Belgian National Plan
Nearly Zero Energy Buildings

Implementation European Energy Performance of Building Directive

Brussels, September 2012.

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1 INTRODUCTION & CONTEXT

The EU 'Energy Performance of Buildings Directive' requires Member States to ensure that all new buildings which are constructed by 2021 are nearly zero-energy buildings. This requirement takes effect in 2019 for public buildings. Actions and measures must be taken to increase the number of nearly zero-energy buildings for both new and existing buildings.

In order to meet the targets set for reducing greenhouse gases, the security of energy supplies and control over energy bills, the European Union has introduced a range of measures that include the directives relative to the Energy Performance of Buildings. Indeed, the consumption of energy in buildings represents a significant proportion (40%) of the energy consumption in Member States, whereas measures to reduce and control that consumption could easily be put in place.

Directive 2002/91/EC aims to improve the energy efficiency of buildings in Member States. After a number of adaptations, the initial Directive issued on 16/12/2002 was completely recast in Directive 2010/31/EC issued on 19th May 2010.

This revision involves making rapid adaptations to the various legal mechanisms, as well as to all tools and measures that accompany the new requirements.

Article 9 of Directive 2010/31/EU specifies that, beginning in 2021, all new buildings must be nearly zero-energy buildings. Within the context of the leading role being played by the public sector, this requirement will apply to all new public authorities buildings beginning in 2019. A nearly zero-energy building is defined in Article 2 of the Directive as a building with a very high energy performance, as determined in accordance with Annex I. The nearly zero or very low amount of energy that is still required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby.

For its part, Article 4 of the same Directive stipulates that: "1. Member States shall take the necessary measures to ensure that minimum energy performance requirements for buildings or building units are set with a view to achieving cost-optimal levels. (…) A Member State shall not be required to set minimum energy performance requirements which are not cost-effective over the estimated economic lifecycle.
Minimum energy performance requirements shall be reviewed at regular intervals which shall not be longer than five years and, if necessary, shall be updated in order to reflect technical progress in the building sector." (art. 4.1. Directive 2009/32).

1.1 *Division of competences*

1.1.1 The distinctive features of the Belgian institutional context

Various constitutional reforms have made Belgium a federal State, as a result of which competences have been distributed among the Federal State and the 3 Regions (Flanders, Wallonia and Brussels-Capital)

The Special Institutional Reform Act of 8th August 1980 defines the breakdown of powers between the various institutions (MB dated 15/08/1980), the addenda of which are included in the Act of 8th August 1988.

The regional aspects of energy include:

- the distribution and local transmission of electricity over networks whose nominal voltage is equal to or less than 70,000 volts;
- the public distribution of gas;
- the use of firedamp and blast furnace gases;
- the distribution networks of remote heat supplies;
- the reuse of slagheaps;
- new sources of energy, with the exception of sources linked to nuclear energy;
- the recovery of energy by industries and other users;
- the rational use of energy.

However, the Federal Authorities have the power in matters where the issues of technical and economic indivisibility require homogeneous implementation on a national level, i.e.:

- The national industrial development programme for the electricity sector;
- The cycle of nuclear fuels;
- The major infrastructures for the storage, distribution and production of energy;
- Pricing.

The policy for the rational use of energy, including its application in the construction sector, therefore comes under regional powers.
The Nearly Zero Energy Buildings policy falls mainly within the competence of the Regions.
The Federal State implements some additional measures aimed at realizing nearly zero energy buildings within its competences.

1.1.2 The Regional-Federal Consultation Cell

The federal structure and the distribution of competences in the field of energy have made it necessary to organize a consultation between the Regions and the Federal State. As far as national issues are concerned, the policies implemented by the Regions and the Federal State need to be coordinated and made coherent. As regards European and international matters such consultation makes it possible for Belgium to adopt a position view, commonly agreed on by the Regions and the Federal State.

In practical terms, this consultation takes place in the "Inter-Ministerial Conference for the Economy and Energy", which was instituted in 1991 through a cooperative agreement, the CONCERE/ENOVER working group (Concertation de l'énergie entre l'Etat Fédéral et les Régions/Energie Overleg tussen de Federale Staat en de Gewesten – *Consultation on Energy between the Federal State and the Regions*). This group meets regularly and has put groups of experts in place which:

- prepare the positions taken by Belgium, in particular on European matters;
- reach agreement for the reporting requirements imposed by international bodies and appoint the Belgium delegates who sit on these bodies;
- try to harmonise certain provisions;
- decide to provide joint-financing for certain research or study projects;
- provide each other with information about projects and support measures implemented, based on their respective skills areas.

For specific tasks, CONCERE/ENOVER working groups are created, such as 'renewable energy', 'certification of installers', 'smart meters', 'energy-efficiency'… For the simultaneous drafting of the Regional NZEB Action Plans and their compilation into a National NZEB Action Plan the CONCERE/ENOVER working group 'NZEB' was created.

1.1.3 The drawing-up and structure of the Belgian National Plan Nearly Zero Energy Buildings

In order to compile the regional and federal policy measures in one Belgian Nearly Zero Energy Buildings Plan, the working group 'NZEB' holds regular meetings with representatives/experts from the Regional and Federal Governments to:

- drew up a harmonised structure and agree on the Belgian National Plan NZEB to be submitted to international bodies and designate the Belgian representatives;
- strive to harmonize certain provisions;
- keep each other informed about projects and supporting measures implemented within their respective competences.

Each Region formulated its own definition for 'Nearly Zero Energy Buildings' and is responsible for monitoring the implementation of its own policy measures. The Federal State has also listed its measures. However, they didn't formulate a definition separately from the Regions.

1.2 *Introduction on Regions' specificities*

1.2.1 Specificities Energy Policy Brussels-Capital Region

The Brussels-Capital Region is a densely populated urban area with just over one million inhabitants, characterized by the presence of a large number of commuters working during the day. The regional economy is based primarily on the tertiary sector, with a strong presence of the public sector (regional, national and international institutions). Its energy balance and greenhouse-gas emissions are characterized by a predominance of the building and transport sectors (97% of final energy consumption and 83% of CO2 emissions). The Region energy and climatic characteristics have led to the energy performance of building being granted absolutely priority as well as the use of renewable energy sources insofar as this is possible.

1.2.1.1 Inventory of Brussels-capital residential housing stock

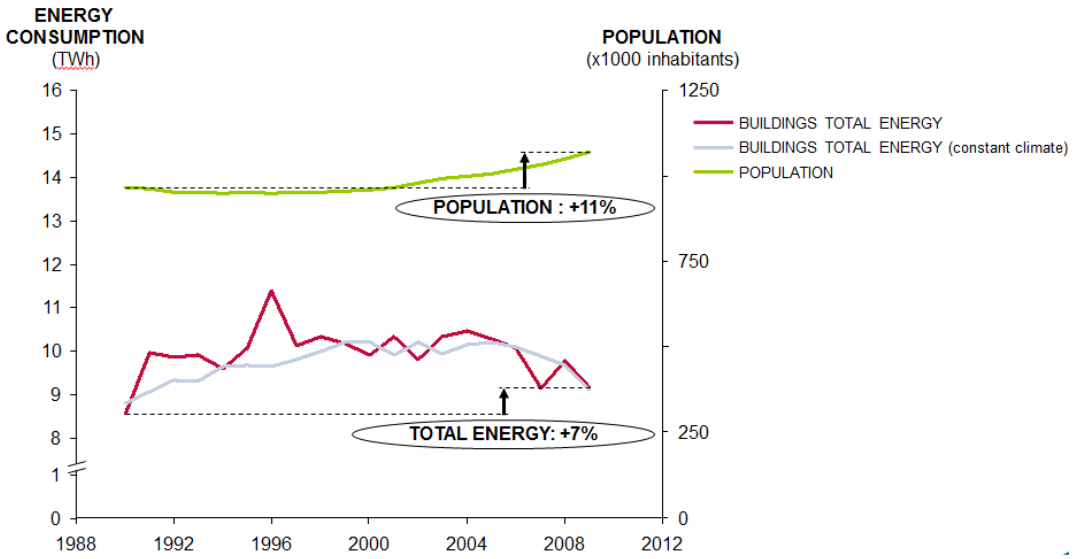
Between 1980 and 2003, the total built-up area increased by 13%, while the non-built-up area decreased by 17%. The surface area covered by office buildings increased by 122% (Source: IBGE, Etat de l'environnement[1]).

The total number of homes (occupied and unoccupied) located in the Brussels-Capital Region on 1st January 2009 was 544 601 units, an increase of almost 11 % compared with 1991 (+55 862 homes), but a slight drop (-0.1 %) compared with 1st January 2008 (-707 homes). In 1999, approximately 93% of the total housing stock was occupied[2]. Out of these 545 000 homes, only 44 000 were built after 1990, i.e. 8 %. The housing is mainly comprised of blocks of flats (56%)[2].

1.2.1.2 Breakdown of consumption in residential buildings

The total consumption of energy in the residential sector in Brussels-Capital Region was 9.18 TWh PCI in 2009 which was 39.3% of the total final consumption for the Region.

Since 2004, when the first real energy and climate policies for the Brussels-Capital Region appeared, the total consumption of energy in the residential sector decreases (constant climate) despite population increase.



