move towards sustainability, companies will have to adapt and improve the skills of their employees. This is because sustainable construction by itself does not automatically lead to the creation of new professions. Rather, existing professions have to adapt to new ways of working. To speed up the conversion of the sector, and to ensure a high level of technical quality, companies will need to resort to providing professional development opportunities to their workers. Thus, the Employment-Environment Alliance commits to:

- Study and create two instruments that facilitate access to business training, namely: a sustainable construction "Catalyst Fund," and "professional development cheques";
- Create a platform to identify the professional development needs of businesses, and stimulate companies to take advantage of training opportunities;
- Adapt training benchmarks to the challenges of sustainable construction;
- Create a network of training operators active in the field of sustainable construction;
- Establish a strategy to increase the number of trainers in sustainable construction (with priority: insulation, airtightness specialists), and ensure constant training of the trainers;
- Develop an insulation-airtightness training module for professionals;
- Extend the supply of professional development opportunities to independent persons, very small enterprises, and others.

Sales: The challenge for a company that already decided to engage in sustainable construction is to carry out its first project, which helps evaluate its mastery of the processes and techniques of implementation, establishes a network of suppliers, and identifies real risks and real sources of additional costs related to sustainable construction. Governments can support companies in their sales in several ways, for instance by introducing specific clauses in public procurement. The Employment-Environment Alliance commits to:

- Promote the Ecobuild Cluster among individuals;
- Constitute a value chain of companies able to meet market demands in Brussels;
- Establish and support clusters (vertical and horizontal) of companies able to meet the quality requirements of the market;
- Mobilize Social Economy regarding promising niches of low-qualified work in the field of sustainable construction;
- Create an "information packet" on all regional aids for sustainable construction;
- Analyze the implementation of systems for declaration of environmental performance of building materials (EPD);
- Have a tool to use environmental information, in line with the "life cycle" approach;
- Reinforce the "lead by example" approach of the regional authorities in introducing verifiable environmental performance requirements in public procurement;
- Introduce environmental clauses in the Contract documents for construction and renovation;
- Develop guidance tools (checklists, standard specifications and datasheets) for construction works most frequent among individuals (insulation, replacement boilers and chassis).

Honouring of Commitments: Once the sale is completed, the company will honor its commitments, which means ensuring a comfortable and fast access to the materials and instructions for implementation, as well as uncovering new techniques and new materials, with the efforts of research and innovation these actions imply. This, the Employment-Environment Alliance aims to:

- Stimulate innovation;
- Provide a platform for research in sustainable construction;
- Promote research and innovation in the renovation of existing buildings;
- Promote research and innovation in the field of materials for sustainable construction;
- Define and mobilize tools for research and innovation for small projects;
- Constitute a value chain of companies able to meet market demands in Brussels;
- Establish and support clusters (vertical and horizontal) of companies able to meet the quality requirements of the market;
- Mobilize Social Economy regarding promising niches of low-qualified work in the field of sustainable construction.

Gaining market recognition: Companies that have capitalized on their first experiments, and can be regarded as competent in the field of sustainable construction, must be recognized as such on the market. Here, the contribution of the Alliance is to set up a visible and recognized set of labels. The Employment-Environment Alliance will:

- Label the actors (companies and professions);
- Reinforce the “lead by example” approach of the regional authorities in introducing verifiable environmental performance requirements in public procurement.

Company growth: A company that has successfully moved towards sustainable construction should logically grow, given the increasing demand for sustainable goods and services. Managing growth is not easy, as many companies have encountered too many unexpected costs that grow too fast. The Employment-Environment Alliance will:

- Help companies manage their growth and transformation through promotion of existing support tools;
- Strengthen and improve regional assistance for companies already active or engaging in sustainable construction;
- Expedite a study of space access (installation, storage, etc.) for companies in sustainable construction

Investment: Companies must be able to finance their growth, and to access funding mechanisms and information. The Employment-Environment Alliance will:

- Create a permanent credit information mechanism for sustainable construction companies;
- Create an "information packet" of all regional aids for sustainable construction;
- Facilitate access to credit for businesses that initiate and or are active in sustainable construction;
- Foster the creation of social economy enterprises active in sustainable construction through financial incentives on startup

Recruitment: Through the training of job seekers but also of youth in secondary education system, companies must make sure that their future employees meet the new requirements of the construction sector. In this area, the Employment-Environment Alliance will:

- Organize pilot projects in education institutions in Brussels;
- Create a "week of sustainable construction professions";
- Organize a "launching the schools and sustainable construction initiative" roundtable;
- Deploy a strategy for teacher training;
- Organize visits of construction sites and businesses for students;
- Raise awareness of sustainable construction in schools and training centers;
- Adapt training benchmarks to sustainable construction;
- Establish a mapping of education stakeholders;
- Create a Joint Working Group, to discuss content material in educational institutions;

- Develop an insulation-airtightness training module for job-seekers;
- Establish a strategy to increase the number of trainers in sustainable construction;
- Improve the matching between supply and demand of the labor market in the area of sustainable construction.

In addition, the Employment-Environment Alliances engages in the following overarching activities:

- Establish an annual scoreboard of the construction sector (state of the market, employment, training, education, government financial aid) for actors involved in the development of sustainable construction;
- Constitute a technical committee to facilitate technical and pedagogical transfer of know-how;
- Build a common glossary for Brussels-Wallonia-Flanders.

Brussels Enterprise Agency (BEA)

The Brussels Enterprise Agency (BEA) is another initiative of the Brussels government authorities, created in 2003. Its purpose is to provide free, unbiased information and consulting services to individuals interested in starting a business in the Brussels-Capital Region.

In addition, the BEA collaborates closely with innovative businesses that show particular promise, and are deemed important for the Region. Green building and green technologies are considered areas of crucial importance, where BEA offers substantial project support.¹²⁷

For instance, in November 2006 the BEA created the **Ecobuild Cluster** – an eco-construction cluster in Brussels that works as an interface for more than 50 businesses. The goal of the cluster is to serve as an umbrella organization for the complete range of Brussels-based sustainable construction actors.¹²⁸ The Cluster members are organized in the following seven categories:¹²⁹

- Architecture firms;
- Engineering and building services and equipments firms;
- Contractors;

¹²⁷ <http://www.brussels.irisnet.be/about-the-region/regional-bodies/agence-bruxelloise-pour-lentreprise-abe>

¹²⁸ http://documentation.bruxellesenvironnement.be/documents/BxlVilleDurable_ANGL.PDF pg. 14.

¹²⁹ [http://ecobuild.b2b-match.com/index.php?page=cat_par¶ms\[id\]=132](http://ecobuild.b2b-match.com/index.php?page=cat_par¶ms[id]=132)

- Sustainable material and product producers or merchants;
- Property developers;
- Renewable energy companies;
- Partners (universities/research centres/non-profit associations).

Among the services provided by the Cluster are: strategic networking, information and best-practice sharing (through presentations and seminars), promotion of the enterprises, and opportunities to work with partners abroad.

Plateforme Maison Passive (PMP)/ Passiefhuis Platform (PHP)

*Plateforme Maison Passive (PMP) and Passiefhuis Platform (PHP) are sister non-profit organizations, leaders in the promotion of energy-efficient construction.*¹³⁰

Plateforme Maison Passive (PMP) works in the francophone part of Belgium. 31 individual members and 22 enterprises, all concerned about energy efficiency, founded PMP in 2006. Its mission is to raise public awareness about the passive standard, to offer professional development opportunities and consulting services, to certify passive and zero-energy buildings, and to set standards related to energy in construction.¹³¹

One of PMP's main activities is to consult individuals and groups on passive building. In Brussels, the first session is free of charge, while the cost of any additional sessions depends on the type of construction project that the clients are interested in (tertiary or residential). In the Walloon region, PMP's services are free of charge. PMP also provides a wide variety of basic and advanced professional development opportunities related to the passive standard.

Currently, PMP offers professional development courses in the following areas:

- Summer internships (for professionals in the construction industry);
- Passive Building (beginner and advanced courses) for the residential and tertiary sectors;
- Use of WUFI software;
- Dynamic simulation;
- Use of PHPP software;
- Use of Therm software.

¹³⁰ http://documentation.bruxellesenvironnement.be/documents/BxlVilleDurable_ANGl.PDF pg. 8-13.

¹³¹ <http://www.maisonpassive.be/?-Presentation-de-la-PMP->

Passiefhuis Platform (PHP) was founded in 2002, and serves the Flemish part of Belgium. Its mission and activities closely mirror those of PMP. PHP's membership body includes leading actors in the building industry: individuals, firms and institutions committed to sustainable construction and energy-efficient technology development.

The goal of PHP is to stimulate the construction of buildings with very low energy requirements, based on the passive house concept. On the one hand, PHP acts as a hub of companies involved in the passive house concept. On the other hand, PMP provides as much information as possible to all parties interested in energy-efficient construction.¹³²

The principal activities of PHP include:¹³³

- Promotion of the passive house standard: especially in the house-building and tertiary sectors. This includes granting quality certificates to recognize potential, as well as completed passive construction projects;
- Professional consulting on how to carry out passive housing projects;
- Documentation of passive houses, as well as publications on passive building;
- Funding of innovative passive construction ideas and technologies.

PHP's target audience is multi-disciplinary, and includes members of architects, builders, engineers, consultants, local governments, and companies building sector. Currently, PHP has 15 staff members: technical advisors, R&D experts, communication and events experts, and administrative support.

PLANNING AND DESIGN CAPACITY

Courses in higher education institutions: involvement of all stakeholders

Since the passive standard became a compulsory norm in the Brussels-Capital Region, there arose a need to train building sector professionals via universities, vocational schools, and various training centres. Nowadays, there are a few training initiatives for passive house and NZEB. Some are organized by Brussels Environment, some by PMP/PHP, and others at

¹³² Email correspondence with Irena Kondratenko, Research Projects Coordinator, Passiefhuis-Platform. August 23, 2012.

¹³³ "Passiefhuis-Platform vzw: The reflex for passive and low energy architecture." Flyer provided by Irena Kondratenko, Research Projects Coordinator, Passiefhuis-Platform. August 23, 2012.

different training centres and educational facilities in the Brussels region. A broad-spectrum commitment is the only way to ensure that all the sector's stakeholders receive the necessary training. As part of the "standardisation" of the passive standard, it is essential to work via partnerships with all stakeholders concerned: federations, training centres, associations, universities, vocational schools, etc. What remains to be done is to extend the training program to secondary and primary schools.

In relation to the bulk of the project and the standardisation of the compulsory passive standard, the sector has already reacted by requesting the introduction of certification and quality insurance process.

The quantity and diversity related to know-how about the passive standard require the integration of the quality control processes that already exist for all public buildings (in Brussels Region) or on a voluntary basis in the private sector. Thus, current control bodies have assimilated the passive standard.

There are European norms for training and execution of the work (NBN EN ISO/IEC 17020:2004 replacing EN 45004) and certification of persons (NBN EN ISO/IEC 17024). Launching the CoQual label (construction quality certification) has been a Belgian national initiative.

In 2009, Brussels Environment decided to develop a professional development program for conceptors, engineers, architects, and contracting authorities. A core premise of the training is a very good conception of a building. Thus, in the Brussels-Capital Region, PMP introduced training for designers in 2005, and for builders in 2007. Today, the training program involves the entire sector (developers, investors and promoters, building managers, property managers, notaries, maintenance companies, etc.) With the help of experts, Brussels Environment spends 18.000 training hours each year on topics of energy, material, water management, biodiversity, land use, and comfort, among others.¹³⁴ PMP's training program enables contractors to talk (train) other contractors, investors to talk (train) investors, etc.

PMP has also been very active in organizing a variety of training courses. Passivehouse training at PMP is tailored to the client: this is necessary because, for instance, tertiary sector clients have different needs from private individuals. For the tertiary sector, PMP has created specific guidelines. PMP officials consider that tailoring training programs is as important as it is appreciated. Awareness raising is also crucial, because many misconceptions persist about passive houses.

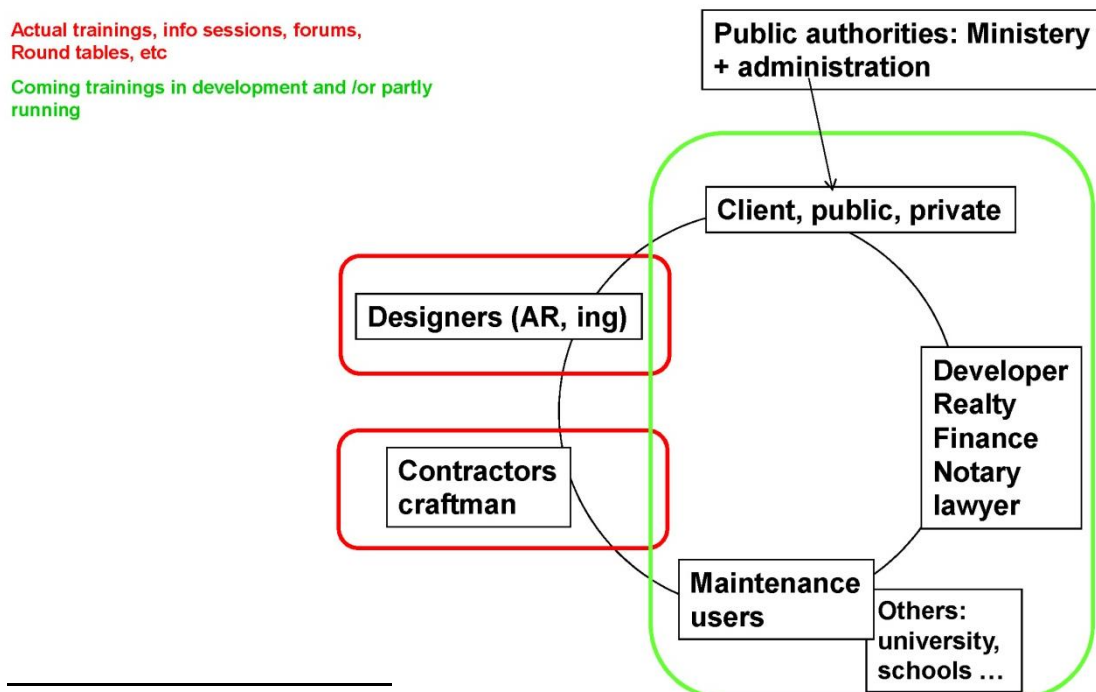
¹³⁴ <http://www.ibgebim.be/Templates/Professionnels/niveau2.aspx?maintaxid=11674&taxid=12318>

In PMP training, there are designer and construction cycles (standard), as well as advanced cycles, so as to suit participants who come into the trainings from different levels. There are also targeted training sessions, which cover very specific topics, as well as personalized guidance (personal sessions), and roundtables with a variety of stakeholders. But training clients alone is not enough. What is important is to foster exchanges between the different industries, to start a common dialogue between constructors, architects, clients, designers, etc.

The PMP designer cycles aims to foster sustainable passive building. It is a global vision: it requires providing a much more complex explanation than just the need to “build passive.” People need to be able to situate the issue within a broader context (global climate, EU policy), as well as to have specific information on materials, mobility, etc. So it does not make sense to focus on passive building only. That’s why the trainings speak of a global vision. The lectures are not very technical, but general vision is important: people should know exactly why they are asked to build passive, and why they are being asked to change their habits.¹³⁵

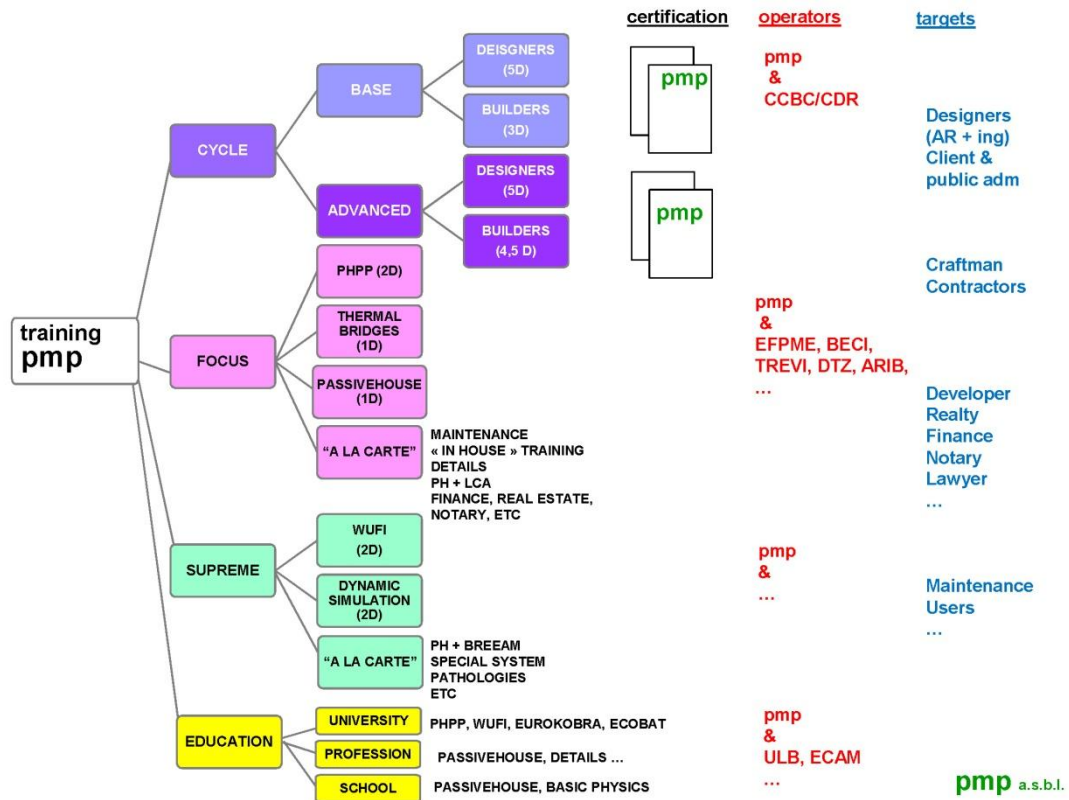
Figure 4 below illustrates the concept of the training, and the stakeholders involved. Figure 5 outlines the general framework of the global training strategy.

Figure 4: Professional Training Concept and Stakeholders



¹³⁵ Quevrin, Benoit, Salle, Sophie and Boyer, Charline. 2012. “Training the market: Lessons to learn.” Speed talks about “top down” measures in Brussels. Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

Figure 5: General Framework of the Global Training Strategy



! The last training day of Designers and Builders session, there is an integrated workshop, mixing both of them. In one day, they must achieve some building connections with in 2d Condetti and in real 3D ...

pmp a.s.b.l.

For designers and builders, the concrete value added of the training lies in the opportunity to apply the learned concepts into practice. During the very last day of the training, participants spend a day together, collaborating on a project to build a typical “passive” construction.

As regards higher education courses, at the Department of Architecture of the Université Libre de Bruxelles, PMP has integrated passivehouse training, which is separated in different levels, as follows:

- Level BA2: All the basics required regarding thermics, techniques, etc.
- Level BA3: From “business as usual” towards a typical “passivehouse”: Details and passivehouse construction site visits.
- Level MA1: Building Physics, including PHPP, Wufi, and thermal bridges.
- Level Ma1 and MA2: LCA, urban sustainable development, etc. and passivehouse construction site visits.

The higher education course program was an initiative of two professors: Bernard Deprez, member of PMP and BEPASSIVE magazine Board of Directors, and Sebastian Moreno-Vacca, also a PMP board member, and editor of BEPASSIVE magazine.

Brussels-Capital Region Construction Confederation

The Brussels-Capital Region Construction Confederation (*Confédération Construction Bruxelles-Capitale*) is the regional branch of the Construction Confederation. Its main mission is to defend the interests of companies in the construction sector, and to represent the sector vis-à-vis the Government of the Brussels-Capital Region.

Since 2008, the Confederation has been offering training for the construction sector. The Confederation maintains a Sustainable Construction Training Platform, which offers training in the passive standard for construction professionals, including the following services:

- Analysis of the needs of all workers: workers, employees and managers;
- Relevant orientation training modules;
- Implementation of customized training;
- Facilitation of requests for financial aid.¹³⁶

Specifically, the Confederation has carried out the following sessions so far:

¹³⁶<http://www.confederationconstruction.be/bruxellescapitale/frbe/serviceauxentreprises/plateformeformatio n.aspx>

- Insulation (Air tightness): 7 training sessions for 27 contractors and 72 workers, amounting to 1.168 hours of training;
- Passive House Builder: 4 training sessions for 16 contractors and 42 workers, amounting to 1.008 hours of training;
- Thermography training.

The results of these training sessions have been overwhelmingly positive. 98 % of the participants are satisfied with the insulation training, and 100% are satisfied with the Passive House Builder session. A positive effect of these endeavors is a snowball effect: participants become ambassadors, and they encourage other workers to participate. To sustain these achievements, good articulation and promotion of the training events are key. Thus, the next logical step is to create a global training plan for contractors, which would ideally be developed collaboratively by environmental, security and human resources managers.¹³⁷

The Professional Reference Centre for Construction (CDR-Construction)

The Centre is part of the employment plan for Brussels residents, and the Contract for Economy and Employment (C2E). A collaboration initiative between the government authorities and the construction sector, its goal is to improve the employability of low-skilled workers in the construction sector. Specifically, the Centre evaluates educational needs and trains unqualified personnel in the areas of eco-building and renewable energy. Among the most highly demanded training areas are insulation, airtightness, eco-materials and photovoltaics. In collaboration with experts from the construction sector, the Centre launched a study of trades in transition. The study aims to shed light on the new skills that today's construction professionals need in order to work in the sustainable sector. One of the main goals of this research is to pinpoint the most urgent training needs in construction.¹³⁸

CDR also is a platform, which offers a global view on construction. This is essential for a good approach. Heavy emphasis is placed on integration of all actors, and the creation of links between a variety of stakeholders. Capitalization on past experiences is also key for success.

There are four important obstacles in training that CDR aims to tackle. First, it is hard to see the concrete impact of the training in the sector. Second, there is resistance to change in the construction sector. Third, there is a lot of renovation work done in Belgium without a contractor and an architect, with which it is very difficult then to follow up. Fourth,

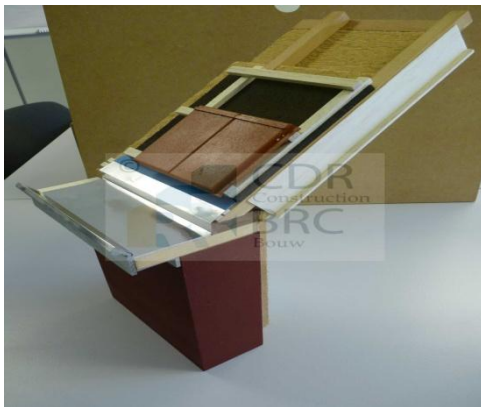
¹³⁷ Speed talks about "top down" measures in Brussels. Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

¹³⁸ http://documentation.bruxellesenvironnement.be/documents/BxlVilleDurable_ANGL.PDF pg. 15.

educating youth about the advantages of passive building is crucial, yet drawing teenagers to teaching in passive and sustainable construction remains a significant challenge.

Figure 6 shows the school kit elements of CDR's insulation/airtightness training:¹³⁹

Figure 6: school kit elements of CDR's insulation/airtightness training



¹³⁹ CDR-Construction. 2012. Speed talks about "top down" measures in Brussels. Presentation at the *PassREg 2nd International Workshop, Brussels* (October 5).

CONSTRUCTION AND TECHNOLOGIES

Below are some of the most prominent passive building projects in the Brussels-Capital Region:

Bruxelles Environnement Offices at the Tour & Taxi site

In an effort to lead by example, the Brussels regional authorities decided to move the headquarters of the Ministry of the Environment into a new building, designed by passive standards. Thus, the Tour & Taxi site in the downtown area became the new home for Brussels Environment. The new building is built on a “box within a box” principle, whereby the office floors in the middle have been broken up to allow natural light to come in through a large glass roof. External and internal sunscreens serve as overheating control.¹⁴⁰

ELIA building

Elia is Belgium’s high-voltage transmission system operator (30 kV to 380 kV). It operates more than 8,000 km of lines and underground cables throughout Belgium.¹⁴¹ In 2012, the committee of the Belgian Energy and Environment Award (Prix Belge de l’Energie et de l’Environnement) awarded ELIA the Eco-Booster Award.¹⁴² Eco-Booster awards are given to building projects that are not yet realized, but show promise in passive construction, and have proven to be feasible.

ELIA won the prize for its plan to build a new, passive office building in Schaerbeek. The new ELIA offices will also meet the (Breeam) criteria. BREEAM is a British evaluation method for the environmental performance of buildings, which comprises all aspects of eco-construction: energy, water, waste management, biodiversity, the well-being of the people working in the building and transports.¹⁴³ The structure of the new ELIA building will be

¹⁴⁰ <http://www.bepassive.be/intl/special01en/> pg. 48-49.

¹⁴¹ <http://www.elia.be/en/about-elia/who-are-we>

¹⁴² <http://www.eeaward.be/>

¹⁴³ http://www.polarfoundation.org/news/news_detail/gent_receives_ipf_prize_at_belgian_energy_awards/

simple and compact, composed of columns and concrete slabs. The curtain wall façade will consist of an assembly of superposed side-by-side box sections, in touch with the triple-glazed window frames. Equipped with cellulose insulation, the framework of the box sections will be made of wooded joists, enclosed by an OSB panel on the inside and a wood fiber panel on the outside. To ensure proper cooling, the building will also have awnings, vertical sunshades, exposed concrete ceilings, and free and night cooling. The energy demands of the building are expected to be 328,000 kWh/year. Employees will have electric cars, rechargeable by the facility. The water from the roof of the building will be stored in three cisterns of 20,000 L. each, and used to supply the toilet flushes.¹⁴⁴

L'Espoir Building

L'Espoir is a social housing project in Molenbeek –a municipality that takes part in the Local Action Plans for Energy Management (P.L.A.G.E.).¹⁴⁵ As the first social housing project in this municipality to comply with the passive standard, the L'Espoir building is a prime example of best practices in the Brussels-Capital Region.¹⁴⁶ In response to the housing crisis in Brussels, Donatienne Hermesse, an eco-counselor at the Bonnevie Community Centre (*Maison de Quartier Bonnevie*) conceived the idea of providing affordable, energy-efficient housing to 14 low-income families (mostly unemployed immigrants). Social mortgages, provided by the Housing Fund (Fonds du Logement), covered 75 % of the cost, thus making the families owners of the project. Grants from the Brussels Regional government (sustainable buildings subsidies) and the Belgian Federal government (Big Cities Policy) covered the rest of the costs.¹⁴⁷

The project consists of seven lower duplex apartments (floors 0 and 1), and seven upper duplex apartments (floors 2 and 3). Hence, all units have two floors and a double orientation (front and rear), much like maisonettes. The facades of the upper and lower duplex apartments are different from the front and from the back, and are painted in different colours. The use of eco-materials, such as solid wood stairs from Wallonia, blown cellulose,

¹⁴⁴ PassREg 2012. "Making frontrunners visible – Supporting future frontrunners."

2nd International Workshop, Study Tour, and 2nd Partner Meeting. Brussels: (October 2-4).

¹⁴⁵ <http://www.bepassive.be/viewer/11/fr/> pg. 12-13.

¹⁴⁶ <http://experimentcity.net/en/best-practices/lespoir/>

¹⁴⁷ <http://experimentcity.net/en/best-practices/lespoir/>

and certified timber and linoleum, is a principal feature of this project. As compact the building is, noise isolation is a major concern. The wooden skeleton was thus divided and spread throughout the length and height of the building. The units were equipped with partition walls, which were mounted on a U-shaped steel plate, attached to OSB panels. Ground floor apartments are accessible for persons with low mobility.¹⁴⁸

From the start, the L'Espoir project aimed to be a participatory one. The families were closely involved in the realization and monitoring of the project. As a result, the building inhabitants managed to reduce their CO₂ emissions by 25,000 kg in one year.¹⁴⁹ The project, which was completed in 2010, received an "Exemplary Building" award.¹⁵⁰

P.L.A.G.E. hospitals

To date, at least 5 major hospitals in the Brussels-Capital Region have been renovated in the framework of the Local Action Plans for Energy Management (P.L.A.G.E.). These hospitals are: the Erasme hospital, Saint-Luc University Clinic, Brugmann University Hospital Centre (Victor Horta and Paul Brien sites), and the Iris Sud Hospitals (Joseph Bracops site). The results in terms of energy efficiency have been positive: the overall energy expenses saved amount to over 2 million years annually.¹⁵¹

Projet Bruyn

Bruyn is a passive residential building project, part of a larger master plan to build 5000 residential units. It is subdivided into three parts: North Bruyn (200 units), West Bruyn, and East Bruyn (50 units and a kindergarten). Together, they comprise more than 300 new residential units.

The second phase of the project, West Bruyn, consists of 5 passive social housing buildings (a total of 79 passive apartments), 75 parking spaces, a multifunctional room, and a green area. The building materials are diverse: brick (regular and painted), whitewash, and concrete. Energy consumption of only 10 kWh/m²/yr is achieved due to high-quality insulation and heating solutions. In addition, the project boasts lateral ventilation and a free cooling

¹⁴⁸ PassREg 2012. "Making frontrunners visible – Supporting future frontrunners."

2nd International Workshop, Study Tour, and 2nd Partner Meeting. Brussels: (October 2-4).

¹⁴⁹ <http://www.bepassive.be/viewer/11/fr/> pg. 12-13.

¹⁵⁰ <http://experimentcity.net/en/best-practices/lespoir/>

¹⁵¹ http://documentation.bruxellesenvironnement.be/documents/BxlVilleDurable_ANGL.PDF pg. 11

system, 125 m² of thermal panels and 110 m² of photovoltaic panels.¹⁵² West Bruyn is equipped with 125 m² of thermal panels, and 110 m² of photovoltaic panels. An open reservoir in the nearby park will be used for rainwater storage. Rainwater from the tanks will be directed into ground-level open ditches along the circulation paths, and feeding this draining/infiltration holding reservoir. As it builds into the reservoir, rainwater is slowly absorbed into the ground. Each apartment overlooks the green area, and is between G+1 and G+# in height.¹⁵³ Open swales, running alongside the roads, return rainwater from a 75 m³ cistern into the soil. A 2500 m² extensive roof and public/semi-private green areas (vegetable gardens) are available for the building inhabitants. The West Bruyn project was one of the “Exemplary Building” winners.¹⁵⁴

34-36 Saint François Street

34-36 Saint François Street is a multi-purpose, passive construction project that includes a 30-bed childcare centre and three residences for people with reduced mobility. The first three levels of the building constitute the childcare centre, while the upper three floors are residences.¹⁵⁵ A wooden façade and triple glazing ensure excellent insulation. Given the low heating needs, heating is provided via ventilation, resulting in a record consumption of 7 to 13 kWh/m²/yr. Solar panels and rainwater recovery further reduce the consumption of energy and water.¹⁵⁶ The project is an “Exemplary Building” winner.

Social housing in Anderlecht

The Anderlecht project is a 4-unit social housing building, built according to passive standards. The overall net heating consumption of the four apartments ranges between 8 and 13 kWh/m²/yr. The project was awarded an “Exemplary Building” award in 2009.

Louvain-La-Neuve Childcare Centre

¹⁵² <http://www.sustainablecity.be/exemplary-buildings/bruyn-ouest>

¹⁵³ PassREg 2012. “Making frontrunners visible – Supporting future frontrunners.”

2nd International Workshop, Study Tour, and 2nd Partner Meeting. Brussels: (October 2-4).

¹⁵⁴ <http://www.sustainablecity.be/exemplary-buildings/bruyn-ouest>

¹⁵⁵ <http://www.bepassive.be/viewer/08/fr/> pg. 62-64.

¹⁵⁶ <http://www.sustainablecity.be/exemplary-buildings/rue-st-francois-child-care-centre>

The passive childcare centre at Louvain-La-Neuve was inaugurated in 2010. It boasts a construction from eco-materials: a wooden frame, a heat pump, geothermal heating, and solar panels. A water recovery system redirects rainwater for use in the toilets, bathroom, and washing machine. Staff awareness of energy efficiency is high: the childcare employees claim to be using only green forms of transportation.¹⁵⁷

Aeropolis II

The Aeropolis II building was a winner of the first round of “Exemplary Building” awards in 2007. To date, it is the largest passive commercial building in the Brussels-Capital Region. Originally, the building was not designed to be passive, but the architecture firm that won the project proposed a design change so as to reach passive standards. Thus, the brick outer layer of the building was replaced with glass: a layer of white glass enamel superimposed on a plate and framed by an anodized aluminum glazing bed. Vents were introduced on the sides of the glazing beds to ensure the desired thermal performance. For insulation, the architects combined the thin outer aluminum layer with a wooden support structure. Inside of this passive curtain wall, a perforated multiplex panel backed with 2 cm of rock wool resolves the acoustic balance. A membrane between the rock wool insulation panels further helps with airtightness. The offices of the building face mostly North, where the façade is glazed. The southern part of the building, which gets more sunlight, is partially occupied services blocks and vertical openings.

The thermal insulation and airtight curtain wall is very effective ($n_{50} = 0.49$ vol/h). The net energy requirement for heating is thus 8 kWh/m²/yr, and heating is provided only by the sanitary ventilation. In winter, warm air is provided by a Canadian well. One 140 kW gas boiler is enough to maintain a temperature of 20 degrees inside. During the summer, the Canadian well dehumidifies and cools the air from 5-10 degrees, while an automatic sunlight control system maintains a comfortable temperature through the use of external blinds. A night cooling system is also in place: it cools the temperature by opening windows automatically, as well as by forcibly extracting air in the roof.¹⁵⁸

¹⁵⁷ http://www.rtb.be/info/regions/detail_une-eco-creche-a-louvain-la-neuve?id=6302053

¹⁵⁸ <http://www.bepassive.be/intl/special01en/> pg. 34-40.