Energy consumption in Residential buildings: Evolution 1990-2009 (Total Energy)[3]

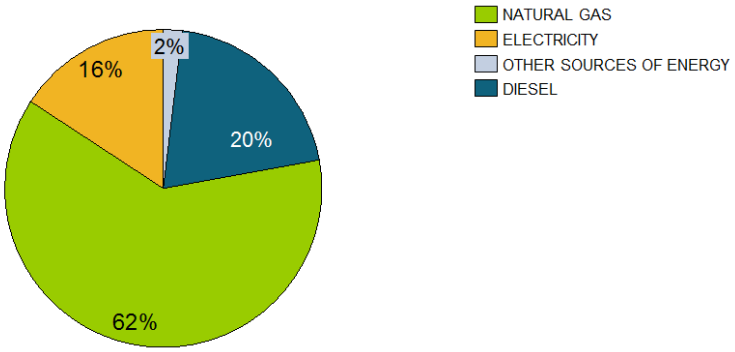
Since 1990, there have been some changes in the breakdown of the energy types consumed. For example, the share of electricity has slightly risen (up from 11.4% in 1990 to 15.6% in 2009) as well as natural gas (up from 58 to

[1] http://www.ibgebim.be/Templates/etat/informer.aspx?id=3054&langtype=2060

[2] Reference : Energy Balance of the Brussels-Capital Region 2009 (Bilan énergétique de la RBC 2009 – Bruxelles Environnement)

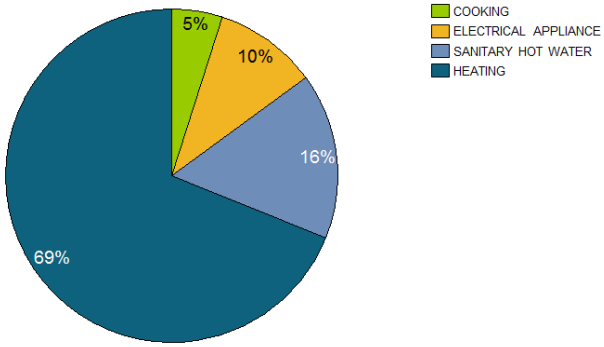
[3] Ibid

62%), diesel fuel down a little (from 26 to 20 %). The share of other sources of energy (coal, wood) down as well (from 4.2 to 2%)[3].



Energy consumption in Residential buildings: distribution per energy source (2009)[4]

In 2009, heating accounts for 69% of consumption in the home. If we focus only on consumption from heating, we can see that central heating continues to be widespread (86.7% in 2009). Natural gas is the leading fuel type used for heating (70% in 2009), followed by oil fuel (25.6% in 2009).



Energy consumption in Residential buildings: distribution of need per type of use (2009)[5]

1.2.1.3 Characteristics of the services sector

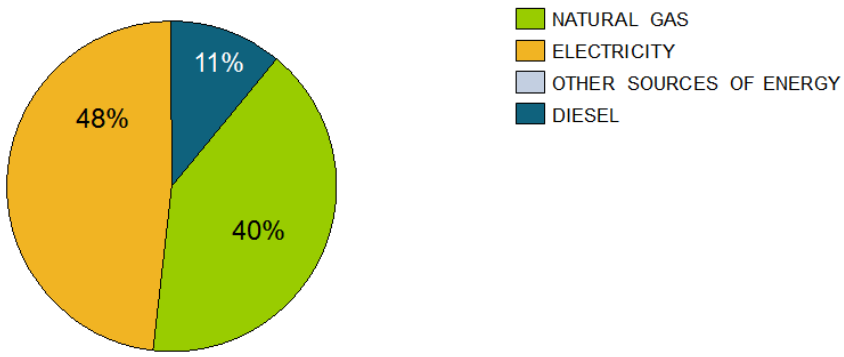
The total consumption of energy in the services sector in Brussels-Capital Region was 7.5 TWh PCI in 2009.

The graph below shows a decrease of the total energy consumption of buildings in the services sector since 2004, while the total number of employment has increased.

[4] Reference : Energy Balance of the Brussels-Capital Region 2009 (Bilan énergétique de la RBC 2009 – Bruxelles Environnement)
[5] Ibid

Energy consumption in Tertiary buildings : Evolution 1990-2009 (Total energy)[6]

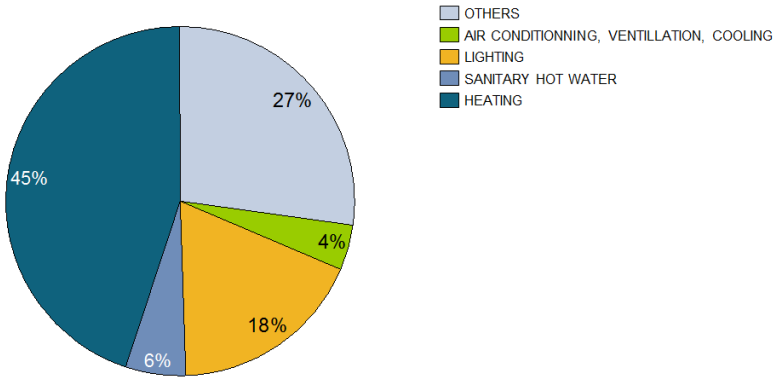
What regards the energy types consumed, electricity comes first in the services sector but it is closely linked by natural gas.



Energy consumption in tertiary buildings: distribution per energy source (2009)

In 2009, heating accounts for 45% of consumption in tertiary buildings.

[6] Reference : Energy Balance of the Brussels-Capital Region 2009 (Bilan énergétique de la RBC 2009 – Bruxelles Environnement)



Energy consumption in Tertiary buildings: distribution of need per type of use (2009)[7]

1.2.1.4 The policies undertaken

It has been seen that the sector that accounts for the greatest part of this final consumption is the building sector (74% of the total, mainly for heating).

Therefore since 2004, the Brussels energy policy was developed mainly around this building sector. Thanks to the numerous initiatives of the Brussels-Capital Region (energy subsidies, strengthening of the regional regulations on energy performance of buildings, etc.), the final energy consumption per inhabitant decreased by 18% between 2004 and 2010.

Based on this results, the Brussels-Capital Region has paved the way for greater restraint in energy use without compromising its economic viability, while at the same time granting special attention to the most disadvantaged sectors of the Brussels population.

This energy policy is furthermore coordinated with the global regional economic development. It is indeed one of the thematic plans of the Regional Sustainable Development Plan, currently being elaborated. This latest plan defines the general policy orientations for the legislative session underway (2009-2014) and announces the transition from separate initiatives to a new sustainable city project.

[7] Reference : Energy Balance of the Brussels-Capital Region 2009 (Bilan énergétique de la RBC 2009 – Bruxelles Environnement)

1.2.2 *Specificities Energy Policy Walloon Region*

1.2.2.1 *Inventory of Walloon residential housing stock*

In 2011, approximately one-third of the land in Wallonia was covered by forests, one-third by arable land, one-quarter by fallow farmland and about 10% by land that is urbanised or 'artificialised', the majority of which (6.1%) is residential land[8]. The population density in Wallonia is approximately 205 inhabitants per km² or virtually 90 dwellings per km². But this breakdown is far from being evenly distributed across the whole of the territory.

It is a well-known fact that Belgium's housing stock is one of the oldest in Europe. And within Belgium itself, homes in Wallonia are the oldest (over 50% of homes date back to before 1945, 75% before 1980 and only 12% after 1990). Wallonia's housing stock is characterised by[9]

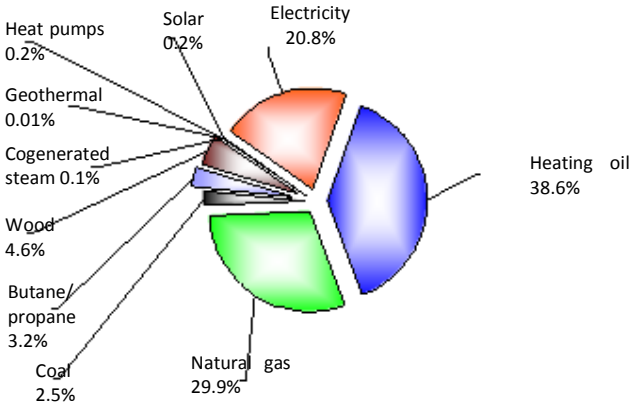
- a high level of historical peri-urbanisation, added to which over the past few decades has seen a tendency towards urban sprawl (known as "rurbanisation", i.e. the urbanisation of former farming areas);
- a relatively high level (approximately 6%) of unoccupied dwellings;
- a very low level of building renewal (the replacement and renovation rates are each a little under 1% per year; (approximately 10,000 permits for each).
- extremely variable typology and condition of dwellings in Wallonia, depending on the borough, with greater density and less good condition along the ridge of the region, mainly in municipalities where the historical industrial centres are located. To the north of this ridge, as well as in the Cantons of the East, although density remains high, the buildings are more recent and of better quality. To the south of the ridge, dwellings are more dispersed.

According to ACED statistics, Wallonia has some 1 570 000 dwellings[10]. Over 80% of these are individual houses (with more than one-third of them detached), 12% are apartment buildings and the remainder are buildings used for services and other activities. In recent years, the number of apartments has tended to develop more quickly than individual houses[11].

The tightening of requirements in the regulations relating to the Energy Performance of Buildings as part of the transposition of the EPB Directive has brought with it a significant improvement in the level of new buildings. But in view of the low renewal rate, it is in terms of old buildings where the potential for improvement lies.

1.2.2.2 *Breakdown of consumption in residential buildings.*

The total consumption of energy in the residential sector in Wallonia was 32 TWh PCI in 2009, which was 25% of the total final consumption for the region. This consumption was made up essentially of heating oil, natural gas and electricity.

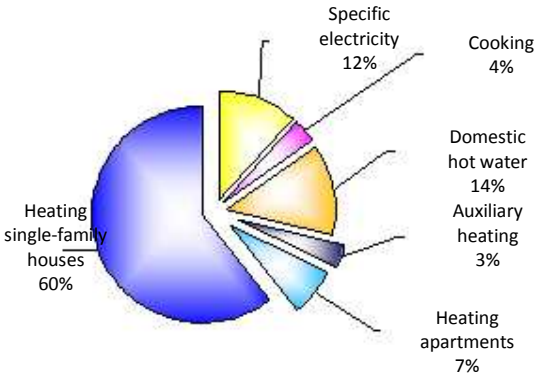


Breakdown of total consumption in the residential sector by type of energy in 2009 (from Assessment of Consumption for the Residential Sector in Wallonia 2009, p. 32)

[8] Source: Key figures for Wallonia 2012 from IWEPS (Walloon Institute of Assessment, Forecasting and Statistics).
[9] Drawn freely from the study "Analysis of existing buildings and highlighting of the main housing typologies" produced by C. Kints, Architecture and Climate, UCL, in 2008
[10] Figures at 01/0/1/2009 from the Central Land Registry Administration.
[11] Date from 2009 residential assessment, based on the development of housing stock taken from the results of the latest census (Socioeconomic Survey ESE 2001).