Maison del L'Emploi et de L'Enterprise (M2E) Project

The House of Employment and Enterprise (Maison de l'Emploi et de l'Entreprise, or M2E) is a public, passive building in the Saint-Denis quarter, Municipality of Forest. The M2E project also contemplates building one passive childcare centre. The building uses solar panels, a rainwater redirection system, green roofs, and eco-friendly construction materials. Its net energy consumption for heating purposes is 9kWh/m²/yr.¹⁵⁹ The project also uses new cooling technologies, such as adiabatic cooling and over-ventilation.¹⁶⁰

Molenbeek-Saint-Jean Channel

This building alongside the Charleroi channel in Molenbeek-Saint-Jean will be delivered in 2013. It includes one elementary school and 13 passive social housing units. The architectural design uses the southern orientation of the housing units to ensure proper light and heating. The design is appropriate for the very densely populated area, in the immediate proximity of downtown Brussels.¹⁶¹

42 Rue de la Loi Building

Another "Exemplary Building" winner, the 42 rue de la Loi project aims to renovate and extend 5 passive housing units, covering a total area of 1850/571 m². The main goal of the project was to renovate profitably and comfortably without installing an air conditioning system. To do so, the architects used an original combination of mixed steel and wood prefabrication. The passive housing units were constructed on the existing roof. With a net heating energy requirement of 27/12kWh/m²/yr, these housing units boast a heat exchanger, green roofs, and airtightness n50=0.60 vol/hr, as well as solar thermal and photovoltaic power.¹⁶²

¹⁵⁹ <http://www.villedurable.be/batiments-exemplaires/md2e>

¹⁶⁰ PassREg 2012. "Making frontrunners visible – Supporting future frontrunners."

2nd International Workshop, Study Tour, and 2nd Partner Meeting. Brussels: (October 2-4).

¹⁶¹ http://www.wbarchitectures.be/fr/architects/TRAIT_norrenberg_somers/Ecole_fondamentale_et_logements_sociaux_a_Molenbeek-Saint-Jean/429/

¹⁶² http://documentation.bruxellesenvironnement.be/documents/BxlVilleDurable_ANGL.PDF pg. 6.

Biplan Participatory Housing – Haren

The Biplan project features an 810m² passive apartment building on the border of the Brussels-Capital Region. Eco-construction, energy efficiency, reduced energy consumption and enhanced opportunities for social exchange among the residents are central to the project concept. In line with the passive standard, the net heating energy consumption of each one of the apartments is below 15 kWh/m²/yr. Such low consumption has been achieved by using eco-friendly construction materials: a wood frame and a 24 cm. cellulose insulation. The building has large green roofs, a rainwater tank, and a station for processing local greywater. The residents also enjoy a laundry room with a solar hot water washing machine, a community garden (for herbs and medicinal plants) on the green roof, a guest room shared by eight apartments, a meeting place located in the garden, and a common cellar for storing vegetable products.¹⁶³

FSE (FBZ), Formelec and Tecnolec Headquarters

The Electricians Security Existence Fund (*Fonds de sécurité d'Existence du secteur des Electriciens*, or FSE), Formelec and Tecnolec are three leading organizations in the electricity sector, which have decided to build a shared, passive headquarters. The “H”-shaped design of the building ensures a common space while still maintaining the privacy of each organization’s main offices. In terms of construction, the project features a mixed system: a metallic frame combined with concrete slabs fillings for the floors and concrete masonry for the walls. The metallic frame was chosen to lighten up the structure, which would have been too heavy if concrete had been used. Moreover, studies showed that the metallic frame does not run counter to the passive standard, provided that the thermal bridge between interior and exterior is well managed. Thus, the metal columns were filled with 30 cm. of polyurethane foam. The rest of the wall structure is classic: a concrete masonry covered with 30 cm. polystyrene coated graphite, and a 28 cm. fiberglass insulation. The roof is insulated with 21 cm. of PIR foam. The floor of the building is a concrete slab, insulated with 15 cm. of projected PUR. Upstairs, the building boasts a wooden frame and aluminum top triple glazing. Even though having a mixed metal/concrete frame posed challenges for airtightness, the problem was eventually solved by using EPDM rubber from the exterior on all four sides of the building chassis. In terms of ventilation, the system is also mixed. Most of the time, the building relies on natural ventilation, but there is also a helicoidal fan that forcibly extracts the air when the natural ventilation is insufficient. An automated opening and closing of windows, depending on the weather conditions, contributes to maintaining a comfortable temperature at all times. Overall, the net heating

¹⁶³ http://app.bruxellesenvironnement.be/batex_search/SearchEngineResults.aspx?language=FR

energy requirement of the building is 13 kWh/m²/yr.¹⁶⁴ Natural lighting comes in through large façade openings. Exterior shades and passive cooling devices (such as night cooling and an earth heat exchanger) control heat during the summer. To further reduce building overheating, which is a challenge particularly with office buildings, the project was equipped with a Canadian well. 318 m² of photovoltaic panels will also be installed on the roof.¹⁶⁵

Royale Sainte Marie Building

In the context of preserving the heritage of rue Royale, the Royale Sainte Marie building plans an extension of the high school, as well as the new gym. The construction will follow passive standards, using aerogel insulation.¹⁶⁶

CPAS Building

After winning “Exemplary Building” funds in April 2011, the Public Center for Social Action (CPAS) in the municipality of Forest inaugurated its newly renovated headquarters.¹⁶⁷ CPAS aimed to renovate in line with passive standards while preserving the patrimonial heritage of the building. Built in the 1930s, the CPAS headquarters boasted an impressive Art-Deco style, but by 2007 the building was in a deplorable condition. The results of the renovation are impressive: while the net heating energy needs of the building in 1934 reached 335 kWh/m² per year, by 2011 it was only 19 kWh/m²/yr.¹⁶⁸ Moreover, the original Art-Deco façade was preserved. The building was equipped with night cooling, a water management system, green roofs, and 30m² of photovoltaic panels.¹⁶⁹

¹⁶⁴ <http://www.bepassive.be/viewer/09/fr/> pg. 38-46; 78.

¹⁶⁵ PassREg 2012. “Making frontrunners visible – Supporting future frontrunners.”

2nd International Workshop, Study Tour, and 2nd Partner Meeting. Brussels: (October 2-4).

¹⁶⁶ <http://www.bepassive.be/viewer/08/fr/> pg. 6.

¹⁶⁷ http://archives.lesoir.be/un-batiment-eco-exemplaire-pour-le-cpas_t-20110427-01DAFP.html

¹⁶⁸ <http://www.bepassive.be/viewer/08/fr/> pg. 68-74.

¹⁶⁹ <https://www.educate-sustainability.eu/portal/content/passivhaus-standard-renovation-cpas-forest-brussels>

Gaucheret Childcare Centre

The Gaucheret childcare centre was among the first “Exemplary Building” winners in 2007. Conceived as a new construction project, the centre was finished in 2011, and welcomes 48 children. The net heating energy requirement of the building is 14 kWh/m² annually. An air-ground heat exchanger system, installed on the first floor, ensures ventilation of 30 m³/h per person.

In addition to an F7-type air filter and battery heating, the ventilation unit also has an electric humidifier that ensures a minimum relative humidity of 40% during the winter. A heat recovery system has also been put in place, with a yield of 84%. In order to avoid unnecessary heating of fresh air during the summer months, a bypass circuit of the heat exchanger was also installed. The fresh air intake of the ventilation unit is connected to an air-sun heat exchanger. Before being sent into the building, the air first goes into the ground via a 40 m long hose. This solution has the advantage of slightly preheating the air during winter, thus saving energy.¹⁷⁰

Urban/Large-Scale Recent Development

The SDRB (regional funds for development) has launched two large-scale projects in Brussels:

- **Tivoli:** 400 dwellings (commercial and social housing), 2 childcare centres and shops that must follow the passive standard. A third one of these must reach zero energy standards. It is a Design & Build & Finance development.
- **Gryson:** 50 social dwellings and 300 student apartments, all passive. It is a Design & Build & Finance development.

Furthermore, an initiative of the Municipality of Brussels is the Neo project. It consists of 750 dwellings, 20 000 m² of office space, and a Congress center (all in line with the passive standard), as well as a shopping mall of 100 000 m² (in line with very low energy standards). It is a “Design & Build & Finance & Operate” development.

As regards private initiatives, there are currently four private real estate skyscrapers, all operating according to the passive standard. The buildings, amounting to more than 200 000 m², contain mainly offices, and some dwelling. In addition, some large-scale “passive” renovation projects are in the works. One of them is the MT200 office building, a private

¹⁷⁰ http://app.bruxellesenvironnement.be/batex_search/SearchEngineResults.aspx?language=FR

development initiative of 100 dwellings. Another is Linne Plante: a regional development that comprises a renovation of a social housing tower and a childcare centre.

VISIBILITY AND PUBLIC SUPPORT

Active promotion of the benefits of energy-efficient construction is a priority for the Brussels regional authorities. One way of doing so is by raising the profile of the “Exemplary Buildings” program. Brussels Environment features the Exemplary Building winners in articles, project files, seminars, the ‘Green Brussels, Inspiring Architecture’ book, and other publications. Visits are organized for the public during or after the execution of the project.¹⁷¹

Furthermore, Brussels Environment has developed AlterClim, which is a software that helps determine whether rooms with a certain number of characteristics can avoid air conditioning (partially or fully). Available through the Brussels Environment website, AlterClim contains the results of 50 000 dynamic simulations, as well as substantial technical and educational documentation in the form of sheets that can be read online or printed.¹⁷²

Some other concrete initiatives of the Brussels-Capital Region to stimulate and increase the visibility of low-energy construction are described below.

Ecodynamic Company Label

Created in 1999, the Ecodynamic Company label is an initiative of Brussels Environment.¹⁷³ Its goal is to encourage companies and organizations to actively commit to improving their environmental performance (especially energy consumption, waste management, and the efficient use of raw materials). The target groups are all enterprises and organizations (large and small, private and public, regardless of their area of expertise).

Specifically, the Ecodynamic Company label is a formal token of recognition of good environmental practices. It is awarded for a period of three years, and it gives companies

¹⁷¹ www.housingeurope.eu/www.housingeurope.eu/uploads/file_/agenda.pdf pg. 1.

¹⁷² See “2007 Energy Efficiency Action Plan for the Brussels-Capital Region,” pg. 41, www.medemip.eu

¹⁷³ http://www.be-smarter.eu/en/best_practice_detail.html?liste=1&id=38

one to three stars, depending on their performance. To receive a label, an organization must operate within the Brussels-Capital Region. The label also promotes setting up a system of environmental management in the context of the Eco-Management and Audit Scheme (EMAS) or ISO 14001.

Obtaining an Ecodynamic Company label requires going through the following steps:

- Formally announcing candidacy for a label by signing the “Eco-dynamic company charter.” The signature obliges the company to commit to the 27 principles of eco-management, outlined in the charter.
- Receiving free guidance from a Brussels Environment consultant during the process of implementation of the 27 principles;
- Submitting a formal application for the label to Brussels Environment, no later than 2 years after having signed the charter. The application includes an environmental analysis, and an environmental program.
- Welcoming an on-site visit from the Brussels Environment jury, which will make a field assessment of the company before making a decision on whether to grant the label.

Companies that obtain the label are featured extensively in Brussels Environment publications, and on their website. In addition, the enterprise is allowed to affix an Ecodynamic Company label to all its communications and marketing materials. For those organizations that obtain the label, EMAS registration and ISO 14001 registration becomes easier.

“Be Passive” magazine¹⁷⁴

Since November 2009, PMP and PHP have been issuing “Be Passive,” a quarterly magazine dedicated entirely to low-energy building, and the passive standard in particular. The target audience is: architects, the public authorities, building societies, regional development agencies, engineers, construction manufacturers, real estate actors and all others involved in construction. The magazine aims to serve as a “one-stop shopping” centre for all that relates to energy-efficient building. The goal is to present the information in a clear, concise, and jargon-free way so as to be comprehensible to individuals without technical training. The

¹⁷⁴ www.bepassive.be

website (free details and free issues) has more than 20 000 downloads. The magazine is distributed to all target audiences without exception (approximately 15 000).

Specifically, the magazine offers detailed accounts of prominent low-energy construction projects, as well as interviews with important individuals (public authorities, architects, construction sector leaders, building owners and residents). The “Exemplary Building” winners receive extensive coverage. In addition, the editors include updates on the current Belgian legislation related to low-energy building.

“Be Passive” is an initiative financed by PMP/PHP and a group of private stakeholders. 4 issues have been supported by Belgian *SPF environnement*.

The “Ice Challenge” Special Event¹⁷⁵

The Ice Challenge event is organized by *Passiefhuis Platform* (PHP) in Brussels and Antwerp. It aims to sensitize the public and illustrate first-hand the benefits of good building insulation. The event consists of placing two 1,3 tone blocks of ice in two separate makeshift constructions – one very well insulated, the other one – not. The two constructions are placed side by side on a major downtown street for everyone to see. The goal is thus to illustrate how much faster the ice in the non-insulated construction melts during the summer months. Observers have to guess how much ice would be left in each shack after 40 days. For example, during the 2007 Ice Challenge, more than 450,000 kilograms of ice still remained in the well-insulated cabin, whereas the ice in the non-insulated one had completely melted in just 11 days. But the main objective of the event is promotional: throughout the guessing competition, participants obtain useful tips energy saving and house insulation tips.

PMP/PHP Events

Passiefhuis-Platform (PHP) and *Plateforme Maison Passive* (PMP) jointly organize an annual **Passive House Fair**: a building technology forum that showcases the latest developments in energy-efficient construction. The Fair targets construction professionals and the general public alike. Among the activities of the happening are open houses, free readings, information and planning advice, and meetings with the professional members of PMP/

¹⁷⁵ <http://www.icechallenge.be>

PHP.¹⁷⁶ In 2012, the Fair took place during the second weekend of September. 120 companies from the building sector participated.¹⁷⁷

In addition, PHP and PMP also organize an annual **Passive House Symposium**, the next one of which will take place on October 5, 2012 at the Crowne Plaza Hotel in Brussels. A more specialized event than the Passive House Fair, the Symposium is targeted specifically to construction professionals. More than 30 prominent Belgian and international speakers give lectures on a variety of aspects concerning passive construction, and share their experiences with the audience. Participation in the Passive House Symposium is mandatory for all professionals who wish to stay abreast of the latest developments in passive construction.¹⁷⁸ The lead themes of the 2012 symposium are: 10 “passive” years, zero energy, neighbourhood developments, school renovations, energy-efficient cooling and heating, major renovations, dweller experiences, shared architecture, and passive schools.¹⁷⁹

“Populist” Actions

Since the bulk of the project and the standardisation of the compulsory passive standard, it was time to communicate these advances widely to the public. One of the first public advertising initiatives is the **Are you normal?** campaign (www.areyounormal.be). The campaign was carried out during the 2012 Passive House fair. It included a flashmob, moving advertising (in rollers) along the main pedestrian popular zone in Brussels (where more than 30 000 people pass by every day), T-shirts, and a quiz on the event website, among others. The goal of the campaign was to show that nowadays, a passive house is mainstream - the only thing special about it is the inhabitant.

Participation in International Projects

Active participation in international projects is a key contributor to the success of the Brussels-Capital Region. This way, the Region gains not only visibility, but also access to international funds to deepen and improve low-energy building policies and practices.

One such international funding mechanism is the **Intelligent Energy-Europe programme (IEE)**. An initiative of the European Commission, IEE is part of a broader EU policy to promote

¹⁷⁶ “Passiefhuis-Platform vzw: The reflex for passive and low energy architecture.” Flyer provided by Irena Kondratenko, Research Projects Coordinator, Passiefhuis-Platform. August 23, 2012.

¹⁷⁷ <http://www.buildup.eu/events/24767>

¹⁷⁸ <http://www.maisonpassive.be/?+5-octobre-2012-Symposium+>

¹⁷⁹ <http://www.bepassive.be/viewer/12/fr/> pg. 11.

energy efficiency. It offers funding for organizations working to improve energy sustainability. Renewable energy, energy-efficient buildings, industry, consumer products, and transport are among the areas eligible for project funding. Each year, IEE disburses funds through calls for proposals. All EU Member States, as well as Norway, Iceland, Liechtenstein, Croatia and the Former Yugoslav Republic of Macedonia (FYROM) are eligible to apply. The IEE budget is € 730 million, running through 2013.¹⁸⁰

In 2011, IEE funded the PassREg project, where the Brussels-Capital Region features prominently. Representatives of ten EU countries (both from municipalities and non-profit organizations), join forces in PassREg. In Belgium, the two key NGO partners that collaborate in the framework of PassREg are *Passiefhuis-Platform* (PHP) and *Plateforme Maison Passive* (PMP). The Passive House Institute Darmstadt, Germany acts as the overall project coordinator.

The overarching objective of PassREg is to spearhead energy-efficient construction throughout the EU. The promotion of passive standards (i.e. a maximum heating and cooling requirements of 15 kWh/(m²a) in all new buildings) is a core activity of the project.¹⁸¹ To do so, PassREg employs a methodology of best practice sharing. Emphasis is placed on participants that are either front runner regions (having already surpassed the existing EU directives for efficient energy building), or aspiring regions (those striving to become front runners). The idea is to showcase the front runners' success, to collect and systematize lessons learned, and to apply the models in aspiring regions and beyond.¹⁸²

The five specific objectives of the PassREg project are:¹⁸³

- To increase awareness of the passive house standard, especially amongst key policy and industry actors;
- To identify the success factors that propelled some regions to a leading position in matters of energy-efficient construction. This includes deriving a list of "solutions," and analyzing whether they apply to other countries and regions;

¹⁸⁰ http://ec.europa.eu/energy/intelligent/about/index_en.htm

¹⁸¹ http://www.passreg.eu/index.php?page_id=65

¹⁸² http://www.passreg.eu/index.php?page_id=65

¹⁸³ http://www.passreg.eu/index.php?page_id=66

- To build the capacity for high-quality professional development for construction professionals;
- To stimulate market demand for sustainable construction, products, and technologies;
- To increase the number of low-energy buildings in the partner regions.

The Brussels-Capital Region features as a front runner in the PassReg project. In May 2012, work started to analyze the key factors that facilitate Brussels' rapid progress in low-energy building. The second step in the analysis will be to determine if any of these conditions exist in other regions. If so, the positive experiences and lessons learned in Brussels will serve to stimulate energy-efficient construction in less-advanced regions. At the same time, the Brussels regional authorities will also benefit - participation in this project allows for careful process tracing, strategy evaluation and analysis of mistakes for future reference.

The Brussels-Capital Region is also a partner of the Seventh Framework Programme for Research and Technological Development (FP7). The FP7 is the main financing framework of the EU for Research & Development.¹⁸⁴ The FP7 runs from 2007 to 2013, and disburses funds through annual calls for proposals. Energy and the environment are among the 10 major themes financed by the calls for proposals. The specific subfields that are directly related to the passive construction standard and can be financed through FP7 are:¹⁸⁵

- Renewable electricity generation
- Renewables for heating and cooling
- CO2 capture and storage technologies for zero emission power generation
- Energy efficiency and savings.

Independent researchers, university research centres and businesses are all eligible to apply for FP7 funds. Accepted applications are usually those filed by a consortium of different types of applicants from several EU member states (participation from third countries is also encouraged).

In this process, Brussels-Capital Region maintains a consulting role. The authorities offer assistance with FP7 applications to all potential candidates. The Brussels Enterprise Agency (BEA) is the designated National Contact Point for FP7. Each year, BEA organizes information seminars to help candidates make the most of their application. During the seminars, experts with detailed knowledge of FP7 projects share their experience, and advice

¹⁸⁴ <http://www.brussels.irisnet.be/working-and-doing-business/doing-business-in-brussels/innovation-et-r-d/european-assistance-and-partnerships>

¹⁸⁵ http://cordis.europa.eu/fp7/energy/home_en.html

candidates on how to improve their application. The last one of the information seminars (before the expiration of FP7 in 2013) was held on September 6, 2012 in Brussels.¹⁸⁶

In addition to participation in EU-funded projects, the Brussels-Capital Region takes part in other international initiatives through the work of key NGOs. For instance, *Passiefhuis-Platform* (PHP) maintains active relations with the principal passive house organizations in Europe. PHP actively promotes Sustainable Energy-Europe 2005-2008, a campaign initiative of the European Commission to raise awareness of passive building.¹⁸⁷ PHP is also a member of *Informationsgemeinschaft Passivhaus*.¹⁸⁸

¹⁸⁶ <http://www.brusselsnetwork.be/eu-funding-m/71-events/1281-fp7-research-for-the-benefit-of-smes-seminar.html>

¹⁸⁷ See http://www.managenergy.net/meta_informations/425

¹⁸⁸ "Passiefhuis-Platform vzw: The reflex for passive and low energy architecture." Flyer provided by Irena Kondratenko, Research Projects Coordinator, Passiefhuis-Platform. August 23, 2012.

THE SUCCESS MODEL OF TYROL

CASE STUDY

ENERGY AND BUILDING POLICIES

Short review

Austria has got a long standing tradition in low energy and passive buildings construction. The country has the highest density of passive buildings in the world. The number of these buildings per 1 million people is five times higher than in Germany or Switzerland.

Despite the success of Austria in passive buildings construction the province of Tyrol stayed away from this process until the beginning of the new millennium. Only 2% of all newly constructed buildings in the region complied with the passive house standard in 2002. In the following years, this percentage shows a rapid growth. The level of energy efficiency for all new buildings rises extensively: from 37,33 kWh/m²a in 2009 (at normative levels at about 54 kWh/m²a) to 29,34 kWh/m²a in 2011. As concerning renovations, the average level for all buildings in 2011 is 47,81 kWh/m²a. The achievement of these impressive results is due to a large extent to the development and implementation of policy instruments and relevant regulations at national and regional levels.

In accordance to the Energy Strategy of Austria, in the National action plans for energy efficiency, adopted in 2007¹⁸⁹ and 2011, Austria plans to achieve energy savings of 9% of its average consumption for the 2001-2005 period by 2016. The measures for saving energy are aimed primarily at buildings and include:

- Increase of the share of newly constructed buildings, which comply with a passive house standard;
- Thermal renovation of all postwar buildings by 2020;
- Increase of the share of energy from renewable energy sources;

¹⁸⁹ In accordance with EU Directive 2006/32/EC

- Housing grants more directly linked to energy saving.

The main policy instrument at regional level for the province of Tyrol is "Energy Strategy 2020" with the primary purpose to reduce the dependence of the province on imported energy sources, among other measures by increasing energy efficiency and changes in the behaviour of the users. An important element of the strategy is the construction of new buildings, complying with the passive house standard and renovation of existing buildings with use of passive house components with the aim to reduce energy consumption in buildings (mostly for space heating and air conditioning) without reducing the comfort of the occupants. The use of renewable energy sources (RES) is promoted as well. Additionally, with its new 10 - point action programme Tyrol aims to cover all its energy needs in the future with locally produced energy.

Policy Instruments

Source:

Austria: Laws and regulations related to construction -

(http://for2morrow.files.wordpress.com/2012/06/construction_laws.pdf)

The success of Tyrol was made possible due to the fruitful atmosphere, created by the Austrian policies for climate protection, energy efficiency and sustainable development. Austria ratified the Kyoto Protocol in March 2002, which requires the country to reduce its greenhouse gas (GHG) emissions by 13% below 1990 levels during the period from 2008 to 2012. A climate change strategy was developed during the same year in order to reach the Kyoto targets. It is performed on three levels: national (federal), regional (provincial) and local (municipal) and has been adopted by all provincial governors and the federal government. The strategy was modified in 2007. A new national Climate and Energy Fund with 500 million euro (2007 - 2010) has been established. It is financed by the national tax system and has already been oversubscribed twice.

At the same time the Austrian government encourages production of electricity from renewable energy sources. Laws have been adopted to guarantee the inclusion of energy, obtained from renewable sources, in the national energy grid and the increase of its use.

Most provinces joined in 2008 a nation-wide effort to harmonize the regional construction laws, in particular with regards to technical construction norms and standards.

National Policy Instruments

Energy Strategy of Austria

In accordance with Directive 2006/32/EC, the Austrian energy efficiency needs to be improved by 9% by 2016 and should therefore achieve savings of end energy consumption of 80,4 PJ.

In order to implement of the package "Energy and Climate" of the EU and to achieve the "20-20-20" EU goals, in April 2009 the Austrian government started the elaboration of the Energy Strategy of Austria, which was completed in March 2010 (www.energiestrategie.at).

The national goals of Austria for 2020 under the EU's climate and energy policy 20/20/20 are as follows:

- 34% share of renewable energy
- 16% reduction of GHG emissions in sectors outside the emissions trading scheme (ETS)

To achieve these objectives the Strategy requires final energy consumption in 2020 to remain at 2005 levels, i.e. not exceed 1 100 PJ.

The three pillars of the strategy are:

- Energy efficiency: improving energy efficiency at all stages of the supply and use of energy (e.g., new and renovated buildings, sustainable mobility, the implementation of systems for energy management, etc.).
- Renewable energy: focusing on hydropower, wind power, biomass and photovoltaic
- Security of energy supply

The proposed measures are divided into the following categories: buildings, manufacturing and services, as well as trade and small users, mobility, energy supply, energy security and general measures. With regard to buildings, it is planned to reduce the final consumption of energy for heating and cooling by 10% until 2020 compared to 2005: from 337 PJ to 303 PJ.

The stabilization of the final energy consumption at 1,100 PJ by applying the energy strategy corresponds to an increase in energy efficiency by approx. 200 PJ.

The target of 34% renewable energy can be achieved in 2020 if the energy strategy is fully implemented. This share will correspond to the final energy consumption from renewable energy sources of 390 PJ by 2020, so it will require an increase in renewable energy with approximately 70 PJ.

According to the assessment of the Energy Strategy of Austria by the Austrian Energy Agency, the Environment Agency, Energie-Control GmbH and a consortium of the Austrian Institute of Economic Research (WIFO-CEPS), the proposed measures will make it possible to achieve the objectives of energy strategies within 2020.

Summary of targets for energy saving in Austria

The indicative target for saving 80.4 PJ in 2016 under Directive 2006/32/EC: in its first NEEAP Austria calculated indicative savings target of 80.4 PJ in 2016 and thus 17.9 PJ in 2010. Therefore at least 80.4 PJ of final consumption of energy has to be saved by measures to increase energy efficiency by 2016.

Review of the "bottom-up" measures for energy efficiency in the building sector

Savings in the building sector, as defined by the "bottom-up" approach, are the result mainly of measures to improve the thermal quality of the building structure, the efficiency of heating systems, including promoting the use of alternative energy systems and tightening the requirements of building regulations. Some of the measures and the savings are:

Energy efficiency measure	Objects	Energy savings (TJ)	
		2010 r.	2016 r.
Housing subsidy Building envelope	new buildings/renovations	13 905	22 705
Housing subsidy Efficient heating	new buildings/renovations	10 292	18 821
Stricter legal requirements	new buildings/renovations	14 805	18 676
Energy advice	private households	145	145
TOTAL savings		39 147	60 347

National Energy Efficiency Action Plans

Source:

http://en.energyagency.at/fileadmin/dam_en/pdf/publikationen/annual_reports/Jahresbericht2011.pdf

<http://www.buildup.eu/sites/default/files/content/AT%20-%20Energy%20Efficiency%20Action%20Plan%20EN.pdf>

http://for2morrow.files.wordpress.com/2012/06/construction_laws.pdf

[http://www.bmwfj.gv.at/EnergieUndBergbau/Energiebericht/Documents/Energy%20Strategy%20Austria%20\(engl%20Kurzfassung\)%20\(2\).pdf](http://www.bmwfj.gv.at/EnergieUndBergbau/Energiebericht/Documents/Energy%20Strategy%20Austria%20(engl%20Kurzfassung)%20(2).pdf)

The first Austrian national action plan for energy efficiency from 2007 aims at energy savings of 80.4 PJ for 2016 and outlines two important objectives:

- 50% of the new buildings to meet the klima:aktiv haus standard;
- from 2015 housing grants to be given mainly to new buildings, complying with passive house standards.

The National energy efficiency action plan draws attention also to the thermal renovation of all postwar buildings by 2020, the use of more climate protection construction materials (wood), space heating and hot water systems using solar energy, biomass heating, heat pumps, housing grants more directly linked to energy saving and other environmentally friendly measures (heating, noise protection, humidity protection).

It also provides an assessment of the share of renewable energy sources in the construction sector in 2005 and 2020:

- All buildings: 2005: 33 %; 2020: 38 %;
- Residential buildings: 2005: 24 %; 2020: 26 %;
- Public buildings: 2005: 1 %; 2020: 2 %;
- Commercial buildings: 2005: 8 %; 2020: 10 %;
- Industrial buildings: 2005: 1 %; 2020: 2%.

The second NEEAP - with the same goal of saving energy by 2016 from 80,4 PJ - was adopted in June 2011.

The plan states that since 1995 the final energy consumption and energy intensity in Austria, as measured by final energy consumption per capita, tends to rise. However, as of 2005, this trend is changing and indicator values decrease.

However, despite this positive trend, the energy scenarios prepared under "business as usual" conditions lead to anticipation of further increase in final energy consumption in the medium term. Therefore, the government's programme and the Energy Strategy developed by the Federal Ministry of Economy, Family and Youth of Austria give the highest priority to energy efficiency and formulate far-reaching measures to improve energy efficiency and set the ambitious goal to stabilize the final consumption energy by

2020 at the level of 2005, i.e. the final energy consumption in 2020 should not exceed 1 100 PJ.

The intermediate target of 17,9 PJ of 2011 was exceeded as final energy savings in 2010 amounted to 49,4 PJ. The savings are largely achieved by measures of thermal insulation and heating systems in buildings as more than 80% of the savings in 2010 were achieved in these two areas. The majority of the savings are achieved by the measures implemented by the federal provinces (Länder).

In Austria, the public sector plays its role to lead by example by:

- Major renovations of public buildings;
- Energy efficiency criteria set by the law for federal contracts and procurement practices of the federal government and the federal provinces;
- Focusing of the central federal procurement agency on energy efficiency criteria;
- Specific criteria for public procurement as part of the action plan for sustainable public procurement;
- Information and advice provided by various federal and widespread information campaigns, in particular "klima: aktiv".

In addition, trained energy consultants of the Austrian Government, the provinces, and energy companies provide energy advice and audits. In October 2008 an agreement on reduction of greenhouse gas emissions in the buildings sector was signed¹⁹⁰. It was decided that public housing grants will be given only to new residential houses with a maximum annual heating demand less than 45 kWh/m² from 2010 and less than 36 kWh/m² from 2012.

In March 2010 the federal ministers of environment and of economics presented the new comprehensive Austrian Energy Strategy. It stated Austria's 2020 targets:

- 34% share of renewable energy;
- 16% reduction of GHG emissions in non-EU emissions trading scheme (ETS) sectors.

In 2011 the Austrian parliament adopted three major energy-related laws: the 2012 Green Electricity Act, the Gas Economy Law and the Climate Protection Law, all of them supporting Austria's efforts to meet the EU 2020 goals.

¹⁹⁰ http://for2morrow.files.wordpress.com/2012/06/construction_laws.pdf

e5: Austrian Programme on Technologies for Sustainable Development

Sources:

<http://www.e5-gemeinden.at/index.php?id=26>

http://www.bmwf.gv.at/fileadmin/.../Ellinger_Panzenboeck_en.pdf
www.bmwf.gv.at/fileadmin/user_upload/RIO_20/Ellinger_Panzenboeck_en.pdf

The e5 energy label programme for energy conscious communities was developed in 1998 and successfully introduced in 7 Austrian provinces (Bundesländer), including Tirol, on the basis of the Swiss "Label Energiestadt" programme. Since then about 104 communities and towns have joined the programme (13 in Tyrol).

The main features of the programme are:

- a catalogue of possible activities;
- an auditing and labelling scheme;
- structures for professional energy efficiency activities;
- a network for exchange of experience and external assistance.

The e5 programme is an integrated approach to raise energy efficiency and the use of renewable energy sources in municipalities. The auditing and labelling scheme offers orientation and reward for success already achieved and identifies further requirements.

Progress is monitored by inspections, the so-called "audits", and is rewarded with one to five possible "e".

In Tyrol, the Energie Tirol agency acts as a consultant. Interested communities form e5 teams. They are responsible for the implementation of the project. The main function of an e5 team is to plan projects and to ensure the approval of the programmes at the political level.

The main benefits of the e5 programme, compared to other measures, are:

- an integrated approach, that includes all energy related fields of action within a community;
- building of structures and networks for professional energy efficiency activities;
- continuous and regularly evaluated energy efficiency activities;
- the cost of participation in the programme depends on the region, but is rather low.

The e5 Programme is a very ambitious approach to increase energy efficiency and the use of renewable energy at local level and within the responsibility of municipalities.

„Smart Energy Demo – FIT for SET" Smart City Programme

Sources:

<http://www.smartcities.at/funding-programme/>

http://www.klimafonds.gv.at/assets/Uploads/Broschren/ePaper_smartcities/index.html

The "Smart Energy Demo - Fit for SET" programme of the Austrian Climate and Energy fund aims to initiate large demonstration and pilot projects of "smart" cities or "smart" urban areas, in other words, districts, residential areas, or towns in Austria to become cities or areas with zero GHG emissions and with an exceptional quality of life thanks to the use of smart green technologies. The fund supports Austrian companies, so that they can achieve a high level of compatibility with projects, funded under the European SET plan¹⁹¹.

The main strategic goals are improving the energy efficiency, increasing the share of renewable energy sources and reducing emissions of greenhouse gases. In medium to long term intelligent smart city concepts should bring about increased development and dissemination of Austrian environmental and energy technologies and help secure and expand the Austria's position as a leader in the field of technology.

Smart City Wörgl

One of the participants in the programme is the town of Wörgl, Tyrol. With the initiative "Wörgl unsere Energie" ("Wörgl our energy") the city of Wörgl belongs to the most dynamic cities in Tyrol. To achieve energy self-sufficiency of the city, urban services place emphasis on the use of its own resources.

One of the elements of the initiative are measures for buildings. The road map for buildings plans renovation of 50% of the existing buildings to a passive house standard by 2050; total energy savings of 20%, construction of new buildings, complying with the passive house standard.

The action plan, developed on the basis of the roadmap, includes the following measures for buildings:

- increased funding for thermal renovation measures;
- training for facility managers via Energie Tyrol;
- establishing an energy management system;
- a demonstration project "South Tyrolean village".

¹⁹¹ *The European SET Plan (Strategic Energy Technology Plan for Europe) allocates 11 billion euro of research funds to be used in the next ten years for new energy supply in Europe.*

Smart City Innsbruck

Over the past few years the capital of the province of Tyrol Innsbruck (120,000 inhabitants) is increasingly developing initiatives for sustainable development and climate protection with research plans for the environment and urban planning.

Purpose

As a part of the wider process of interrelations with all stakeholders, Innsbruck develops the following programs:

- "Intelligent Energy Vision 2050": long-term program
- "Roadmap for 2020 and Beyond": a medium-term program
- Action Plan 2012 -2015

Approach

Comprehensive data from existing research and development plans for the city are completed in preparatory work package. Based on these data, three forums are organized, formulating short-term (up to 2015), medium term (2020 and beyond) and long-term goals and measures.

Focus: Renovation of buildings

The project examines the technical and architectural concepts to increase energy efficiency in buildings. There is also a demand for "smart" connections between buildings and power lines; possible ways of using renewable energy in buildings and facades are also considered.