This consumption has tended to become stabilised (back to the 1990 level, after peaking 13% higher in 2005). This is despite a 16% increase in the number of dwellings and a 6% rise in degree-days. Which demonstrates the effectiveness of the measures undertaken…

Since 1990, there have been some clear-cut changes in the breakdown of the energy types consumed. For example, the share of electricity has risen sharply (up from 12 to 21%), with the use of coal virtually disappearing (down from 16 to 2.5%), oil down a little (from 45 to 42%) in favour of natural gas (up from 24 to 30%), while the use of wood as a fuel has risen significantly (from 3 to 4.6%), albeit remaining under 5%.



Breakdown of the normalised consumption of energy in the residential sector, by main usage in 2009 (from Assessment of Consumption for the Residential Sector in Wallonia 2009, p. 37)

Heating (including secondary heating) accounts for 70% of normalised consumption[12] in the home. If we focus only on consumption from heating, we can see that central heating continues to be widespread (76%). Despite being slightly lower, heating oil remains the leading fuel type used for heating (50.7%), followed by natural gas (35.7%). Natural gas is gaining ground more rapidly in apartments and urban dwellings. Wood (while still marginal) is making good progress (reaching 4.6%), particularly in single-family houses, and as secondary heating (representing 80% of secondary heating).

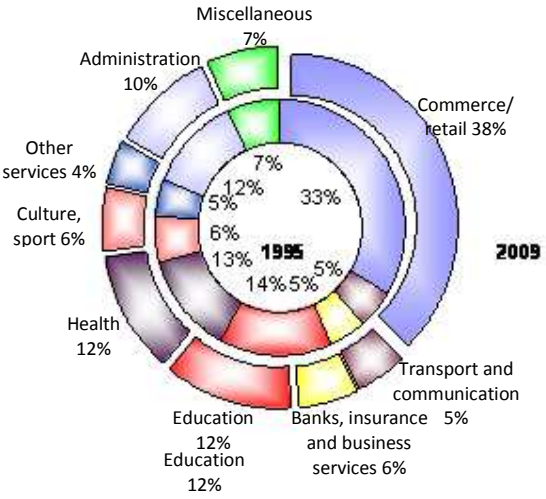
The share of "non-heating" consumption continues to grow and is becoming electric. Household hot water leads the way with 14% and is constantly growing, broken down between natural gas, heating oil and electricity (with gas up slightly at the expense of electricity and the timid appearance of solar at 1%). Then comes Electro13, at 12%, up sharply despite the advance of low-energy equipment, and finally there is cooking, with 4%, broken down equally between electricity and gas.

People becoming more aware of the issues surrounding the thermal quality of our homes is leading to new buildings and systems that are much more efficient. However, part of these benefits is being offset by developments in the opposite direction, such as the reduction in the size of households, the increase in population in Wallonia, the increase in the rate of penetration of electric and electronic equipment (even more efficient), etc.

[12] Normalised by way of an adjustment based on the number of degree-days in relation to a reference year.
[13] Miscellaneous electrical consumption, excluding heating, cooking and domestic hot water.

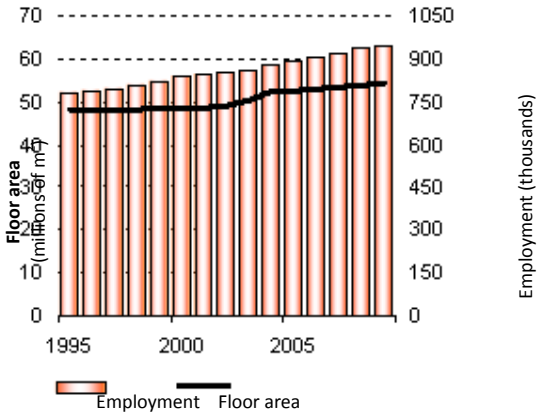
1.2.2.3 *Characteristics of the services sector*

Breakdown of activities:



Breakdown by area of activity for the consumption of the services sector in 1995 and 2009 (from Assessment of Consumption for the Residential Sector in Wallonia 2009, p. 16)

Usage and development of floor space

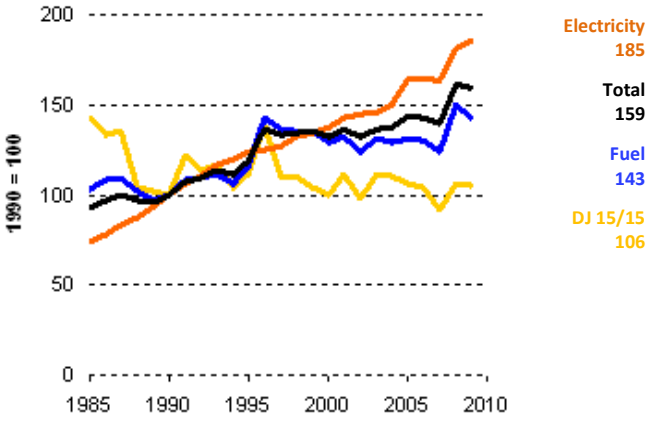


Breakdown of comparative developments in employment and floor area in the services sector (from Assessment of Consumption for the Residential Sector in Wallonia 2009, p. 10)

Energy consumption:

The services sector represented 11% of final energy consumption in 2009.

Retail is responsible for 38% of consumption, with the non-trading sector representing 41%. However, the services sector is distinctive for its growing share in the consumption of electricity (more in the trading sector);



Private offices consume more electricity than government offices, whereas it is the other way round in terms of fuel.

1.2.2.4 The policies undertaken

The analysis above demonstrates just how important buildings are in the consumption of energy in Wallonia, whether for residential or services.

Achieving a sharp reduction in the energy consumption of buildings has been one of the main policies pursued by the Walloon Government for many years. Approved just recently, the First Employment-Environment Alliance (EEA) of the "Plan Marshall 2.Vert", (part of section 5 of the plan, as well as part of its horizontal dynamic to promote sustainable development in all government policies), is based on the principle of making an improvement in the quality of the environment a source of economic opportunities and job creation. The EEA focuses specifically on the construction sector, with the overall aim of improving the quality of buildings in Wallonia and the enhanced energy performance that goes with it, while at the same time guiding the construction sector towards taking a more sustainable approach and boosting its level of employment.

To achieve that aim, the EEA includes a series of measures that act simultaneously on:

- stimulating demand for building renovation and sustainable construction, for both private and public buildings,
- strengthening the sector's capabilities in offering sustainable construction and renovation.

These measures will be explained in greater detail elsewhere in this NZEB plan, under the heading of supply and demand in the section on action and measures.

Thus this NZEB plan is part of the group of policies undertaken with a view to reducing the energy consumption of buildings, the main tool of which is the Employment-Environment Alliance. For its part, NZEB focuses mainly on new buildings of all types, while at the same time focusing on improvements to existing buildings.

1.2.3 *Specificities Energy Policy Flemish Region*

1.2.3.1 *Coalition Agreement and Pact 2020*

This action plan provides specific details for the Pact 2020, the Flemish coalition agreement and the Energy 2009 – 2014 policy memorandum as they relate to the promotion of low and 'nearly zero-energy buildings'.

The coalition agreement states:
We will gradually tighten regulations for the energy performance of buildings. Considerations will include the investment costs and the resulting savings in energy. If the on-going research demonstrates the feasibility of attaining the E60 level, we will make the E60 level a requirement by 2012 for all new homes built.

The Pact 2020 states:
By 2020, all new home construction will meet the top energy performance standard.'

An E-level requirement has applied to both new homes and new offices/schools since January 2006. This requirement was tightened from E100 to E80 for all homes for which a building permit was applied in January 2010 or later. Beginning January 2012, the maximum E-level requirement of E70 applies to homes, offices and schools. For permit applications which are made on or after 1 January 2014, this requirement will be tightened to E60 (resolution of the Government of Flanders of 20 May 2011).

The insulation level of Flemish new home constructions has improved considerably since the implementation of energy performance regulations.

	2004	2007	2009	2011	change between 2004-2011 (%)
Wall insulation (average thickness in mm)					
Mineral wool	53.5	57.7	69.7	96.6	80.6
Other insulation	40.4	47.8	63.3	78.8	95
Roof insulation (average thickness in mm)					
Pitched roof	113.9	132.7	158	186.9	64.1
Flat roof	76.1	81.1	105.2	116.2	52.7
High-specification glazing (as a %)					
HS++ (U < 1,2 W/m^{2}K)	42.8	57.3	99.6	100	

Table 1: change in the insulation level of new homes built in Flanders[14]

The number of new and renovated buildings is minimal compared to the volume of existing buildings, but they will determine the long-term energy performance of the building stock to a great extent. Buildings in Belgium have a long life span (30 years until the first major renovation; the overall life span can reach as much as 100 years).

As indicated in the Energy 2009-2014 policy memorandum, an implementation plan is being drafted in this legislature which outlines a tightening of requirements over the long term for residential and non-residential buildings in Flanders.