Facts and figures

Consortium leader	City of Innsbruck, Department "Traffic Planning and Environment"
Inhabitants	120 497
Length of transport network	Highways: 27,4 km Federal and provincial roads: 54,4 km City road network: 416,9 km Other roads: 151,5 km Total: 650,2 km
Types of transport	Motorized individual transport: 42,2 % Pedestrians: 27,1 % Public transport: 17% Bicycles: 13,2 % Others (taxis, etc): 0,5%

Number of buildings	12 284
Total number of companies	3 281
Total energy consumption (2012), TJ/a	Electricity: 2 725 Thermal energy: 9 907 (2009)
CO ₂ emissions in t/a	Production of thermal energy: 405 485 Motor vehicles: 114 300 Public Transport: 10 000 Total: 529 785 (2009)
Membership / awards	Partnership with Klima:aktiv

Regional Policy Instruments

Energy Strategy Tyrol 2020

Sources:

http://www.tirol.gv.at/fileadmin/www.tirol.gv.at/themen/umwelt/wasser_wasserrecht/downloads/Tiroler-Energiestrategie-2020.pdf

Energy Etrategy of Tyrol 2020 (Tyrol Energy Strategy 2020-BUL.docx)

The dependence of Tyrol on imported energy sources should in the long term perspective be kept to a minimum and the necessary energy supply infrastructure should be ensured. To this end it is necessary to increase energy efficiency through innovative energy generation technologies and changes in energy end-user behaviour, but also through construction of local energy generation facilities.

Energy Strategy 2020 is based on a package of measures for energy efficiency improvement, promotion of energy production from RES and guaranteeing of energy supply for the purposes of implementing the requirements of the EU Directive concerning energy efficiency improvement and increase by more than 50% of the share of energy from RES. With regards to measures for buildings Energy Strategy Tyrol 2020 is mainly focused on the following areas:

- space heating and air-conditioning of buildings (residential and intended for services);
- electricity;
- RES.

Space Heating, Cooling, Ventilation (Air Conditioning)

Private Households

Consumption for space heating predominates in energy end-use by households and at the same time the highest potential for energy efficiency improvement exists here. Through implementation of low-energy buildings and passive house standards in new buildings or buildings renovation savings of up to 80% of energy consumption for space heating can be achieved.

It is particularly important that the annual number of residential buildings being renovated, which currently amounts to less than 1%, be increased to at least 3% in order to achieve the 5% share laid down in the action plan in parallel with the improvement of the quality of renovation in the direction of low-energy or passive building. This should be achieved mainly through such tools like promotion of low-energy or passive buildings construction, building regulations, consultancy services, education and skills upgrading, as well as work among the broad public.

Space heating objectives for households

- New buildings: minimum energy standard: category A energy passport: maximum heating demand 25 kWh/m² per year;
- Acceleration of the activities for renovation of buildings with a special focus on good-quality comprehensive renovation for attainment on the average of energy performance standard for issue of category B energy passport (maximum useful heating demand 50 kWh/m² per year).

Private and public services

In the field of services energy consumption for space heating predominates, although on a smaller scale than in the households sector – 50% of the total, followed by electricity consumption about 45% of the total (less transport). The highest potential for savings exists in the field of space heating (up to 80 %) and ventilation/air conditioning (up to 60%).

The Energy Strategy aims at combination of economic growth with reduction of energy consumption through measures for energy efficiency improvement in the field of services. To achieve this objective it is necessary to reduce the energy consumption for space heating through application of low-energy buildings and passive house standards in both construction of new buildings and building renovations. Special emphasis is laid on avoidance of the need for air-conditioning (integrated planning).

The use of energy from RES is promoted with priority depending on demand, for example solar systems for domestic hot water.

Space heating objectives for services

- New buildings: minimum energy standard: category A energy passport (maximum 25 kWh/m².year heating demand), as well as mandatory requirement for use of passive house components;
- Renovation: good quality and comprehensiveness of renovation works for the achievement on the average of energy performance of category B energy passport (maximum 50 kWh/m².year heating demand);
- Optimisation of in-house systems (space heating, ventilation, air-conditioning).

Due to the economic role of tourism and the high space heating demand in this sector stricter efforts for energy efficiency are of particular significance. Accommodation facilities possess large potential for improvement in space heating during renovation works, as well as in the case of new construction. The use of RES like biomass and thermal solar installations, such as installations for domestic hot water, are particularly suitable for this services sector with its high demand of hot water with low temperature.

Tyrol Energy Strategy 2020 envisages for the public services sector the function to act as a model, for instance through construction of new buildings complying with a passive house standard or through renovation using passive house components.

Electricity

Regardless of the energy efficiency improvements the rate of growth of electricity consumption is 2% per year. The Energy Strategy aims at breaking this trend and achieving a reduction of the average specific electricity consumption per household.

By expert assessment the potential for electrical energy efficiency improvement in households is about 30% through wider use of energy efficient household appliances and lighting, as well as by changes of consumer behaviour.

Renewable Energy Sources (RES)

The major ways of use of RES energy in households are diverse and include biomass, solar energy and geothermal energy. In view of its lower heating demand the innovative types of buildings, such as low energy buildings and passive houses, which use solar energy and geothermal energy, are becoming increasingly important.

The Energy Strategy aims at promoting the share of energy from RES to a maximum. The major instruments for this purpose are promotional measures, consultancy services and work with the general public.

In future new technologies will be used on a broader scale in the services sector, for instance in administrative buildings and commercial sites. Thus the innovative and

efficient use of geothermal energy for heating and cooling in commercial buildings will be ever more frequently taken into consideration. The significance of photovoltaic plants will also increase.

Energy Autonomous Tyrol Project: A New 10-point Programme of the Province

Source:

http://www.waengle.at/pdf/energie_tirol/generationenprojekt_energieautonomes_tirol.pdf

With its new 10 - point action programme Tyrol aims to cover its energy needs in the future with locally produced energy. Drastic reduction of energy consumption and increasing the share of renewable energy are its two main pillars. The energy consumption in buildings is 40 % of the total consumption and one of the main measures of the programme is to improve the energy efficiency of existing buildings. It is estimated that through quality renovation of buildings more than two thirds of their energy consumption can be saved permanently.

The ten points of the programme are:

1. Raising the buildings renovation rate from 2 to at least 3 percent per year thus halving their energy demand.
2. Energy efficient renovation of public buildings in order to serve as models.
3. A new funding programme for energy-efficient and innovative tourism projects.
4. Waste heat recovery in industrial and commercial sites.
5. Hydropower expansion and improvement.
6. Development of new mobility concepts.
7. Energy and climate projects at community and district levels.
8. A support programme for new photovoltaic power plants.
9. Strengthening of research and development on energy innovation in Tyrol.
10. Public awareness through broad information, guidance and training.

Legal Framework

Source:

http://for2morroW.Files.Wordpress.com/2012/06/construction_laws.pdf

Austria is a federal republic, which consists of nine provinces (Länder). Due to the division of responsibilities according to the 1929 constitutional law there has never been one

single building law in Austria, but nine different systems, each consisting of a building law (covering the procedures and functional requirements for building works) and related ordinances (covering the technical requirements).

Most provinces joined in 2008 a nation-wide effort to harmonize the regional construction laws, in particular in the field of technical construction norms and standards. They changed their building regulatory system on the basis of the so-called guidelines, developed by the Austrian Institute for Construction Engineering (OIB).

With regards to low-energy and passive buildings major roles are played by Guideline no.6 of the Austrian Institute for Construction Engineering for the minimum requirements for heating demand of buildings and by the klima:aktiv haus standard for support of sustainable development and reduction of energy consumption and emissions of CO₂, including criteria for energy efficiency, environmental protection, quality of planning, materials and construction, as well as comfort and quality of ventilation. This standard is similar to the well-established passive house standard of the German Passive House Institute (PHI), Darmstadt.

National regulations

Guideline No 6 of the Austrian Institute for Construction Engineering (OIB Nr. 6): Energy Economy and Heat Retention

Sources:

http://for2morrow.files.wordpress.com/2012/06/construction_laws.pdf

080313 SBI Survey - European national strategies to move towards very low energy buildings - March 2008 .pdf

OIB Guideline no. 6 for minimum requirements for space heating energy demand (calculated values based on building performance, www.OIB.or.at) is implemented in the building regulations of the Austrian provinces. It establishes an energy performance certificate in accordance with the EU directive on EPBD (Energy performance of Buildings 2002/91/EC), supplemented and revised in 2010. (2010/31/EU). Under OIB Guideline no. 6 'Energy economy and heat retention' there is also a manual for calculation of the energy performance of buildings, which has been published as a separate document. This manual contains the methodology for the assessment of the energy efficiency of buildings as required by the EPBD.

The main criteria of OIB directive 6 (Recast 2011) are:

- annual heating demand for new residential buildings: max. 54.4 kWh/m² ;
- annual heating demand for non-residential buildings with an area of more than 400 m²: max. 18.7 kWh/m²;

- annual heating demand for renovation of residential buildings: max. 87.5 kWh/m²;
- specific minimum requirements for insulation of walls, windows, doors, ceilings, floors;
- minimum insulation requirements for pipes and fittings;
- avoidance of thermal bridges;
- an energy performance certificate.

klima:aktiv haus Passive House Standard

Sources:

ec.europa.eu/energy/efficiency/doc/il/info_note.pdf

080313 later named SBI when it became Survey - European national strategies , presentation to move toward very low energy - March 2008.pdf

The impact of energy performance regulations on systems of building control' by H. Visscher/E. , Mlecnik/F. Meijer (RICS Cobra Research Conference, University of Cape Town, 10- 11th September 2009

http://www.sci-network.eu/fileadmin/templates/sci-network/files/Resource_Centre/Tools/klimaaktiv.pdf

Since 2005 the Austrian Federal Ministry of Agriculture, Forestry, Environment and Water Management supports the dissemination and implementation of minimum criteria concerning the energy performance and the ecological quality of newly built residential buildings within its klima:aktiv haus programme.

klima:aktiv haus is one of the thematic sub-programmes of klima:aktiv, the national programme for climate protection. The klima:aktiv haus standard has been developed with the aim to support sustainable development and to reduce the total energy demand and the CO₂ emissions.

The standard includes criteria for energy efficiency, ecology, quality of planning, materials and construction, as well as comfort and quality of ventilation.

The assessment is carried out on the basis of a credit scheme with a maximum value of 1000. In case the number of credits is above 700, then, once the builders, planners or house sellers have filled-in the building declaration, the house counts as a klima:aktiv house; with more than 900 points it can be referred to as a klima:aktiv passive house. The declaration is then lodged with the managers of the klima:aktiv house programme for quality assurance purposes.

The main requirement is that the energy consumption does not exceed 15 kWh/m² per year (with small variations in the definition of area in the different provinces). Buildings must be without thermal bridges and airtight, they must be equipped with energy efficient ventilation systems with heat recovery and with water saving fittings.

Furthermore they must not be built of HFCH or PVC containing building materials and they must satisfy the requirements for summer suitability.

The criteria of klima:aktiv for passive houses are similar to the well-established passive house standard of the German Passive House Institute (PHI), Darmstadt. Their certification is performed by the Passive House Planning Package (PHPP) – a software developed by the Passive House Institute. An essential difference is that the klima:aktiv haus standard, in addition to the energy consumption criterion contains additional criteria for quality of the building.

List of National Regulatory and Legal Documents

Source:

Energy strategy of Tyrol 2020 (Tyrol Energy Strategy 2020 ", -BUL.docx)

- Law on electricity and electricity sector organization, (ElWOG) BGBl. I Nr. 143/1998, IDF BGBl. I Nr. 106/2006
- Law for eco-power BGBl. I Nr. 149/2002 IDF BGBl. I Nr. 10/2007
- Energy supply deviations Act 1982 BGBl. Nr. 545/1982 IDF BGBl. I Nr. 106/2006
- Law on preliminary advice and registration for natural gas 1982 BGBl. 546/1982 IDF BGBl. I Nr. 106/2006
- National law concerning a GHG emissions trading system with certificates (Law on emissions certificates – EZG), BGBl. I Nr. 46/2004 IDF BGBl. I Nr.171/2006
- Harmonizing of the Austrian Climate Strategy for achievement of the Kyoto objectives 2008-2012, Decision of the Council and Ministers of 21.03.2007
- Ordinance on eoc-design 2007 BGBl. II nr. 126/2007

Regional Regulations

Regional Standards

Source:

Energy strategy of Tyrol 2020 (Tyrol Energy Strategy 2020 ", -BUL.docx)

One of the central tools for promotion of construction and renovation leading to energy conservation is the Regulation on Housing Construction. The focus is laid above all on promotion of comprehensive building renovation and use of passive house components in building renovation. The system for promotion of housing construction (new buildings and renovation) is consolidated in particular in the direction of promotion of low energy consumption, use of environmentally friendly household appliances and environmentally sound building materials. The Regulation on Housing Construction (new buildings) envisages calculation of an energy demand indicator (useful heating demand in

kWh/m².year). The Law on Energy Passports envisages mandatory introduction of energy passports by 1 January 2008. A significant effect from the introduction of energy passports is the promotion of integrated planning for new and renovated buildings. This means that isolated measures will no more be the first choice, but rather the joint impact of building technologies and in-house systems. Through the introduction of the new indicator for final energy consumption in future it will be possible to take into account also the efficiency of in-house systems. In this respect the involvement of the communities will play an important role in requiring a presentation of an energy passport in the event of requests for building/renovation permit. For certifying the transfer of knowledge concerning the requirements for issue of an energy passport it will be necessary to set up an information office in support of municipalities. At the same time in order to guarantee the quality of a building in the event of sale/purchase a presentation of energy passports will be required.

The use of RES energy in housing construction is an object of an intensive promotional policy.

List of Regulatory and Legal Documents of the Province of Tyrol

Source:

Energy strategy of Tyrol 2020 (Tyrol Energy Strategy 2020 ", -BUL.docx)

- Tyrol law on promotion of housing construction 1991, LGBl. Nr. 55/1991 IDF LGBl. 108/2001
- Tyrol building regulation 1998, LGBl. Nr. 94/2001 IDF LGBl. Nr. 60/2005
- Tyrol law on space heating in-house systems 2000, LGBl. Nr. 34/2000 34/2000 34/2000 IDF LGBl. Nr. 89/2002
- Tyrol law on natural gas 2000, LGBl. Nr. 78/2000
- Tyrol law on electricity 2003, LGBl. Nr. 88/2003 IDF LGBl. Nr. 17/2007
- Tyrol law on spatial planning 2006, LGBl. Nr. 27/2006

ECONOMY AND FINANCING

Short review

Sources:

<http://www.iibw.at/en/>

http://www.iibw.at/EN/index.php?option=com_content&view=article&id=22&Itemid=26

The housing policy in Austria is in the authority of the Federal State (Civil Law, i.e. Rent Law, Condominium Law, Limited Profit Housing Law, etc.; tax collection) and the provinces

(housing subsidy schemes, regional planning, building regulations, etc.). Housing markets are strongly influenced by policy action.

The klima:aktiv national programme is a part of the Austrian strategy for climate protection and consists of more than 20 sub-programmes with measures for buildings, electrical appliances, products from renewable materials, etc. One of the objectives of the programme is attracting additional investments in energy efficiency and renewable energy. Another national programme is the Austrian programme on Technologies for Sustainable Development. It aims to promote effective restructuring of the economy towards sustainability. The sub-programme "Building of Tomorrow" is a part of it with respect to buildings.

The action programme "Economy of Tyrol" supports optimisation of energy use by operational energy consulting for implementation of new technologies.

The financing of measures in the area of construction of new low energy and passive buildings and of thermal renovation of existing buildings, as well as of use of RES energy, is carried out mainly by means of subsidies at national and regional levels. Housing subsidies are very important, as the structure of housing tenure shows relatively high sector of subsidised social housing - 23 % (approximately 10 percentage points above the EU-15 average). Other incentive programmes, oriented to the sector of private services are "Promotion of domestic environmental protection" and "Promotion of energy conservation measures in Tirol".

National Programmes

klima:aktiv - Austrian Climate Protection Programme

Sources:

[http://www.klimaaktiv.at/klima:EU Activ Annual Report 2011](http://www.klimaaktiv.at/klima:EU%20Aktiv%20Annual%20Report%202011)

<http://www.uncsd2012.oorg/content/documents/519AUSTRIA%20klima%20aktiv.pdf>

klima:aktiv is a climate protection programme launched in 2004 by the Federal Ministry of Agriculture, Forestry, Environment and Water Management and managed by the Austrian Energy Agency. It plays an important role in the Austrian federal climate strategy, which consists of a bundle of measures of regulation, taxes, and subsidies.

The main purpose of klima:aktiv is to introduce and promote environmentally sound technologies and services.

klima:aktiv focuses its activities in several key areas with initiatives for training, clear and transparent quality assurance standards and measures, consultation and information activities, as well as activation and integration of all the important stakeholders.

klima:aktiv follows the idea of market transformation. The main characteristic of this approach is an active and comprehensive inclusion of all relevant market participants and stakeholders. The main advantages of a market transformation approach are comparatively low costs and high sustainable effects. In this case market transformation aims to raise the share of energy efficient products and services.

The advantage of combining all these various strands under one umbrella brand mainly results from the fact that the instruments used (training, consulting, quality management, networking and awareness campaigns) might differ in content and importance in different market segments but not so much in form. Thus the individual thematic programmes can profit from each other – not only can they learn from their own but also from others' mistakes. Vice versa, success stories will quickly work a circuit and all other programmes can profit.

Austrian Programme on Technologies for Sustainable Development "Nachhaltig Wirtschaften"

Source:

<http://www.nachhaltigwirtschaften.at/english/>

In 1999 the Austrian Federal Ministry of Transport, Innovation and Technology (BMVIT) launched a research and technology programme "Nachhaltig Wirtschaften", which aimed to effectively stimulate the restructuring of the economy towards sustainability. It initiates and supports advanced research and development projects and the implementation of exemplary pilot projects and includes several sub-programmes, one of which is "Building of Tomorrow" (Haus der Zukunft). The program could finance with a grant up to 35% of the "innovative costs" of the project. Starting from the low-energy solar building approach and the passive building concept and incorporating ways of using environmentally friendly and renewable materials in construction, new designs with great promise for the future have been developed and implemented both for new construction and for renovating existing buildings.

In "Building of Tomorrow Plus" the overriding goal is to achieve technological preconditions for constructing buildings that do not consume energy, but generate it.

The long term vision for "Building of Tomorrow" is to increase energy efficiency in construction and use to a point where, over buildings' entire life cycle, the emissions of greenhouse gases are reduced to zero in total.

By 2010 of over 700 projects submitted around 300 have received funding and the Ministry has provided more than 35 million euro in grants.

The Ministry commits program management to the Austrian Research Promotion Agency (FFG) – the national financial institution for applied research in Austria (<http://www.ffg.at/en>) as financial manager and to the Austrian Society for Environment and Technology (OGUT) as Manager of Public Relations (<http://www.oegut.at/en/>).

Regional Programmes

Action Programme "Tyrol Economy": Energy Consulting

Source:

http://www.energieinstitut.net/portal/page/portal/EIW_HOME/DOWNLOADS/eiw_studie_beratung_foerderung.pdf

The province programme for operational energy consulting in Tyrol is conducted primarily by the Chamber of Commerce (together with Energie Tirol and klima:aktiv). The focus is on optimisation of energy use by means of new technologies. In addition, the Tyrol Chamber of Commerce in cooperation with the regional energy agency Energie Tirol carries out audits of the tourist industry, preliminary assessments of potential energy savings and advice on possible measures for their implementation.

The hourly rate for the consultations is €67 with possible discounts from 25 to 50 %. The energy audit of hotels, restaurants and other tourist businesses is free of charge.

The regional energy agency of the province, Energie Tirol, focuses on consulting households and communities, and as a part of the action programme it serves as the organization for initial information on energy issues.

Financing

Austria and its provinces have a comprehensive system of subsidies for energy efficiency and for use of renewable energy sources, including grants for research and development. The amount of subsidy is directly dependent on the rate of energy efficiency achieved.

Subsidies on national level are mainly investment subsidies, provided by the by the Ministry of Agriculture and Forestry, Environment and Water Resources Management and the "Klima- und Energiefonds" (National Climate and Energy Fund; <http://www.klimafonds.gv.at>), which provides 100 M€ per year until 2014 for thermal renovation of residential and non-residential buildings.

Various subsidies exist on provincial level, most being linked to the housing support (Wohnbauförderung). All subsidies are based on the national and provincial tax systems.

National Incentives and Subsidies

Sources:

<http://www.energie-gemeinde.at/>

<http://www.umweltfoerderung.at/>

Projects for energy from RES and for energy saving by buildings renovation, airconditioning systems, that use only RES, etc. are supported within the framework of the "Climate Protection in the Municipalities" programme. Subsidies are granted to

commercial companies and non-profit organisations, municipalities and private persons mainly by the Ministry of Agriculture and Forestry, Environment and Water Resources Management, the Climate and Energy fund and the Ministry of Economy.

The "Climate and Energy" Fund for the period 2007 - 2010 is created by the Council of Ministers on May 2, 2007. The objective of the fund, with an allocation of 500 million, is to improve energy efficiency and increase the share of renewables in energy production. The Fund is designed to be an important step to reduce greenhouse gas emissions and to allow the implementation of the national climate strategy. The Fund finances projects and research related to climate and energy, and in 2007 provided a total of € 50 million, and since 2008 - € 150 million annually.

The main focus of the fund is to provide financial assistance and procurement support initiatives in climate protection and sustainable energy supply. The program provides measures in three areas:

- Research and development of sustainable energy technologies;
- Promotion of projects in the local public transport and eco-friendly freight, and project management in mobility;
- Projects supporting the market penetration of sustainable energy technologies that are related to climate protection.

The "Climate and Energy" Fund was established as a legal entity with Presidential Committee, an Advisory Council of Experts and a Managing Council. The Conference Committee includes the Federal Chancellor, Federal Minister of Agriculture, Forestry, Environment and Water Management, Federal Ministry of Transport, Innovation and Technology and the Federal Ministry of Commerce, Industry and Labour. The Advisory Council of Experts is composed of four members and makes recommendations on financial aid; the companies Österreichische Forschungsförderungsgesellschaft mbH and Kommunalkredit PublicConsulting GmbH act as implementing agencies.

The fund is intended, first, to further strengthen the position of Austria as a leading industrial country in the field of energy and technologies for environmental protection and, on the other hand, to ensure sustainable and environmentally friendly energy supply for Austria.

At the moment, subsidies amounting up to 35% of the eligible costs (innovative components) for materials, installation and planning and are provided for:

- energy sources: for heating systems, working with wood or with solar energy, heat pumps and (until 2012) for photovoltaic systems;
- energy savings: for energy efficient buildings renovation and construction of new low energy agricultural buildings, as well as for transition to a space heating system with RES energy.

Residential Subsidies at Regional level

Sources:

http://www.iibw.at/en/index.php?option=com_content&view=article&id=19&Itemid=23

http://www.iibw.at/EN/index.php?option=com_content&view=article&id=22&Itemid=26

http://www.buildup.eu/system/files/austria_0.pdf

Various subsidies exist at provincial level, most being linked to housing support (Wohnbauförderung), especially concerning thermal insulation, use of biomass for heating and solar energy for space heating and domestic hot water preparation, but also for energy consulting and issue of EPCs.

The provinces provided € 1,950 million in 2010 for subsidised new construction. Roughly 1/3 went to companies, constructing affordable houses (LPHA), 1/6 to commercial housing developers and the remaining more than 1/2 to individual households and municipalities. In 2010 as many as 28,000 houses were subsidised. This is roughly 60% of all new construction. The provision of subsidies is usually linked with limitations of purchase prices and rents.

The subsidies for renovation of buildings are put into effect either as investment grants (usually between 10 and 25%) or loans (with 1% to 4% interest for a period of 10 to 20 years, depending on the regional system and the quality of supported measures).

Almost half of the housing subsidies by the provinces is granted for new construction in the multi-apartment sector, another 11% are spent for the sector of detached houses. The expenditures for housing renovation are quickly increasing (28 %).

Residential Subsidies in Tyrol (Wohnbauförderungsrichtlinie)

Sources:

http://www.tirol.gv.at/fileadmin/www.tirol.gv.at/themen/bauen-und-wohnen/wohnbaufoerderung/downloads/wbf-richtlinie_01-07-2012.p

http://www.tirol.gv.at/fileadmin/www.tirol.gv.at/presse/downloads/sanieren_folder_download.pdf

New guidelines for housing subsidies in Tyrol came into force on April 1, 2009. Particularly attractive subsidies are provided for renovation of residential buildings. With extensive renovations up to two-thirds of the heating costs can be saved. In addition, developers are rewarded for quality renovations with an eco-bonus of up to € 8,000 per family house.

To obtain the subsidies for new housing applicants must have a family income between € 1,150 and € 2,400 per month, depending on the number of family members. In obtaining subsidies for social housing, there are restrictions on the sale cost of housing and the amount of the rent. There are no economic restriction for subsidizing of retrofitting of existing buildings.

he first level of subsidizing a credit low rate (from 1 to 4%) for up to 20 years. Compliance with certain minimum requirements for space heating is a precondition to receive

subsidies; from 1.1.2012 the maximum annual heating demand shall not exceed 20 to 36 kWh / m².a depending on the characteristic length of the building (approximately 33% lower than the rate of OIB directive). The loan may not exceed 900 € / m².

The second level is a grant subsidy to be obtained in order to cover increased criteria for energy consumption of the building. The subsidy amount is calculated as the total number of points multiplied by the eligible area and multiplied by the point value of EUR 8. Some of the more important measures and corresponding points are the following:

- Improving heating

>= 33%	3 points
>= 60%	6 points
to passive house standards <= 10 kWh/m ² .a	11 points
- Biomass heating as the sole heating system

Building up to 300 m ² of floor area	2 points
Buildings over 300 m ² of floor area	1 point
- Installing a heat pump for heating purposes (space heating)

Building up to 300 m ² of floor area	2 points
Building over 300 m ² of floor area	1 point
- Installation of a comfort ventilation with heat recovery

Building up to 300 m ² of floor area	3 points
Building over 300 m ² of floor area	2 points
- Solar Panels for hot water and heating

The grant amounts to EUR 210, - per square meter of solar collectors area in a solar system for hot water to a maximum of EUR 2.100, - per apartment. If the solar system is used to support space heating, the maximum funding amount is increased to EUR 4.200,-.

„Promotion of Domestic Environmental Protection” and “Promotion of Energy Conservation Measures in Tirol” Programmes

Sources:

Umweltförderung im inland, Bundesministerium für Land- und Forstwirtschaft, Umwelt- und Wasserwirtschaft.

Wirtschaftsförderungsprogramm des Landes Tirol, Tiroler competitive benefits Energiesparmaßnahmen.

There are two promotional programmes for the private services sector at national and provincial levels – „Promotion of domestic environmental protection” and “Promotion of energy conservation measures in Tyrol”. Under these programmes energy efficiency measures and use of RES are supported.

Under “Promotion of energy conservation measures in Tirol” the use of renewable energy sources is promoted as a priority in parallel with measures for energy efficiency improvement.

In the area of tourism special consulting services within the framework of programmes for the promotion of solar energy installations are already provided.

In the area of advisory services further consultations for the individual economic sectors in the framework of the “Action Programme Tirol Economy” need to be developed. In addition to consulting activities it is necessary to promote the use of RES in the services sector through its own technologies programme. Besides the information and communication activities R&D projects in the area of RES are in the focus as well.

KEY STAKEHOLDERS INVOLVED

Short review

The achievement of the objectives of the Tyrol province in terms of low energy and passive buildings with use of renewable energy sources is made possible by pooling the efforts of all stakeholders and the efficient use of their potential.

Key partners at national level are the Federal Ministry of Transport, Innovation and Technology with its five-year research and technology programme on technologies for sustainable development; the Austrian Energy Agency, which brings together policy, economy, scientific institutions and other interested organizations to prepare the soil for decisions in politics, public administration and industry; the Austrian Society for Sustainable Real Estate Management, which aims to achieve a transparent system for integrated assessment of all sustainability criteria for buildings; the Limited Profit Housing Associations (LPHA), which carry out 1/3 of subsidised new construction in Austria; the Austrian Institute for Construction Engineering, founded by the nine provinces for coordination of the activities of the provincial administrations in the field of construction, particularly with respect to legislation, standardisation and certificates.

At regional level important players are the energy agency of Tyrol Energie Tirol, founded in order to improve energy efficiency in the private and public sectors, taking into account local renewable energy sources, and Low Energy Building Cluster Tirol, which is a public-private initiative of the Austrian Federation of Industry in Tyrol and private companies with a mission to accelerate the market diffusion of low energy buildings and to increase the construction quality of new buildings, as well as of the renovation of existing ones. Other organizations at the regional level are the agency Standortagentur Tirol, including the cluster "Renewable Energy Sources Tyrol", the “alps” Technology Center for

Adaptation to Climate Change, the association IG Passivhaus Tirol and the leading developer in Tyrol Neue Heimat Tirol – a limited profit housing association.

National Level

Austrian Federal Minister of Transport, Innovation and Technology (BMVIT)

Source:

<http://www.bmvit.gv.at>

<http://www.nachhaltigwirtschaften.at/english/index.html>

The Austrian Federal Ministry of Transport, Innovation and Technology (BMVIT) has developed a five-year R&D programme on technologies for sustainable development. It initiates and supports advanced research and projects for development and implementation of exemplary pilot projects in several areas of activity.

One of subprogrammes, "Building of Tomorrow", aims to support innovative sustainable buildings in Austria. "Building of Tomorrow" refers to residential and office buildings with the following improvements in comparison to existing practices in Austria:

- improved energy efficiency during the entire life cycle;
- emphasis on use of renewable energy sources, in particular solar energy;
- costs, comparable to those of conventionally designed buildings.

Austrian Energy Agency (AEA)

Source:

<http://en.energyagency.at>

The Austrian Energy Agency is an energy research and policy institution, established in 1977, in which the federal and the provincial administrations, as well as a number of important institutions and corporations from different economic sectors cooperate.

The AEA prepares the ground for decisions in politics, public administration and industry by means of detailed research and by highlighting important dependencies and relations among topics. It also provides information to all target groups in the society on the background and the developments in the field of energy production and consumption.

It brings together politics (the federal and provincial governments, the Association of Austrian cities and towns), economy (OMV, EVN, Wiener Stadtwerke Holding, TIWAG, etc.), stakeholders and organisations involved (WKÖ, IV, Fachverbände, AEE, Austropapier, Biomasseverband etc.) and scientific institutions (WIFO-CEPS, EIV, LEV).

The main areas of activity are innovative energy technologies, energy efficient systems and renewable energy sources.

Austrian Society for Sustainable Real Estate Management (ÖGNI)

Source:

www.ogni.at

The Austrian Society for Sustainable Real Estate Management is a partner organization of the German Green Building Council (DGNB).

The goal of ÖGNI is to achieve a transparent system for integrated assessment of all sustainability criteria for buildings for the Austrian real estate sector. The organization is funded on the base of the projects it develops, i.e. it does not have a certain fixed budget. Its main areas of work are the promotion of "sustainability" as a concept to the general public, the organization of exhibitions and awards for already constructed buildings. Its main task is to maintain a good network of contacts among all participants in its initiatives by regularly conducting specialized workshops and conferences. The organization is still in an early stage of development.

Limited Profit Housing Associations (LPHA)

Source:

http://www.iibw.at/en/index.php?option=com_content&view=article&id=17&itemid=20

The LPHA in Austria comprise 190 housing co-operatives, private-limited and public-limited companies with a total housing stock of 865,000 units, which represents 23% of the country's total. Roughly 1/3 of the subsidised new construction is carried out by LPHA. LPHA are entrepreneurs who build at fixed by local governments price and have limits on the value of the property at the sale and the amount of rent. They are also responsible for the maintenance and management of buildings after construction is complete.

All Limited Profit Housing Associations together have a stable housing output of 14,000 to 16,000 units per year. This is more than half of all multi-apartment housing construction in Austria. With this very high market share, the LPHA have not only outperform municipal housing, but also private multi-apartment housing construction.

Austrian Institute for Construction Engineering (Österreichisches Institut für Bautechnik - OIB)

Source:

<http://www.OIB.or.at>

The Austrian Institute for Construction Engineering (OIB) is a private association, founded by the nine Austrian provinces. It is responsible for coordination of the activities of the provincial administrations in the field of construction, particularly with respect to legislation, standardisation and certificates. The OIB represents the provinces in the Standing Committee on Construction and in the Preparatory Group within the European

Commission. In addition, the OIB is the Austrian European Technical Approval Body and a member of the European Organisation for Technical Approvals (EOTA).

Austrian Research Promotion Agency (FFG)

Source:

<http://www.ffg.at/en>

The Austrian Research Promotion Agency (FFG) is the national funding agency for industrial research and development in Austria. As a "one-stop shop" offering a diversified and targeted programme portfolio, the FFG gives Austrian businesses and research facilities quick and uncomplicated access to research funding.

The FFG was founded on 1 September 2004 (pursuant to the FFG Act on establishing a research promotion agency, Federal Law Gazette I No. 73/2004). The FFG is wholly owned by the Republic of Austria, represented by the Federal Ministry for Transport, Innovation and Technology (BMVIT) and the Federal Ministry of Economy, Family and Youth (BMWFI). As a provider of funding services, however, the FFG also works for other national and international institutions.

One of the areas of funding of FFG is to promote energy efficiency and better environmental protection. Energy resources are limited and must therefore be used more carefully in the future. And this is precisely where the FFG has an important role to play: it promotes technologies that enable more efficient use of energy. The Agency supports the creation and development of new smart energy infrastructures and facilitates the development and optimisation of renewable energy sources.

Austrian Society for Environment and Technology (ÖGUT)

Source:

<http://www.oegut.at/en/>

The Austrian Society for Environment and Technology (OGUT) is a non profit organization, formed as a scientific platform for environment, economy and administration. It was founded in 1985 with the goal to overcome the communicational barriers in the conflict areas of economy and ecology.

Due to the membership of around 80 organizations from ministries (e.g. Ministry of Economics and Labour, Ministry of Agriculture, Forestry, Environment and Water Management), public authorities (e.g. Municipality of Vienna, Province of Lower Austria), private industry and enterprises (e.g. Siemens Austria), interest groups (e.g. Chamber of Commerce, IG Passivhaus), environmental organizations (e.g. Greenpeace, WWF, Global 2000) and professional individuals, OGUT has the best preconditions for networking, preparation and providing of competent information and innovative solutions in order to meet and initiate challenges in the environmental field.