[14] Source: bvba Essencia - InfoConstruct, marketing agency specialising in market information for the building sector; number of homes visited: 602 in 2004, 612 in 2007, 587 in 2009, 764 in 2011

1.2.3.2 *Amendment of Flemish Parliament Act*

Within the framework of the transposition of the new Directive on the Energy Performance of Buildings of 19 May 2010, the following provisions were included in the Energy Act:

Art.11.1.1, §1 third paragraph, in conclusion (our translation): 'The Government of Flanders shall determine which EPB requirements are consistent with a nearly zero-energy building. Within this context, the Government of Flanders shall ensure that:
1° the EPB requirements for all new buildings are consistent with the EPB requirements for nearly zero-energy buildings no later than 1 January 2021;
2° after 31 December 2018, all new buildings which are owned and occupied by public agencies are nearly zero-energy buildings.'

Art.11.1.3: 'The Government of Flanders may, when determining the EPB requirements for new buildings and existing buildings which are subject to major renovation, establish that a minimum level of energy be drawn from renewable energy sources.'

1.2.3.3 *Evaluation energy performance regulations*

Pursuant to the Energy Act, the Flemish Energy Agency (VEA) must, on a biennial basis, evaluate the method for calculating the energy performance of buildings, the procedures to be followed, the EPB (energy performance and indoor air quality) requirements and the administrative burdens which are imposed by the regulations. This will occur in consultation with the stakeholders. The second evaluation memorandum was finalised by the VEA in mid-2010.[15] The third evaluation will be carried out in 2012.

Since April 2007, it has been possible to submit EPB declarations. Because the average amount of time between the date a permit is applied for and the date the EPB declaration is submitted is approximately 2 years, 2009 saw a significant increase in the number of declarations submitted.

	2006	2007	2008	2009	2010	2011	Total
start declaration	4,534	20,937	24,782	25,083	27,125	25,570	128,031
EPB declaration		964	8,032	21,162	30,318	34,152	94,628

Table 2: number of start declarations and EPB declarations submitted per submission year

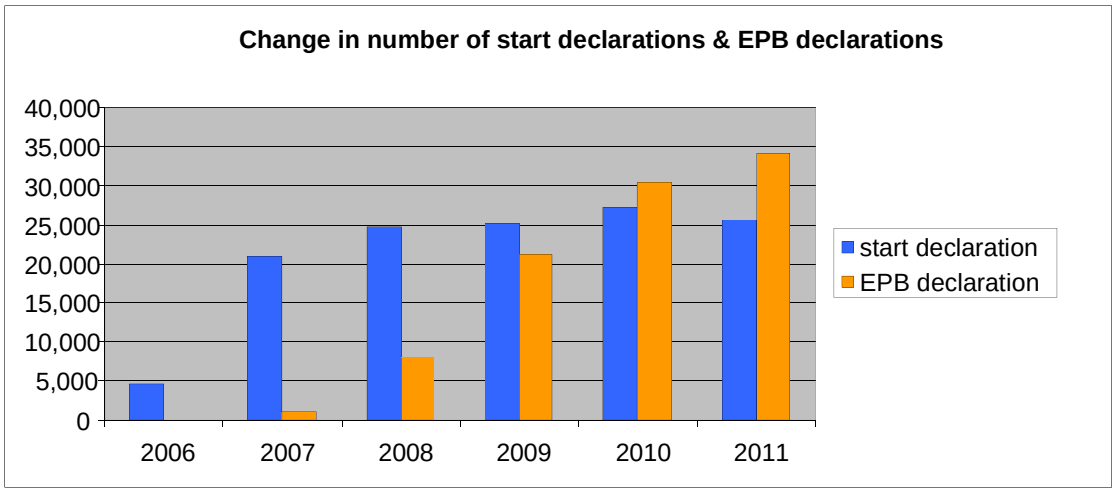


Chart 1: change in number of start declarations and EPB declarations

[15] http://energiesparen.be/epb/evaluatie

1.2.3.3.1 E-level evolution

Figures on the E-levels attained in new residential buildings, broken down by the year in which the building permit was applied for, show a few interesting and positive changes.

	New residential buildings		
	Average E-level	Average K-level	Legal requirement
2006	86	40	E100/K45
2007	83	39	E100/K45
2008	80	38	E100/K45
2009	77	36	E100/K45
2010	70	33	E80/K45

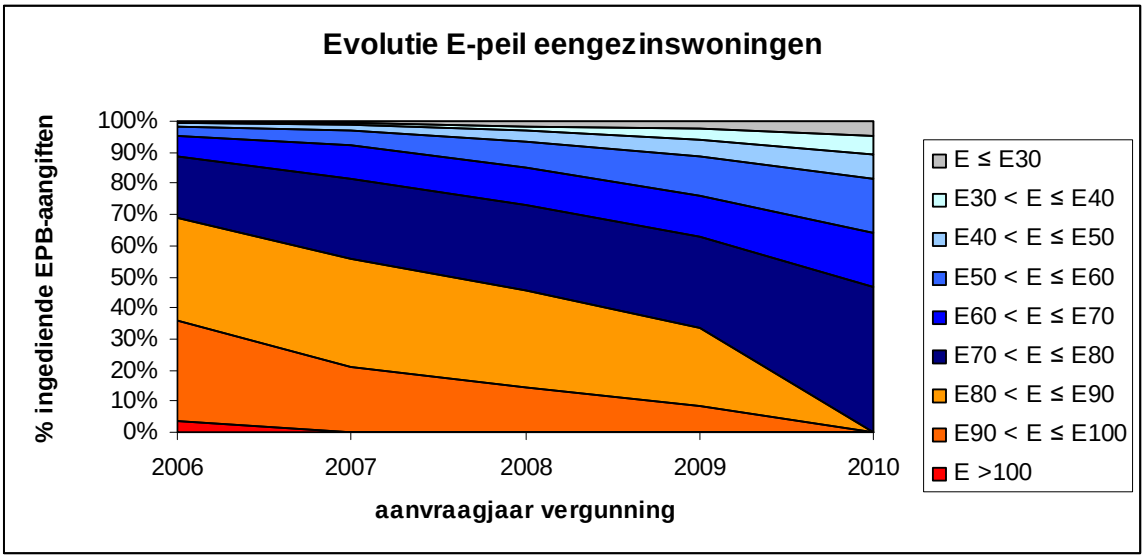


Chart 2: changes in E-level in single-family homes

[% of EPB declarations submitted – Changes in E-level in single-family homes – year permit applied for]

Homes built by Flemings are becoming more energy efficient every year.
As the above chart clearly shows, new residential buildings are becoming more efficient all the time. The curve representing the share of residential buildings with an E-level between E60 and E80 rises from 27% in 2006 to 40% in 2008, and to 64% in 2010. The curve representing the share of residential buildings with an E-level greater than E80 declines accordingly over the course of this same time period. That share fell from 69% in 2006 to 45% in 2008, and to 0.25% in 2010.

More than 50% of applications in 2010 complied with the more stringent E70 requirement which took effect beginning in 2012, and 35% were already in compliance with the requirement which will take effect beginning in 2014.
All permit requests for residential buildings made on or after 1 January 2012 will be subject to a maximum E-level of E70. The fact that more than 1 out of every 2 permit requests for residential buildings in 2010 actually met the more stringent E-level requirement that was just instituted at the start of 2012 is very positive. A maximum level of E60 will apply beginning in 2014, a requirement which was met by 35% of applications made in 2010.

The share of low-energy homes is on the rise.
A few builders are actually taking it one step further and constructing low-energy homes with an E-level between E40 and E60, and sometimes even lower than E40. The chart shows these curves rising as well.
The share of **'trendsetters'** - the group of builders complying with energy efficiency requirements much higher than the stated requirement by attaining an E-level lower than 40 - grew from 1% in 2006 to 11% in 2010.
It is worth noting that apartment buildings have not achieved as much progress.

1.2.3.3.2 Tightening of energy performance regulations over the short term

E-level

For residential and office buildings, the E70 level requirement is still higher than the economic optimum. To be able to implement an E-level of E60 on a large scale, building practices and the equipment that is used need to be adapted. On 20 May 2011, the Government of Flanders gave final approval to the proposal to tighten the E-level requirement for residential, office and school buildings to E70 in 2012 and E60 in 2014.

K-level, U- and R-values

For buildings subject to EPB regulations, the maximum required U-values and the minimum required R-values for all types of building envelope sections will be tightened[16] to levels approximating those of neighbouring countries - levels which correspond closely to the cost-optimal values. Beginning in 2012, the K-level requirement was tightened to K40.

Net energy demand

In order to achieve a good building envelope and to limit transmission and ventilation loss, an additional criterion was enforced regarding the net energy demand for space heating. This is why the net energy demand for heating residential buildings was capped at 70 kWh/m² starting in 2012. This is an additional step aimed at reducing the energy demand of buildings.

1.2.3.4 Minimum level renewable energy in buildings

In implementation of the European Directive on Renewable Energy Sources, the Energy 2009-2014 policy memorandum proposes a study into how we will effectively introduce a required minimum level of energy from renewable sources, while focusing on the relationship between renewable energy generation in a building and that building's E-level.

The VEA commissioned a study which sought to determine the most appropriate method for incorporating a requirement for a minimum share of renewable energy sources into the building regulations for new buildings. This study focuses primarily on buildings for which the E-level must be calculated.
In early 2012, a concrete proposal was presented to the Government of Flanders.

1.2.3.5 2020 Energy Renovation Programme

The Government of Flanders has set the ambitious target of providing every Fleming with an energy-efficient home by 2020.
The Government of Flanders has set up an emergency programme to have all roofs insulated by 2020, to replace all single-pane glass with insulating glass and to carry out a ban on antiquated boilers in Flemish homes: the 2020 Energy Renovation Programme.

The coalition agreement states:
'We will extend the 2020 Flemish Energy Renovation Programme and expand it to include tailored measures. We will ensure that all roofs are insulated by 2020.
We will ensure energy efficiency for all people by supporting investments in roofs, boilers and glazing.'

The next target from the Pact 2020 can also be found in this line:
'The installation of roof and attic floor insulation, the replacement of single-pane glass and inefficient heating systems as well as innovations within the sector will result in a significant drop in energy consumption by the building stock by 2020.'

The Energy Renovation Programme 2020 is intended to integrate high-priority standard measures into a broad scope of application, while the action plan for NZE buildings is promoting the adoption of highly advanced and more complex measures by trendsetters.

[16] www2.vlaanderen.be/economie/energiesparen/epb/doc/epbuwaarden2012.pdf – summary tables of the U and R-value requirements taking effect in 2012
www2.vlaanderen.be/economie/energiesparen/epb/doc/epbuwaarden2014.pdf - summary tables of the U and R-value requirements taking effect in 2014

1.2.3.6 *Financial support measures*

From the Energy 2009-2014 policy memorandum: *'Once the timeline for tightening the E-level requirement has been fully established, pre-existing or planned measures (reduced withholding tax on income from real estate for low-energy homes, subsidies from network operators for low-energy homes) will be coordinated in support of this effort.'*

Specific note should be made of the reform that was announced in the Finance and Budget policy memorandum, whereby cadastral income will no longer be used as a basis for reduced registration duties and will be replaced by a home rebate with additional criteria, including energy efficiency criteria. Low-energy and nearly zero-energy homes which combine a limited surface area with extensive energy efficiency can receive additional support from this.

In 2011, existing subsidies were evaluated and streamlined, culminating in the resolution of the Government of Flanders of 23 September 2011, which went into force on 1 January 2012. This resolution harmonised all the subsidies from network operators in Flanders and incorporated the Flemish roof insulation subsidy into the network operator subsidy.

Subsidies and benefits can be acquired for investments made in new construction in Flanders via three different channels:

- reduced withholding tax on income from real estate;
- subsidies from the network operators;
- tax reduction (since January 2012, only to a very limited extent).

A continued streamlining of subsidies - once the tax incentives are withdrawn, etc. - remains necessary. Budgetary allocations have not been established for this yet. It might be possible to develop new initiatives following the 2012 budgetary control and 2013 budget preparations. These will then be explained in the Energy 2012-2013 policy paper.

More information on these financial support measures can be found at www.energiesparen.be/subsidies. For other buildings which are not classified as residential buildings, a financial support policy is provided by way of the subsidising agencies, including the Flemish Infrastructure Fund for Person-related Matters (VIPA) and the Agency for Infrastructure in Education (AGIOn).

2 DEFINITION OF NEARLY ZERO ENERGY BUILDING

2.1 *Definition NZEB Brussels-Capital Region*

In the Brussels-Capital Region, the Brussels Air, Climate and Energy Code (COBRACE) that will make the nearly zero energy buildings (NZEB) obligatory by 2021 (by 2019 for public buildings) passed second reading in July 2012 and is scheduled to come into force by the beginning of 2013.

The definition written in the COBRACE uses the definition given by the Recast of the Energy Performance of Buildings Directive (2010/31/EU) i.e. "nearly zero or very low amount of energy required should be covered to a very significant extent by energy from renewable sources, including energy from renewable sources produced on-site or nearby". The results of the study "Cost Optimum" that will be launched by the end of 2012 will be used to make this definition more specific.

However, from 1st January 2015 onwards, all new buildings (housing, office or service buildings or schools) will have to be up to the Passive House standard that is to say the level of "nearly zero or very low energy consumption reached thanks to high energy performance" (NZEB definition). Its definition is the following (Government Decree of 5th May 2011 that passed first reading on 19th July 2012).

2.1.1 Individual Housing EPB units

- a primary energy consumption for heating, domestic hot water and electrical appliances below 45 kWh per m^2 per year;
- a net heating need below 15 kWh per m² per year;
- an overheating temperature that can only exceed 25°C for 5% of the time throughout the year;
- by 2018, airtightness at 50 Pa below 0.6 per hour.

A derogation can be granted in case of housing to be built in an unfavourable location (that is to say an overshadowed or badly oriented location, weak compactness, etc.). It has to be up to a new energy need calculated using default parameters for insulation efficiency (0.12 W/m^2.K for opaque walls and 0.85 W/m^2.K for windows and doors), airtightness (1 volume per hour in 2015 to 0.6 volume per hour in 2018), and the efficiency of the ventilation system (75%).

The calculation method of primary energy already includes the input of renewable energy sources like solar energy (thermal and photovoltaic), biomass heating, geothermal heating and heat pump systems as well as passive cooling techniques.

2.1.2 Offices and Services EPB units and Educational EPB units

As for Offices and Services EPB units and Educational EPB units, the Decree provides for:

- a total primary energy consumption below (95-2.5*C) kWh per m² per year, with C defined as the compactness, that is, the ratio between the volume enclosed and the loss area (maximum C is 4);
- a net heating need below 15 kWh per m² per year;
- a net cooling need below 15 kWh per m² per year;
- an overheating temperature that can only exceed 25°C for 5% of the utilisation period;
- by 2018, airtightness at 50 Pa below 0.6 renewals per hour.

A derogation can be granted on the same conditions as those applied for housing.

The calculation method of primary energy includes the input of the same renewable energy sources as described for housing.

2.2 *Definition NZEB Walloon Region*

The recast version of the Directive on the Energy Performance of Buildings 2002/91/EC was published in the Official Journal of the European Union on 19th May 2010 under reference 2010/31/EU. The new wording refers to the notion of "nearly zero energy building" and points out that measures are needed to increase the number of buildings that not only meet the minimum requirements in effect in terms of energy performance, but also display enhanced energy efficiency, thereby reducing both the consumption of energy and emissions of CO_2.

Tenders for a public service contract were called for by the Walloon Region at the end of 2011 to conduct a study (Co-ZEB Study) aimed at, in line with articles 4, 5 and 9 of the Directive on the Energy Performance of Buildings 2010/31/EU:

- determining requirements relative to nearly zero energy buildings;
- determining the optimum level of energy performance in relation to costs.

The contract was awarded to the association of the University of Mons (Energy Centre), The University of Liège (EnergySuD) and the study bureau, 3E. At the present time, only the first task of the study has been completed. As the second task in the study, aimed at determining the reference level in kwh/m² per year, was not able to be completed, this reference will be set based on the other results available from the study.

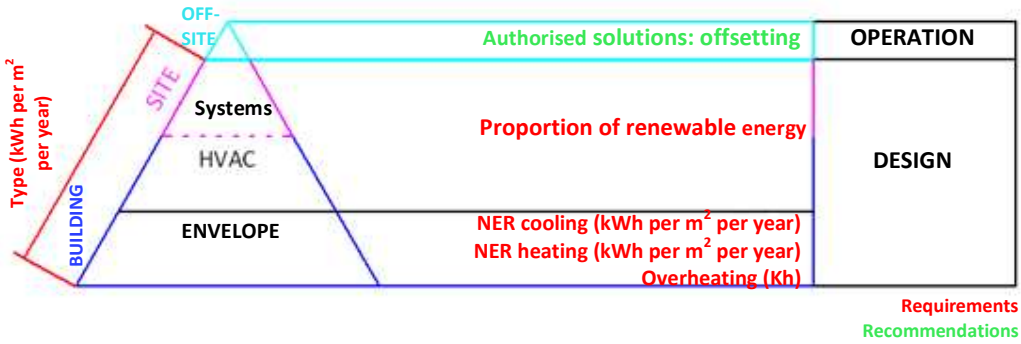
Research work has been conducted previously by the contract association on the status of works relative to defining "nearly zero energy building" in the various Member States.
A document recording this research and presenting the various options possible for the Walloon Region has been presented.

The Co-ZEB study qualifies any NZEB by a **level of energy performance of the building's envelope close or equivalent to the passive standard.** However, an NZEB does not necessarily have to comply with all of the criteria set by the passive standard given the highly constraining nature of these criteria for certain types of building and/or in certain locations (in particular the criterion governing the airtightness of the building envelope, which imposes a specific level of performance that is often difficult to achieve in construction terms).

Quantification of the level of performance is based on development zones and the type of buildings, as well as whether they are new or renovated.

In addition to the energy performance level of the building envelope, part of the residual consumption of heat/cold and electricity may be covered by sources of **production of renewable energies,** with the whole characterising all NZEB.

This means that a Nearly Zero Energy Building is characterised at the design stage by energy performances that are close or equivalent to those of the passive standard in terms of the building envelope and by the renewable energy coverage of part of the consumption, as illustrated in the figure below.



To be certified as NZEB, the building must meet a series of strict requirements or alternative criteria.

A series of non-restrictive recommendations aims at facilitating compliance with the requirements set.
A list of recommended solutions for equipment encourages the occupants of NZEB to align their actual energy consumption with projected consumption or reference consumption estimated for items not considered in the characterisation of an NZEB at the design stage.
The definition of an NZEB and the energy performance level associated with it evolve in terms of the technologies available, their cost and their ability to be implemented.

2.3 *Definition NZEB Flemish Region*

The Energy Performance of Buildings Directive provides a general definition of an NZEB. This definition consists of two levels:

1. The building must first and foremost achieve high energy performance (low energy demand).
2. The residual energy demand must be compensated by renewable energy to a significant extent, whether generated on-site or nearby.

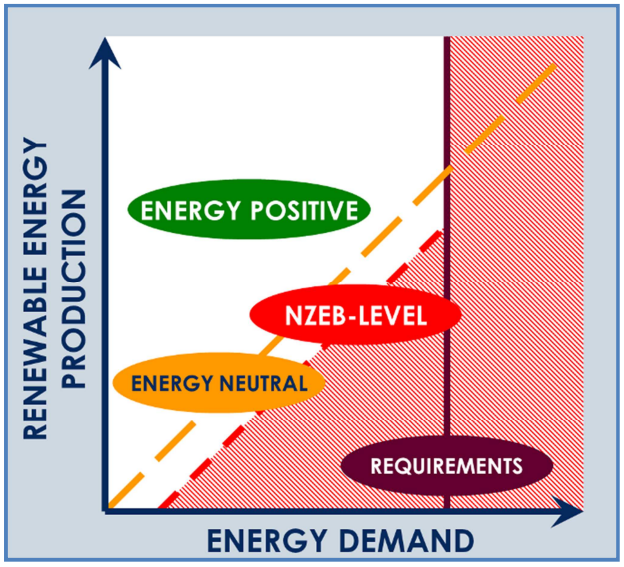


Chart 3, achieving NZEB via minimal energy demand, compensated to a great extent by renewable energy.