The main focus at OGUT lies on "networking, scientific competence and innovation" and the topics that are dealt with lie in the fields of "Environment and Technology". An important pillar of OGUT's activities is to develop strategies for environmentally sound policies and measures as a think-tank, together with its members.

On the European level OGUT is participating in Eracobuild (an Era-net on research in the building sector where Austria is the leader of the Steering Committee), it is the project coordinator of PASS-net (a network of passive house organizations), it is participating in ACTP (Austrian Construction Technology Platform – Research Group) which is the national branch of ECTP (European Construction Technology Platform) etc.

OGUT has a permanent staff of 35 employees (28 scientists). Besides scientific expertise - where one of the main emphases is laid on sustainable buildings, OGUT has a designated expertise in project and programme management, e.g. OGUT is commissioned by the Austrian Federal Ministry of Transport, Innovation and Technology to manage the Austrian building RTD programme "Building of Tomorrow" since the year 2000. OGUT is responsible for the content of the programme, supervising the various participating projects, building networks between the people involved in them, informing potential participants about the programme and integrating important stakeholders. Furthermore, OGUT has broad knowledge in project management and is involved in some European Projects (FP6 – ERANET Project ERABUILD, INTERREGG-Projects with new EU member states, IEE projects EffCoBuild and PASS-NET, etc.) dealing with building issues.

The Austrian Society for Environment and Technology works primarily on contract basis for its members. In the department for Building and Innovation OGUT has worked as coordinator or partner in many innovative projects in and for the construction industry. OGUT is managing the Austrian building standard for sustainable buildings: klima:aktiv building & refurbishing.

Besides scientific expertise, OGUT has an accounted expertise in project and programme management. In that role OGUT is commissioned by the Austrian Federal Ministry for Transport, Innovation and Technology to manage the Austrian building RTD programme "Building of Tomorrow".

Responsibilities

The Austrian Society for Environment and Technology is a non-profit organization. OGUT is dealing with relevant issues on the interface between the environment and technology. Its responsibilities specifically include:

- Avoiding/resolving conflicts involving the environment
- Facilitating the reconciliation of interests between the various stakeholders affected by environmental policy (particularly environmental organizations, firms, employers' and employees' associations, and the administration)
- Boosting Austria's environmental technologies (including transport and energy technologies) in the widest sense
- Assisting the states of Central and Eastern Europe in solving environmental problems

- Evaluating the legal, political, social and economic framework for environmental technologies and developing it further
- Informing the general public about options and hazards as regards the environment and technology
- Handling issues relevant to the environment and technology in the interest of a majority of ÖGUT's members
- Working as a Think-Tank for members and administrative authorities

In connection with these assignments ÖGUT actively promotes communication and cooperation between scientific institutions, business, industry, representatives of employers and employees, the authorities, environmental organizations, the media and other relevant institutions.

IG Passivhaus Österreich (IGPH)

Source:

<http://www.igpassivhaus.at/>

IG Passivhaus is an independent organization with the goal to spread the concept of the passive house in Austria. Besides the federal organization IG Passivhaus Austria, there are 7 regional associations:

- IG Passivhaus Vorarlberg
- IG Passivhaus Tirol
- IG Passivhaus Salzburg
- IG Passivhaus Oberösterreich
- IG Passivhaus Ost
- IG Passivhaus Steiermark-Burgenland
- IG Passivhaus Kärnten

Organization members are companies from different sectors of the construction industry who have made it their aim to implement the concept of the passive house at the highest level.

IG Passivhaus Austria serves as the headquarters for the coordination of cooperation and exchange of information between the provincial organizations. It currently represents approximately 320 companies with around 24,000 employees.

IG Passivhaus Austria is a common platform for communication, consultation and research in the development of passive houses (single-family and multi-storey residential buildings, office and administrative buildings, commercial and hotel buildings, educational and exhibition buildings, etc.).

IG Passivhaus Austria is a non-profit organization. Funding is provided solely by membership fees and grants. The organization's mission is to disseminate knowledge and experience in the field of passive buildings. To provide new knowledge for its members, decision makers and stakeholders and to prepare the way for innovation, it regularly

conducts extensive research in passive buildings development.

It is the first point of contact for information about passive buildings and offers advice to all stakeholders. The organization serves as a communication network for other participants (especially consultants, designers, developers and construction industry) in the field of passive buildings, as well as for other national and international organizations. The main focus is on coordination and sharing of resources.

The organization helps to ensure the quality of construction of passive houses and manufacturing of components for them through training courses, seminars and workshops. As the main organization for regional IG Passivhaus clubs, it contributes to the rapid spread of standards and accelerates the construction of passive public buildings. Similarly, IG Passivhaus Austria serves as the contact organization for international exchange of knowledge with related organizations in other countries as well as European and international bodies and politicians.

Regional Level

Energy Agency of Tyrol (Energie Tirol)

Source:

<https://www.energie-Tirol.at/>

Energie Tirol is a regional energy agency in Tyrol, founded in 1992 by the province as a non-profit association. Its objective is to improve energy efficiency in the private and public sectors, taking into account local renewable energy sources. It is financed partly by the provincial government, by the major energy supplier in Tyrol and by participation in projects (about 60% of the financing). Its aim is to improve energy efficiency in the public and private sectors, taking into account local renewable energy sources by:

- consulting the end user;
- advise the Government on how to develop a system of subsidies.

Energie Tirol participate in the dissemination of information, advice on specific energy issues, energy audits, promote new technologies, energy efficiency in buildings, solar thermal and change the behavior of individuals in terms of energy use.

The Agency provides consulting services to households, businesses and municipalities and puts a strong emphasis on energy efficient buildings and passive houses in particular. It is a partner in the e5 programme for energy efficient communities.

Low Energy Building Cluster Tyrol (Niedrigenergiehauscluster Tirol)

Source:

ec.europa.eu/enterprise/sectors/construction/files/COMPET/national-building-regulations/PRC-at_en.pdf

Low Energy Building Cluster Tyrol is a public-private initiative of the Austrian Federation of Industry in Tyrol and private companies, mainly from the construction industry, established in 1999. Its mission is to accelerate the market penetration of low energy buildings and to increase the construction quality of new buildings, as well as of the renovation of existing ones. This mission is achieved by networking, professional training and definition of common quality standards.

To ensure construction of low energy buildings (including complying with a passive house standard) at high quality standards the cluster is active in the following areas:

- standardisation of the products (e.g. passive houses) of different companies;
- development of innovative products and services;
- motivating and improving the qualifications of employees (and companies);
- change of public regulations and general market conditions in favour of low energy buildings;
- “clustering” of independent companies.

Standortagentur Tirol

Source:

<http://www.standort-tirol.at/>

Standortagentur Tirol is an agency of the Province of Tyrol, established in 1997 with an annual budget of about € 7 million and a targeted mission to assist the region in terms of science, economy and employment. The Agency is funded by grants, participation in projects and membership fees.

Through its program for establishing clusters it has created a network of more than 68 companies and partners, thus helping the participants in the network to identify potential partners and projects in the province of Tyrol.

One of the members of Standortagentur Tirol is the cluster “Renewable Energies Tyrol”.

Cluster “Renewable Energies Tyrol” (Erneuerbare Energien Tirol (EET))

Tyrol is traditionally active in the production of energy from renewable sources. Tyrolean companies and research institutes have been particularly successful in developing new technologies for efficient use of wind energy.

The cluster includes 86 innovative companies, institutions and universities with over 8000 employees. The companies and research institutions in the cluster cover in particular the following technology areas:

- Solar heat
- Photovoltaic energy
- Heat pumps
- Energy from biomass and biogas, CHP
- Electric Mobility
- (Small) HPP
- Energy efficiency and energy-efficient buildings

Its daily activities include:

- Establishing contacts between companies and researchers;
- Motivate and encourage strategic research and innovation activities;
- Initiating and coordinating collaborative projects between its members;
- Initiating and supporting innovative projects and activities in the field of renewable energy sources;
- Informing members of developments in the field of renewable energy.

alpS - Technology Center for Adaptation to Climate Change

Source:

<http://www.alp-s.at>

AlpS GmbH is a private non-profit organization in Tyrol. The organization investigates how global climate change affects regional and local human-environment systems. Climate and socio-economic scenarios provide the basis for assessment and evaluation of possible future developments in mountain regions.

AlpS focuses on innovative, marketable technologies and strategies for a sustainable adaptation to climate change. These include innovations for early warning and monitoring systems for the prevention of natural disasters, tools for modern risk management as well as concepts for adapted land-use, water resource and forestry management.

The organization also supports decision makers, institutions and businesses on the basis of its scientific expertise. Risk management for municipalities and businesses or regional energy development strategies serve as two successful examples.

IG Passivhaus Tirol

Source:

<http://www.tiroler-passivhaus.at/>

IG Passivhaus Tirol began its operation as a private initiative of the 8 small / medium companies in 2003 and it was officially established as an association in 2005 and over time has grown to a network of nearly 80 members in 2012. It is an association of experts

in technology for passive buildings whose purpose is to accelerate the deployment of passive houses in Tyrol.

The association's position as a center of expertise in Tyrol on all issues related to sustainable and most of all passive buildings is provided by a continuous exchange of information, the provision of quality, comprehensive training and careful cooperation.

The Association is a member of the IG Passivhaus Austria.

Neue Heimat Tirol

Sources:

<http://www.neueheimattirol.at>

<http://www.tiroler-passivhaus.at/ueber-uns/mitgliedsbetriebe/neue-heimat-tirol.html>

The Company Neue Heimat Tirol, founded in 1939, is one of the leading developers and one of the leading property management companies in western Austria. It is owned by the province of Tyrol and Innsbruck (by 50% each). Its features are accessible cost of ownership and management of rented housing and optimized energy costs. As a consultant in the residential sector, Neue Heimat Tirol offers its services to all communities and institutions. The main emphasis is placed on the cost saving architecture, quality of life and environmental awareness. Neue Heimat Tirol is a leader in the renovation and maintenance of buildings, and in improving of the quality of life.

One of the long standing efforts of the Neue Heimat Tirol is to keep heating costs to the lowest possible level. This, therefore, requires a suitable building envelope. To minimize the consumption of oil and gas, solar panels on the newly built housing are almost always installed. Neue Heimat Tirol reduces the energy load on buildings with full energy renovations, improved thermal insulation of the facade and roof, and replacement of doors and windows.

The competence of Neue Heimat Tirol on energy issues provides relatively stable heating costs for housing over the past two decades despite the sharp increase in energy prices.

One of the greatest achievements of the company is the construction of "Olympic Village" for the Youth Winter Olympic Games in 2012 in Innsbruck, which demonstrates the construction of buildings in the passive house standard in large scale. The project consists of 13 residential buildings comprising a total of 444 apartments.

PLANNING AND DESIGN CAPACITY

One of the necessary conditions for achievement of the objectives of the energy strategy of Tyrol is acquisition of appropriate knowledge and skills by all stakeholders. This is achieved through professional orientation, basic vocational training and/or upgrading of skills, professional advice, creation of clusters, as well as national and international networks and other forms of exchange of experience.

At national level the most important programmes are klima:aktiv - training of professionals, the Austrian programme on Technologies for Sustainable Development "Nachhaltig Wirtschaften" and the BUILD UP Skills programme.

At regional level in Tyrol the local energy agency Energie Tirol has implemented decentralised energy consultancy services, while Energy Academy Tyrol offers practical training in relevant key thematic areas, and Energy Academy Tyrol and IG Passivhaus Tirol offer practical training in relevant key thematic areas.

Federal Programmes

klima:aktiv - Training of Professionals

Source:

<http://www.uncsd2012.org/content/documents/519austria%20klima%20aktiv.pdf>

One of the key activities of the klima:aktiv programme is training of professionals. klima:aktiv provides the qualifications needed in the thematic programmes and coordinates training and education in various relevant fields. The main focus is on advanced vocational training. Pilot training and seminars are initiated and introduced in the training market, in cooperation with universities, technical colleges, educational service of the Chamber of Commerce etc. klima:aktiv is therefore not in competition with the educational market players but acts as a partner and an innovation manager.

The competence partners and the klima:aktiv professionals, who profit from trainings are plumbers, owners of biomass plants, planners, chimney sweepers, architects, master builders, energy advisers, ecology trainers and mobility managers.

Austrian Programme on Technologies for Sustainable Development "Nachhaltig Wirtschaften"

Source:

<http://www.nachhaltigwirtschaften.at/>

This programme has been developed by the Austrian Federal Ministry of Transport, Innovation and Technology (BMVIT). It initiates and supports advanced research and development projects and implementation of exemplary pilot projects.

The objectives of the programme are:

- new opportunities for the economy;
- economical use of natural resources;
- consolidation of Austria's position in the field of technology;
- a positive effect on the economy and employment, achieved through:
 - strengthening of R&D competence;
 - interdisciplinarity and networking;
 - dissemination and application of R&D results.

BUILD UP Skills – Top Qualification for Energy Efficiency in the Building Industry

Source:

<http://en.energyagency.at/projects-research/buildings-household/detail/artikel/build-up-skills-top-qualification-for-energy-effi>

The guideline for overall energy efficiency of buildings creates a new challenge for designers and experts in the field of construction industry in respect of the category of buildings with almost zero energy.

The "BUILD UP Skills" initiative of European Union – Intelligent Energy Europe (IEE) aims to improve the relevant know-how of craftsmen, construction workers and installation personnel by means of specific training and further training concepts.

In the first stage the "BUILD UP Skills" project in Austria initiates a national strategy process, bringing together all relevant national participants in the areas of qualification, training and education. In the second stage the relevant working groups prepare a national road map for improving the qualifications of craftsmen in the construction sector.

The project consortium consists of three partners: Austrian Energy Agency as a coordinator, Regional Association Steiermark and Organisationsberatung GmbH (responsible for the klima:aktiv education coordination). The total project includes representatives from ministries, numerous public authorities, social partners, representatives from interested lobbies and educational institutes in several working groups. The project started in Austria in November 2011, the national roadmap is envisaged to be completed by May 2013. In the second phase of the initiative, the newly gained knowledge will be applied to new training and further training measures.

Regional Programmes

Energie Tirol Consultations

Source:

<https://www.energie-Tirol.at/index.php?id=2238>

The establishment of decentralised energy consultancy services in Tyrol is important for achieving the objectives related to space heating. The provincial office for energy consultancy Energie Tirol is represented in all districts and offers advice and consultations. It conducts meetings on fixed dates in individual districts and on-the-spot consultations upon request. With the opening of energy services desks in 2009 the decentralised provision of consultations by Energie Tirol developed further and now intensively networks with regional actors. Thus a dense system for energy consultancy services is being build jointly with the municipalities, close to the citizens' concerns.

The consultations, provided by Energie Tirol, represent a service in the areas of energy saving, environment and efficient use of resources for promotion of energy conservation. A specific emphasis is put on the quality of construction works, which should ensure optimal results from design phase to construction from energy performance point of view.

Experts not only advise on all major issues of low energy and passive houses, but also provide important advice and information for new insulation systems, window frames and glazing, environmental heating systems, use of solar energy by means of collectors and heat pumps for the promotion of energy conservation in the country.

Energy Academy Tyrol

Source:

http://www.energie-tirol.at/fileadmin/static/energie_akademie/et_eat_programm_2010-2011.pdf

Promotion of energy efficient buildings, environmentally friendly heating systems and diffusion of innovative energy technology are the main activities of Energy Academy Tyrol. The academy has been founded by Energie Tirol and the province of Tyrol in collaboration with various partner organisations.

The energy academy offers an interesting range of information sessions for private clients. Topics include renovation of buildings, comfortable ventilation systems, environmentally friendly heating systems, etc.

The academy offers practical training in key thematic areas for representatives of communities and for employees of municipalities.

In-house training for companies will be offered tailored to the requirements of the particular company for training courses for its employees.

IG Passivhaus Tirol – training courses

Source:

[https://www.energie-](https://www.energie-tirol.at/index.php?id=1830&tx_ttnews%5Btt_news%5D=42&tx_ttnews%5Byear%5D=2010&tx_ttnews%5Bmonth%5D=05&tx_ttnews%5Bday%5D=07&cHash=171fe0f038)

[tirol.at/index.php?id=1830&tx_ttnews%5Btt_news%5D=42&tx_ttnews%5Byear%5D=2010&tx_ttnews%5Bmonth%5D=05&tx_ttnews%5Bday%5D=07&cHash=171fe0f038](https://www.energie-tirol.at/index.php?id=1830&tx_ttnews%5Btt_news%5D=42&tx_ttnews%5Byear%5D=2010&tx_ttnews%5Bmonth%5D=05&tx_ttnews%5Bday%5D=07&cHash=171fe0f038)

Through its training center, IG Passivhaus Tirol offers training courses for certified designers and construction specialists in the field of passive houses in collaboration with Energie Tirol and other institutions. This practical training aims to prepare specialists in the application of EU regulations and deliver deep knowledge required for the construction of passive houses.