The Energy Performance of Buildings Directive does not outline an unambiguous method for further specifying what constitutes an NZEB.
Different articles from the Directive allow for different interpretations:

- **Article 9** (Nearly zero-energy buildings) states that the only cases in which the general requirements (low energy demand with the balance to be compensated by renewable energy generation) do not have to be complied with are 'cases where the cost-benefit analysis over the economic lifecycle of the building in question is negative'.
  This provision can be interpreted as saying that no general system of exemption is possible and that only a system of case-by-case exceptions can be devised. The compatibility of this article with Article 4 needs to be reviewed.
- **Article 4** (Establishment of minimum energy performance requirements) states that Member States are not required to set minimum requirements for energy performance which are not cost-efficient over the estimated economic lifecycle. This article actually states that it is not economically and technically prudent to impose regulatory requirements that the government must acknowledge are not cost-efficient.
- **Article 5** (Calculation of cost-optimal levels of minimum energy performance requirements) stipulates that the Commission shall establish the methodology framework for calculating cost-optimal levels of minimum energy performance requirements by 30 June 2011. This methodology framework shall differentiate between new and existing buildings and between different categories of buildings. The cost of a nearly zero-energy scenario must also be calculated. However, there is still no European agreement on the methodology framework, a version of which was proposed by the European Commission in early 2012. According to this proposal, the cost-optimal level must be calculated from both a micro as well as macro perspective, though Member States do have the option to decide which of these perspectives will serve as the basis for setting energy performance requirements.

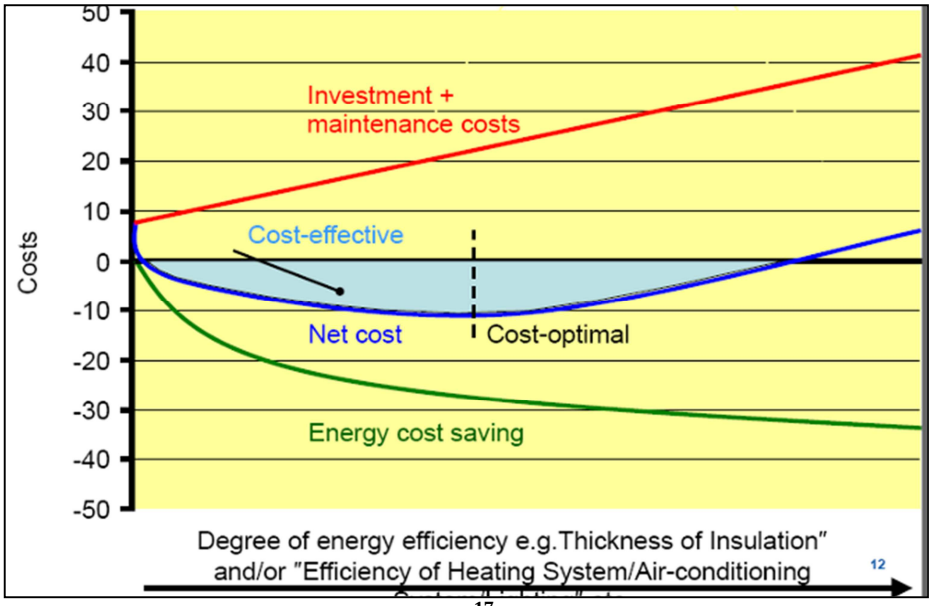


Chart 4, cost efficiency and cost-optimal level[17]

- **Article 13 of the Renewable Energy Directive** stipulates that, by 31 December 2014, minimum levels of energy from renewable sources be used in new buildings and existing buildings which are subject to extensive renovation.

Based on these articles, it is reasonable to assume that **an NZEB must at minimum satisfy the cost-optimal level with a minimum level of renewable energy** as regards energy performance requirements, and that Member States will be able to establish this cost-optimal level for the different types of buildings during the second half of 2012 at the earliest.

2.3.1 New constructions

According to the 2008 'economic feasibility' study, the cost-optimal level for residential buildings in the Flemish Region was E55-E60. This cost-optimal level was achieved without self-generated electricity (photovoltaic). This study will be updated in 2012, taking into account the methodology framework that was provided by the European Commission in early 2012 but for which there is still no European agreement. The contract for updating this study will begin in May 2012 and will last for 8 months. It is also being expanded to cover non-residential buildings.
In order to establish the minimum level of renewable energy, a proposal has been presented to the Government of Flanders for integrating the EPB method.
Since the study on the cost-optimal levels is still running, a detailed definition for NZEB and the intermediate targets will be added later on as an addendum.

2.3.2 Existing buildings

The greatest potential for energy savings lies in existing buildings. The Energy Performance of Buildings Directive requires Member States to take measures to increase the number of NZE buildings. No provision has been made for a requirement for renovating existing buildings to the NZE level. The policy decision can therefore consist of interpreting the NZE concept in such a way that guarantees that as much energy-saving potential as possible is achieved combined with the generation of energy from renewable sources. The most appropriate option seems to be to base the definition on the index number of the EPC.
Since the study on the cost-optimal levels is still running, a detailed definition for NZEB and the intermediate targets will be added later on as an addendum.

[17] Source: DG Energy, European Commission

3 TARGETS NEW AND EXISTING BUILDINGS

Intermediate targets for improving the energy performance of new and existing buildings by 2015.

3.1 *Targets Brussels-Capital Region*

3.1.1 Individual Housing EPB Units

See definition for individual housing EPB units (chapter Definition NZEB Brussels-Capital Region 2.1, title 2.1.1, p.20): targets by 2015.

3.1.2 Offices and Services EPB units and Educational EPB units

See definition for offices and services EPB units and educational EPB units (chapter Definition NZEB Brussels-Capital Region 2.1.2, title 2.1.2, p.20): targets by 2015.

3.2 *Targets Walloon Region*

3.2.1 Interim targets for improving the energy performance of new buildings, by 2015

The targets set in the Regional Policy Statement (RPS) and included in the EEA:

"With regard to new buildings, all construction will comply with the 'very low energy' standard from 2014 onwards. Construction will also comply with the 'passive' standard or equivalent from 2017. From 2019 onwards, all new buildings – in addition to the passive standard – will be required to comply as a minimum with the 'net zero' standard and tend towards positive-energy buildings (i.e. buildings where the production of renewable energy is equal to or greater than the consumption of non-renewable primary energy on an annual basis).
(…)
In order to set an example, from 2012 onwards the Walloon Region will apply these standards for all public buildings, as well as for granting subsidies, making donations or any other form of aid for property investments that the Region grants to other public or associated bodies."

In the spirit of the RPS, any new building will tend towards the 'very low energy' standard from 2014 onwards, while complying as a minimum with requirements Ew ≤ 60 and K ≤ 35.

The table below shows how the energy standards that will be imposed for new and similar buildings between now and 2014 will be imposed.

Indicators	Integration of EPB requirements as part of CWATUPE (Regulatory requirements) New buildings & similar		Requirements for financial execution orders and frames of reference for the specifications for public buildings* and for public housing financed as part of the 'Local Base 2012- 2013' programme and subsequent programmes
For the legislature			
	1st May 2010 (in effect)		
E_w	100 (1)		-
E_{spec}	170 (2)		-
K	45 (3)		-
	1st September 2011 (Art. 5 of the Walloon Government Decree dated 17th April 2008)		**1st January 2012**
E_w	80 (1)		60 (1)
E_{spec}	130 (2)		100 (2)
K	45 (3)		35 (4)
	1st January 2014 (as part of the Recast EPB Directive)		**1st January 2014**
E_w	60 (1)		*(Transition period for technological adaptation towards Nearly Zero Energy Buildings. Not relevant to strengthen the indicators during this period.)*
E_{spec}	100 (2)		
K	35 (4)		

*Targeted in the right-hand column of the table above:

- all regional public buildings or buildings belonging to other public bodies or similar in the context of granting subsidies, making donations or providing any other form of property investment aid granted by the Region yet excluding buildings belonging to inter-municipal companies and hospitals.
- the public housing financed as part of the Local Base 2012- 2013 programme and subsequent programmes.

(1) Residential buildings (with the exception of collective accommodation buildings), buildings for offices and services or buildings intended for teaching.
(2) Residential buildings only (with the exception of collective accommodation buildings).
(3) With the exception of industrial buildings that are required to comply with a K55 level and exceptions specified in the CWATUPE regulations.
(4) With the exception of industrial buildings that are required to comply with a K level to be determined at a later date and exceptions specified in the CWATUPE regulations.

On 1st January 2012, in order to set an example:

- level Ew60 will be used as the benchmark in funding decrees and specifications:
  - for public buildings (office and services buildings and buildings intended for education)
  - for public housing (single-family homes and apartment buildings) from the 2012 -2013 programme
- level K35 will be used as the benchmark in specifications and funding decrees for all types of public buildings, i.e. residential buildings, including collective accommodation buildings, office and services buildings and buildings intended for education, as well as all other non-residential buildings, such as hospitals, retail, hospitality, sports infrastructure, etc. (with the exception of industrial buildings and exceptions provided for under CWATUPE regulations).

The RPS states the energy performance requirements to be achieved by 2020. It is important to incorporate these requirements so that the sector can plan ahead and adapt to them. These requirements are consistent with the Recast EPB Directive:
"All construction will comply with the 'passive' standard or equivalent from 2017. From 2019, all new construction – in addition to the passive standard – will be required to comply as a minimum with the 'net zero' standard and tend towards positive-energy buildings (i.e. buildings with production of renewable energy equal to or greater than the consumption of non-renewable primary energy, on an annual basis)."

Roadmap (post-legislature)*			
	1st January 2017		**1st January 2017 - 2017-2019 Programme**
E_w	*Passive* 30		*New zero energy buildings* ≈ 0 (1)
E_{spec}	*18*		≈ 0 (2)
K	*≤20*		< 20 (4)
	1st January 2019		
E_w	*Net zero* *0 (1)*		
Espec	*0 (2)*		
K	*≤20 (4)*		

* These requirements will be translated into a decree as soon as the methodological framework for calculating the optimum levels in relation to the cost of minimum requirements in EPB matters makes it possible to verify that profitability has been assessed positively.
In the context of "passive" houses, the dimension of the impact on the health of the inhabitants will be taken into account and assessed, in particular for everything relating to ventilation systems[19].

In addition to these indicators and in accordance with EPB regulations, the requirements in terms of insulating walls, ventilation and overheating continue to apply.

Parallel to requirements E_w, E_{spec} and K, requirements U_{max} and R_{min} will gradually be strengthened.

3.2.2 Interim targets for improving the energy performance of renovated buildings, by 2015

The energy requirements provided in the RPS, from 1st January 2015 for large-scale renovation works, are to comply with "very low energy" requirements.
As a reminder, large-scale renovation works, according to the government decree dated 17th April 2008, apply to buildings subject to approval, where the total usable floor area is greater than 1000 m2, that are the subject of major renovation works, i.e.:

- either if it involves works encompassing at least one-quarter of the building envelope;
- or if the total cost of the renovation works relating to the envelope of the building or to its energy systems is greater than twenty-five per cent of the value of the building; the value of the building does not include the value of the land on which the building is situated.

3.3 *Targets Flemish Region*

3.3.1 Short term energy performance requirements

E-level

For residential and office buildings, the E70 level requirement is still higher than the economic optimum. To be able to implement an E-level of E60 on a large scale, building practices and the equipment that is used need to be adapted. On 20 May 2011, the Government of Flanders gave final approval to the proposal to tighten the E-level requirement for residential, office and school buildings to E70 in 2012 and E60 in 2014.

K-level, U- and R-values

For buildings subject to EPB regulations, the maximum required U-values and the minimum required R-values for all types of building envelope sections will be tightened[20] to levels approximating those of neighbouring countries - levels which correspond closely to the cost-optimal values. Beginning in 2012, the K-level requirement was tightened to K40.

Net energy demand

In order to achieve a good building envelope and to limit transmission and ventilation loss, an additional criterion was enforced regarding the net energy demand for space heating. This is why the net energy demand for heating residential buildings was capped at 70 kWh/m² starting in 2012. This is an additional step aimed at reducing the energy demand of buildings.

3.3.2 Long term energy performance requirements

Based on the determinations of the cost-optimal level and the minimum share of renewable energy, a timeline for more strict requirements by 2019 (for public buildings) and 2021 is being developed. Target figures are being defined for both new construction as well as existing buildings.
Separate sets of target figures are being defined for residential and non-residential buildings as well, with particular attention given to public buildings, for which the more strict energy performance regulations shall be on a faster track.
This chapter will be completed as soon as an NZEB definition is available for the different types of buildings.

3.3.3 Minimum level renewable energy in buildings

In implementation of the European Directive on Renewable Energy, the Energy 2009-2014 policy memorandum proposes a study into how we will effectively introduce a required minimum level of energy from renewable sources, while focusing on the relationship between renewable energy generation in a building and that building's E-level.

The VEA commissioned a study which sought to determine the most appropriate method for incorporating a requirement for a minimum share of renewable energy sources into the building regulations for new buildings. This study focuses primarily on buildings for which the E-level must be calculated.
In early 2012, a concrete proposal was presented to the Government of Flanders.
Definitive approval is foreseen by the end of 2012, and it is foreseen that legislation will be in force for public new buildings and major renovations from January 2013. From January 2014 legislation will be in force for new residential buildings, offices and schools and major renovations.
For singular residential buildings are 6 possibilities foreseen:

1. Thermal solar energy systems
2. Photovoltaic solar energy systems
3. Biomass (boiler, stove or qualitative CHP)
4. Heat pumps
5. Connection with district heating or cooling
6. Participation in a RE project

[20] www2.vlaanderen.be/economie/energiesparen/epb/doc/epbuwaarden2012.pdf – summary tables of the U and R-value requirements taking effect in 2012
www2.vlaanderen.be/economie/energiesparen/epb/doc/epbuwaarden2014.pdf - summary tables of the U and R-value requirements taking effect in 2014

For residential buildings with more than one housing units are the same 6 possibilities foreseen with the additional possibility ≥10 kWh renewable energy per m² total useful floor area (combination one or more systems).
The same regulation counts for schools and offices.
The possibility for combining leads to more possibilities in design.

If not complied with the minimum RE requirements, the energy performance requirement (E-level) is set 10% more strict. The implementation is integrated in the existing E-level calculations for buildings, no new methods are required.

4 ACTIONS & MEASURES

4.1 *Summary approach Belgian Regions*

4.1.1 Brussels-Capital Region

A particular feature of the Brussels-Capital Region is that the construction sector is dominant, representing 70% of energy consumption. This has driven the Region to develop an ambitious policy for buildings in terms of energy over the past few years. Through the governmental order of the Brussels-Capital Region of 5th May 2011, the Region has already legally provided for the obligation of all new constructions to meet requirements comparable to the passive standard as of 2015.

To bring its action into play, the Region is developing, alongside its objectives, the expertise and means required to meet the multiple demands that such objectives will clearly raise. In other words, to use a familiar term, the offer and demand "in sustainable construction" must be balanced. In order to explicitly show the way one meets the other, the Brussels-Capital Region's measures are structured according to two key areas: one dedicated to demand and the other dedicated to the market offer for buildings with nearly zero energy consumption.

The aim of the first key area is to stimulate the market's demand for buildings with nearly zero energy consumption. This is achieved, among other things, by the exemplariness of buildings with a high energy performance through the "exemplary building" project call, begun in 2007, which demonstrates that it is indeed possible to achieve excellent energy and environmental performances while respecting financial constraints. On the basis of this demonstration, a statutory framework has been established imposing the high performance standards in energy reached by the exemplary buildings. The requirements are mostly imposed in a more restrictive and/or anticipatory manner on the public authorities who assume an exemplary role. Various financial incentives and the support of the public also help to support the demand for nearly zero energy consumption buildings.

The aim of the second key area is to guarantee a quality offer on the market in order to meet this new demand for nearly zero energy consumption buildings. Several actions have appeared in the last few years, such as the development of specific training or support for professionals in sustainable development. On the one hand, it is a question of bringing together players and good practices to help them pursue the change, and on the other hand, to enable the complete transition of the whole construction sector towards the construction of nearly zero energy consumption buildings.

The third aspect ensures the control but also possible sanctions for the failure to respect the requirements.

4.1.2 Walloon Region

Below we will go through all of the programmes and measures implemented or decided on in Wallonia aimed at encouraging:

- the awareness of private individuals and building professionals about energy efficiency;
- an increase in the energy performance of buildings.

Some of these programmes and measures will contribute in particular to achieving the objective of nearly zero energy buildings. These are identified by a star (★). These measures have a direct link with the promotion of new, energy-efficient building and/or the promotion of systems to produce renewable energy.
Those programmes and measures that do not have a star are designed more to encourage awareness in the area of energy performance, to promote energy-efficient renovations and/or the development of technical opportunities. This means that they will have an indirectly positive impact on the building sector in terms of NZEB.

Most of the measures are included in the 2nd Action Plan on Energy Efficiency (APEE2) approved by the Walloon Government on 26th May 2011.

4.1.3 Flemish Region

In Flanders, a considerable number of nearly zero energy buildings need to be built in the medium term.
A Flemish action plan was developed (and integrated in this national plan), based on the barriers to realise NZEB's. The main purpose of the 'Flemish Action Plan NZEB' is to realise a transition to a broad societal acceptance of NZEB's by 2020. It is the action plan's approach to adopt measures and actions to stimulate the construction of NZEB's on large scale, this with a specific policy focus on trendsetters.
In order to achieve this objective, the actions presented in the Flemish action plan are categorised into five pillars:

1. Innovation
2. Quality framework
3. Communication
4. Financial initiatives
5. Energy policy

During the so-called introductory phase, trendsetters must receive support in the development and application of these systems, technologies and services so that they are followed by the early adopters, ushering in a growth phase. Only then - once the 'early majority' has adopted the systems, technologies and services - can a volume market be achieved.
The goal of the trendsetter policy is therefore to support a transition from demonstration projects to a volume market by way of a growth phase.

All stakeholders like (local) governments, building federations, knowledge institutions, environmental organisations and so on, are actively involved.

Imposing a roadmap with clear and transparent requirements for energy performance will lead to the realisation of new NZEB's. However, the challenge as well as the opportunities for energy retrofit for existing buildings are large. Stimulating measures and actions for these buildings have an even more important role in realising this transition.
The actions in this document are aimed at encouraging both the new construction and the renovation markets to attain the NZEB requirements. In terms of the Flemish building sector and the techniques it employs, only minimal distinction is made between these two markets.
There is made very little distinction between residential and non-residential buildings. The actions are thus being further developed for all types of buildings.
The exemplary role which is reserved for the government during this transition process is extremely important. In addition, the attainment targets which are enforced for public buildings must be implemented more rapidly.