CONSTRUCTION AND TECHNOLOGIES

Sources:

ec.europa.eu/energy/efficiency/doc/il/info_note.pdf

<http://www.langconsulting.at/index.php/en/lang-consulting-en>

In Austria there are two definitions of low energy buildings:

- Low energy building: annual heating energy consumption below 60-40 kWh/m² gross area, 30% above standard performance;
- Passive building: equal to Feist passive house standard: annual heating energy consumption below 15 kWh/m² (heated area in Tyrol)

Project Lodenareal

Sources:

http://www.passivhausdatenbank.eu/obj_basic_show.php?objid=at-0619



The largest residential complex in Europe, designed and built up to the passive house standard was opened in October 2009 in Innsbruck, the capital of Tyrol. Around 35.000 m²

(gross) for 354 flats (26.000 m² usable area) have been build by the building owner Neue Heimat Tirol (www.neueheimattirool.at), a social housing company providing affordable flats to citizens. The heat energy demand is to be 15 kWh/m² per year, as calculated by the PHPP software. Solar collectors (1.050 m²), groundwater pre-heating (or cooling) of ventilation air, a wood pellets boiler (300 kW) and a condensation gas boiler (326 kW) cover the energy demand for space heating and hot water. The compliance with the passive house standard has been certified by the Passivhaus Institute (PHI), Darmstadt.

Overall annual energy consumption per square meter does not exceed the 15 kWh/m² passive house standard, of which only 7 kWh/m² per year is used for space heating. Up to 80% of the heating consumption will be covered by a combination of a wood pellets and a gas boiler and up to 20% by 1050 m² of solar panels, which produce annually 350 kWh/m². The insulation and ventilation technologies also comply with the passive house standard.

Main features:

- Treated floor area: 26000 m²
- Annual heat demand: 14.5 kWh/ (m².a)
- Heat-load: 9.1 W/m²

Olympic Village, Innsbruck, Tyrol, Austria

Sources

<http://www.phnw.org/files/11.pdf>

http://www.innsbruck2012.com/en/venues/olympisches_jugenddorf

The new apartment complex for the 2012 Youth Winter Olympic Games demonstrates the potential for a large scale building project, complying with the passive house standard. The development consists of 13 apartment blocks, comprising a total of 444 apartments for accommodation of the participants in the Olympiad, which after April 2012 were made available to local residents.

Main features:

- Very low energy new building (<= 25 kWh/m² annual heat demand)
- Treated floor area: 32229 m²
- Annual heat demand: 18.2 kWh/ (m².a)
- Total primary energy demand (domestic hot water, heating, cooling, household electricity): 108 kWh/ (m².a)

- Primary energy demand:
(hot water, heating and auxiliary electricity) 33 kWh/ (m².a)
- Heat load: 13.3 W/m²

Passive House Disk Salzkammergut

Source:

<http://www.langconsulting.at/index.php/en/research/demonstration-projects/34-lang-consulting-en/research/demonstration-projects/>

Built as one of the first passive houses in Upper Austria, the house was presented with the award "House of the Future" in 2000. Due to the optimising measures conducted, the demonstration project has been built without incurring extra costs compared to the then current design under the Austrian Building Code.

The basic idea arose from the opportunity of reusing a discarded trade-fair pavilion as a basic structure for building a single family home. In order to get the most out of the existing structure the future building shape was adjusted to it.

Despite the high standard, living comfort and extraordinary architecture, the construction costs of € 1,240. -/m² were no higher than those of conventional single-family homes at that time.

The one-storey single-family house in lightweight construction has a diameter of 14.7 m and an usable living area of 140 m².

Energy concept

Insulated to extremely high degree building envelope and windows, no thermal bridges, air tightness.

Low-tech concept

All HVAC equipment with controlled living space ventilation, including heat recovery and hot water preparation, is accommodated in a compact unit in the toilet.

Main features:

- Annual heat demand: 13.7 kWh/m²
- Heat load (PHPP): 10.2 W/m²
- Airtightness (measured), n50: 0.41 1/h
- Transmission heat losses of particular components:
 - Exterior walls 0.10 W/m²K
 - Roof 0.08 W/m²K

- Ground floor 0.12 W/m²K
- Exterior doors incl. frame 0.45 W/m²K
- Windows incl. frame 0.78 W/m²K

Evaluation

The average consumption of green energy for heating, hot water and ventilation for a period of 8 years was only 1.580 kWh/a, which corresponds to an average energy demand for heating, hot water and ventilation of 11.25 kWh/m².a. As a result the actual energy consumption is even significantly lower than calculated.

After 7 years the air tightness pressure test was repeated. The result achieved, n₅₀ = 0.42 1/h, is virtually identical to the original measurement. A thermographic measurement, conducted after 8 years, confirmed the excellent state of the building as well.

Air quality inside the house

Due to controlled ventilation and extraction, all rooms are supplied with fresh air throughout the year and the CO₂ concentration never exceeds 800 ppm.

Awards received for the Salzkammergut passive house

Haus der Zukunft 2000 - won

Energy Globe Award 1999 - nominated

OÖ. Umweltschutzsonderpreis 1998 - won

CERTIFICATION AND QUALITY ASSURANCE

A necessary condition for the completion of programmes and plans for energy efficiency in the field of construction of low energy and passive buildings and thermal renovation of existing ones is the creation of a system of certification and quality control. Certification of passive buildings is of particular importance for provision of subsidies and for monitoring of achieved energy savings results.

Construction quality control is performed by the building authorities and usually only the design documentation is assessed. In cases of larger and complex projects on-site inspections are carried out as well.

Certificates for energy performance of buildings in Austria are issued by qualified experts and quality control is performed by the regional authorities.

Sources:

http://www.buildup.eu/system/files/Austria_0.pdf

http://ec.europa.eu/enterprise/sectors/construction/files/compet/national-building-regulations/prc-at_en.pdf

Certification of Passive Buildings

Sources:

"The impact of energy performance regulations on systems of building control" by H. Visscher/E. Mlecnik/F. Meijer (RICS Cobra Research Conference, University of Cape Town, 10- 11th September 2009)

<http://www.langconsulting.at/index.php/en/the-passive-house/passive-house-guide>
erg.ucd.ie/pep/pdf/European_Embedding_of_Passive_Houses.pdf

The Austrian Institute for Construction Engineering (OIB) certifies passive houses in Austria using the Passive House Planning Package (PHPP) software, developed by the German Passive House Institute (Passivhaus Institut) and/or the Austrian methodology under OIB guideline No 6 when there is an application for housing subsidies.

There are some differences between the PHPP and the Austrian OIB methodology. The reference area in the PHPP is the heated occupied area whereas in the OIB guideline the energy demand for space heating refers to the heated gross building area. This results in a difference in the threshold value for the passive house standard of 5 kWh/m² per year. Very optimistic default values for internal heat gains and shading of the OIB methodology may be criticised, while those of PHPP are validated in real applications.

Construction Control

Source:

ec.europa.eu/enterprise/sectors/construction/files/COMPET/national-building-regulations/PRC-at_en.pdf

Construction quality control is performed by the building authorities. Private experts or private institutions are only involved in certain cases either on behalf of the building authority or contracted by the builder (building owner) as provided for in the procedural regulations of the province. Verification is done in most cases through an assessment of the design and only in a few ones (e.g. for larger or more complicated projects) by additional inspections on site. Only registered designers, contractors and specialists are allowed to participate. The professional requirements for those registered designers, contractors and specialists are relatively high in Austria (professional education at secondary or university level plus several years of professional experience plus additional examination).

The assessment is done before the construction work starts, hence building permits can be seen as design permits. After the completion of 'Y0602.01.01 Screening nat. building

regulations-Austria- 4-14 Febr. 2011¹ in most provinces a confirmation by the builder is required that all legal requirements as well as conditions and orders of the building permit have been duly respected. Site inspections are normally only carried out for larger and/or more complicated projects. In order to make inspections at the right time the building authority can oblige the builder to notify the building authority when certain stages of the construction process have been achieved (e.g. completion of the foundation, placement of the reinforcement, etc.).

Building plans are monitored on all aspects of sustainability, except for those related to economic and social quality. The inspections are performed by the municipal authorities for functional and technical quality. Other aspects of sustainability are checked either by the architect, a technical advisor on behalf of the authorities or the owner, or by other public authorities. The monitoring process is regulated in the building law of the province.

Construction works are inspected on some aspects of ecological quality, like waste reduction, and on functional and technical quality. This monitoring is performed by the municipal authorities, by the technical advisor on behalf of the municipality or by other public authorities. Prior to occupation the finished building is checked on most aspects of sustainability, except on economic quality and technical execution/quality of the construction process. This is done by the municipality, by other public authorities, or by a technical advisor.

Existing buildings are only checked on aspects of functional and technical quality by other public authorities.

Quality Control of Energy Performance

Source:

http://www.buildup.eu/system/files/austria_0.pdf

There is no mandatory national quality assurance scheme for energy performance certificates (EPC) of buildings in Austria. Qualified experts usually have had a certain amount of information and training during their specialisation, although widely differing and, with some exceptions, not covering all fields of knowledge necessary to issue an EPC. Therefore, most of them undergo additional training, which is organised and offered by the governments and the responsible institutions of the provinces. The training of experts, managed mainly by the provincial authorities, universities, the Chambers of Commerce and Civil Engineers as well as by some private organisations, evaluates the knowledge of the experts about the technical requirements of buildings, the diverse regulations and the details of the certification system itself.

Depending on the regulations of the specific province either all energy performance certificates (EPC) or most of them are checked if they are linked with residential or other subsidies. Random checks are carried out of EPCs, that recorded in an official database of

the provinces (e.g. ZEUS). Checks always include a full data review of calculations in order to verify compliance with the correct methodologies. Further checks may include input data if they do not seem plausible. Other EPCs are not checked regularly, but will be in the future, after independent controlling institutions are set up in the provinces.

After a number of checks have been performed many experts have had to revise the EPCs at their own expense and, in some few cases, legal actions have been taken due to incorrect application of thermal regulations or certification methodologies, which have finally led to compensation payments or to annulment of contracts.

VISIBILITY AND PUBLIC SUPPORT

A very important step in every success model is working with the community and presenting the information in a way appropriate for the final customer/consumer. Drawing attention on topics such as environmental care and reasons why one should/must change the way s/he leads her/his everyday life and raising the overall awareness of the future of habitation and its comfort is as important as building the right policy and financial plans.

To this end a number of information campaigns are being carried out at national level, such as information and communication campaigns for energy performance certificates as well as providing information and raising of public awareness within the framework of the klima:aktiv programme.

At regional level the energy agency Energie Tirol participates in the processes of dissemination of information and consultations through various information campaigns, such as "Yes to Solar", "Heat Pumps – Let Us Make Best Use of Geothermal Energy", "Tirol A++ - Saving Heating Costs!", targeted at the general public; by organizing competitions with awards such as an award for renovation of homes and an energy award for communities; by conducting on-site information sessions in municipalities and by publishing the "Energy prospects of Tyrol" newspaper.

National Information and Communication Campaigns for Energy Performance Certificates (EPC)

Source:

http://www.buildup.eu/system/files/austria_0.pdf

Austria started the implementation of EPBD certificates in 2008 and the provincial governments performed many actions to promote EPCs on regional level, mainly using brochures, folders and information campaigns linked to the training of experts. No extensive advertising campaign was developed to launch the EPCs, like in some other EC

member states, but information was well distributed by numerous energy agencies as well as by experts, the provincial governments and independent energy consultants.

During the preparations for the introduction of the EPBD energy performance certificates comprehensive measures to inform the population and affected professional groups (such as planners, real estate agents, residential constructors, etc.) were taken in all federal provinces also with the help of several joint projects co-financed by the European Commission.

During 2008-2010 representatives and experts of the provincial governments, universities, energy agencies and Chambers of Commerce have participated in more than 3000 events, fairs, seminars and workshops disseminating the certification process and the EPCs, promoting awareness among citizens regarding information on thermal quality performance of buildings. A number of websites provide detailed information about the building energy performance certificates as well.

klima:aktiv - Providing Information and Raising Awareness

Source:

<http://www.uncsd2012.org/content/documents/519austria%20klima%20aktiv.pdf>

One of the main activities of the klima:aktiv programme is providing online and printed information and thus raising the awareness of consumers, businesses and professionals.

klima: aktiv uses modern language, avoiding moralising and "teaching", but shows the direct benefits of climate protection actions and products instead. The klima:aktiv awareness and information campaigns inform the media and the citizens about the benefits of climate friendly activities. Advertisements, articles in newspapers and specialised magazines, give-aways etc. are part of the klima:aktiv initiative to make the "klima:aktiv" brand well-known. In June 2008 already 26% of the Austrians recognised the brand with a very positive image attributed to it: economic, positive, modern, dynamic and ecological. klima:aktiv provides on-line information platforms to empower consumers, companies and professionals to act instantly. klima:aktiv is present at about 1500 events each year.

Energy Agency of Tyrol (Energie Tirol)

Source:

<https://www.energie-Tirol.at/>

Energie Tirol participates in dissemination of information, consultations on specific energy issues, energy audits, promotion of new technologies, energy efficiency of buildings, solar energy, thermal insulation and changing citizens' behaviour with respect to energy use.

Information Campaign "Yes to the solar energy!" ("Ja zu solar")

Sources:

Energy strategy of Tyrol 2020 (Tyrol Energy Strategy 2020 ", -BUL.docx)

http://www.energie-tirol.at/fileadmin/static/folder/ET_Folder_Ja_zu_Solar_mod.pdf

The promotion of decentralised energy consulting service centres is essential for further increase of the share of renewable energy sources.

The local regional energy agency in Tirol (Energie Tirol, Austria) started the “Ja zu Solar” information campaign in 2004. Since a lack of information on the consumer side was identified as one of the main barriers to increased uptake of solar thermal technologies, the implementation of a broad information campaign was seen as an appropriate tool to reach this goal. The programme primary criterion for success was the initiation of additional uptake of solar thermal technologies measured in additional area of solar collectors installed. The target was to increase the installed collector area from 160 000 m² (2005) to 300 000 m² within five years.

Energy Programme Tirol A++

Sources:

[http://projekte.izt.de/bewaree/services/exhibitions-and-events/
Energy Strategy of Tyrol 2020 \(Tyrol Energy Strategy 2020 ", -BUL.docx\)](http://projekte.izt.de/bewaree/services/exhibitions-and-events/Energy%20Strategy%20of%20Tyrol%202020%20(Tyrol%20Energy%20Strategy%202020%20,-BUL.docx))

In the field of work with the general public the Energy Strategy relies on the “Tirol A++” programme for energy efficiency improvement . This promotional programme is considered to be the central focus of comprehensive information activities aimed at improvement of energy efficiency in households. The information activities comprise themes, related to building construction and renovation methods, leading to energy conservation, as well as such related to energy efficiency oriented change in the behaviour of building users. As with the already successful "Yes to the solar energy!" promotional programme the work is implemented in close cooperation with Tyrol municipalities. The information palette extends from special events through dissemination of information materials to special offers for consultations and advisory services.

The achievement of the efficiency objectives obviously depends also on the commitment and involvement of construction and construction-related companies in Tyrol. In this respect training for skills upgrading, networking and activities going beyond the framework of the construction sector are of utmost significance.

“Heat Pumps – Let Us Make Best Use of Geothermal Energy” Campaign

On the basis of the experience, accumulated from the initiative for utilization of solar energy the “Heat Pumps – Let Us Make Best Use of Geothermal Energy” information campaign was launched in 2007 within the framework of “Tirol A++”. In the centre of attention was the efficient use of heat pumps. Evidence about the benefits from that technology is observed above all in low-energy buildings, respectively passive ones.

“Tirol A++ - Saving Heating Costs!” Campaign

The “Tirol A++ - Saving heating costs!” energy initiative is a joint project of the province of Tirol and Energie Tirol to improve the energy efficiency in the region. Within the

framework of this project Energie Tirol performs information events in cooperation with municipalities in Tyrol. The one to two hour events include presentations on different topics and the participants have the possibility to consult experts afterwards. The variety of topics ranges from information about saving heating costs by behavioural changes, use of solar energy, simple structural measures to reduce the consumption of energy for space heating, renovation of buildings for considerable reduction of energy consumption, information about energy passports to information about municipal subsidies for energy saving measures. Energie Tirol estimates that only by economical behaviour and implementation of simple measures in private households up to 20% of the energy consumed could be saved. In an average one family house the savings would be about 400 Euros per year (2007).

Tyrol Renovation Award

Source:

<http://www.architekturwettbewerb.at/competition.php?ID=937>

The purpose of the award is to pay tribute to outstanding building renovation services, which combine technical and architectural quality, as well as to promote the knowledge of new construction services. The success models are intended to present the achievements of Tyrol and to promote high quality renovation of old buildings.

Tyrol Energy Award for Communities

Source:

[https://www.energie-tirol.at/index.php?id=1543&tx_ttnews\[tt_news\]=252&tx_ttnews\[year\]=2012&tx_ttnews\[month\]=10&tx_ttnews\[day\]=24](https://www.energie-tirol.at/index.php?id=1543&tx_ttnews[tt_news]=252&tx_ttnews[year]=2012&tx_ttnews[month]=10&tx_ttnews[day]=24)

The Tyrol energy award for communities is awarded for outstanding achievement in energy efficiency projects by one of the Tyrol e5 communities. The choice for the award is made by a jury of experts in the areas of energy, environment, transport and land use planning.

The aim of the award is to demonstrate the enormous potential of energy efficiency communities and particularly of innovative, sustainable community projects and highlight their role model.

"Energy Prospects of Tyrol" Newspaper

Source:

<https://www.energie-Tirol.at/index.php?id=2238>

"Energy prospects Tyrol", the newspaper of Energie Tirol, presents an overview of the most important innovations in the Tyrol energy sector. One of the recent issues, for example, focuses on a broad range of advice by Energie Tyrol, which extends from consulting for clients in the energy services centres in Tyrol to individual consulting services for renovation of multi-family houses to construction supervision with respect to energy.