According the EPB directive, the national plans shall include the Member State's detailed application in practice of the definition of nearly zero energy buildings, reflecting their national, regional or local conditions, and including a numerical indicator of primary energy use expressed in kWh/m² per year.
Based on the comparative methodology framework for calculating cost-optimal levels of minimum energy performance requirements established by the European Commission, the Flemish Energy Agency (VEA) has set up a tender to determine the cost-optimal levels for Flanders. The outcome of this study will be used as input for the detailed application in practice of the Flemish definition on nearly zero energy buildings.
Since the study on the cost-optimal levels is still running, a detailed definition for NZEB and the intermediate targets will be added later on as an addendum.

4.2 *Overview actions & measures by governments*

4.2.1 Overview actions & measures Brussels-Capital Region

DEMAND	
Policy	Action 1 : As of 2015, apply PEB requirements comparable to the passive concept for all new constructions, and at the very low energy level for all major renovations
	Action 2 : Continue implementation of the energy certificate for buildings built, rented or sold
	Action 3 : Reduce the use of air conditioning and increase performance of air conditioning systems
	Action 4 : Establish an efficient, high-quality system of energy audits
	Action 5 : Control energy management by large owners through establishment of Local Action Plans for Energy Management ("PLAGEs")
	Action 6 : Implement mandatory energy audits during renewal of environmental permits21 for large buildings
	Action 7 : Evaluate the opportunity for derogation from the town planning regulations of the Region and the municipalities in order to facilitate certain work especially efficient from the energetic point of view
	Action 8 : Green certificates quotas obligation for the electricity suppliers
Public bodies exemplarity	Action 9 : Continue implementation of the energy certificate for public buildings
	Action 10 : Continue implementation of strict energy performance requirements for public buildings
	Action 11 : Control energy management of owning or occupying public authorities through establishment of Local Action Plans for Energy Management ("PLAGEs")
	Action 12 : Use the "Sustainable Building" quality labelling framework as a tool to promote sustainable construction and renovation of buildings of the public authorities
	Action 13 : Establish an energy services company that acts in financing the third-party investor system for buildings of the municipalities and other regional authorities
	Action 14 : Revise the investment rationale for public housing ("SDRB", "SLRB", Housing Fund, etc.) by incorporating occupation cost rationales
	Action 15 : Integrating part of green energy production into the consumption of newly-built public buildings
	Action 16 : Energy accounting service available to municipalities via "NRClick"
Non financial incentive	Action 17 : Support market development toward construction of buildings with nearly zero-energy consumption thanks to "Exemplary Buildings"
	Action 18 : Award a "Sustainable Building" label and certificate
Financial incentive	Action 19 : Pursue and improve support for the investment "energy subsidies"
	Action 20 : Continuation and general implementation of the financial help "loan with a reduced rate"
	Action 21 : Pursuing and reinforcing aid for "green certificate" production
	Action 22 : Provide special guidance and financing for at-risk populations
	Action 23 : Improve support to the non-residential sectors via the financial incentive policy
	Action 24 : Encouraging the private sector (tertiary and industrial) to make the most of ESCO
Communication & accompaniment	Action 25 : Establish a technical, financial and administrative support service involving Rational Use of Energy (RUE) and eco-construction for households
	Action 26 : Communicate on and raise awareness of housing with nearly zero-energy consumption through actions and events on a Region-wide scale
	Action 27 : Supporting households to reduce energy consumption (use) in nearly zero-energy homes
	Action 28 : Develop a proactive support service for non-residential buildings
	Action 29 : Communicate on and raise awareness of non-residential buildings with

[21]The environmental permit is an administrative authorisation that contains technical provisions that must be observed so that the facilities do not constitute a nuisance or hazard to the immediate vicinity and do not directly or indirectly harm the environment or the health or safety of the population. The environmental permit allows among other things the technical facilities related to buildings of a certain size to be regulated. Among these facilities we can cite HVAC (heat, cooling, etc.) facilities, cogeneration, ventilation, mobility, etc.

	nearly zero-energy consumption
SUPPLY	
Policy	Action 30 : Guarantee the quality of the procedure via an accreditation and recognition system for sustainable building professionals
Training	Action 31 : Ensure an adequate training offering for professionals in sustainable building from design to implementation
	Action 32 : Employment-Environment Alliance: collaborate with the competent authorities to improve teaching in construction
Quality framework	Action 33 : Develop and consolidate the technical reference and the tools available to professionals in sustainable building
Support to business development	Action 34 : Facilitate the creation of - or the transition toward – businesses active in sustainable construction and offer them support structures
Innovation	Action 35 : Finance applied research in the area of sustainable buildings, in particular with regard to the flexibility and adaptability of the buildings and the reuse of construction materials
	Action 36 : Allow the concrete application of research results in sustainable building
MONITORING (CONTROL & IMPROVEMENT)	
Action 37 : Monitoring thanks to the Brussels-Capital Region's energy balance	
Action 38 : Every second year, publish a report on the sustainable management of the buildings of the Brussels public authorities	
Action 39 : Establish a collection of data on the quality of the building stock	
Action 40 : Monitor proper implementation of the regulatory and incentive actions and, if necessary, sanction	

4.2.2 *Overview actions & measures Walloon Region*

DEMAND	
Policy	Action 1 : Regulations on the Energy Performance of Buildings (★)
Public bodies exemplarity	Action 2 : Action taken by the Region in relation to its own premises
	Action 3 : Action by local entities (mainly local boroughs)
	Action 4 : Action in schools
Non financial incentive	Action 5 : Quality labels/certification : - Passive building certification - Reference system for sustainable building
Financial incentive	Action 6 : Energy Bonuses for private individuals (★)
	Action 7 : 0% loan - Ecopack
	Action 8 : Subsidies for RUE investments in public buildings (RUEPB)
	Action 9 : Grant for Public Service Housing Companies
	Action 10: Green certificates for the production of electricity from renewable sources and from high-yield cogeneration, and the payment mechanism for transfer/supply to the power grid (★)
Communication & accompaniment	Action 11 : Project tenders “Exemplary Buildings Wallonia” (★)
	Action 12 : Project tenders – large solar thermal systems
	Action 13 : Project tenders “Sustainable Home”
	Action 14 : EAP energy audit
	Action 15 : RUE information in public buildings
	Action 16 : Communication campaigns conducted by the Department of Energy and Sustainable Building in the context of EPB
	Action 17 : Energy Service Counters
	Action 18 : Single service counters
	Action 19 : Creation of the Sustainable Living Home
SUPPLY	
Policy	Action 20 : Strategic planning tools
Training and quality framework	Action 21 : Organising EPB training courses (★)
	Action 26 : Build Up Skills (★)
	Action 27 : Quality labels and certification
	Action 28 : The accreditation of liquid and gas fuel technicians and refrigeration engineers
	Action 29 : Training of Energy Officers in public institutions
	Action 30 : Teaching Tools and Practical Guides (★)
	Action 31: ATG and ATG-E – Technical accreditation (energy) of construction products and systems with certification.
	Action 32: Facilitators
	Action 32: Passive House platform
	Action 33: Energy Advisers and Energy Units in federations
Research and innovation	Action 34 : Development of systems and buildings innovative in EPB using the equivalence principle
	Action 35 : SAFE (Suburban Areas Favouring Energy efficiency) Programme
	Action 36 : Aid for energy research and development - Calls for tenders for energy research projects (★) - Participation of research teams and design offices in certain International Energy Agency projects (★)
	Action 37 : WARE: Virtual Energy Research Centre

MONITORING (CONTROL & IMPROVEMENT)
Action 38 : Monitoring of EPB regulations + energy certification
Action 39 : PAEE monitoring, monitoring of bonuses, etc.
Action 40 : Monitoring the proper implementation of the EEA

4.2.3 *Overview actions & measures Flemish Region*

INNOVATION	
Research & development	Action 1: optimisation of research and development into innovation
	Action 2: conduct analysis of trendsetter target group ▪ Supply-side trendsetters ▪ Demand-side trendsetters
	Action 3: EPB framework for valorisation of innovative systems or technologies
	Action 4, promote airtightness and ventilation ▪ Promoting the airtightness of the building envelope ▪ Study of minimum airtightness requirements ▪ Promoting the top-quality installation and optimal use of ventilation systems
Transition to a volume market	Action 5: from a demo market to a volume market
QUALITY FRAMEWORK	
Knowledge enhancement	Action 6: knowledge enhancement in the building sector ▪ Overview and roadmap of professional training in the building sector ▪ From energy-conscious to NZE architect ▪ Energy-conscious contractor ▪ Specific info/training sessions for building professionals ▪ Educating the real estate sector & property owner associations ▪ Training builders ▪ Training the builder of the future ▪ Train the trainer
Valorisation of quality	Action 7: creation of a quality framework for the building sector ▪ Developing a vision for an integrated quality framework in the building sector ▪ Individual certification of installers ▪ Energy efficiency & renewable energy quality label for companies ▪ Promoting construction teams with an energy consultant
COMMUNICATION	
Awareness & information campaigns	Action 8: 'NZE' trademark branding
	Action 9: establishment of knowledge platforms
	Action 10: awareness & information campaigns directed at trendsetters
Demonstration projects	Action 11: development of demonstration projects ▪ Residential demonstration projects ▪ Non-residential demonstration projects
Non-financial support	Action 12: advice for NZE projects ▪ Advice for residential buildings ▪ Advice for non-residential buildings
	Action 13: manual for NZE buildings
	Action 14: manual for extensive energy renovations
FINANCIAL INITIATIVES	
Financial support	Action 15: adjusting the conditions for incentives
	Action 16: linking support to an overall improvement in energy performance
Financing	Action 17: recognition of energy performance by the financial sector
Third-party financing	Action 18: third-party financing for extensive energy renovations
ENERGY POLICY	
E-level long-term trajectory	Action 19: defining and communicating the long-term trajectory of energy performance regulations ▪ Establishing the timeline for tightening energy performance regulations for new buildings ▪ Establishment of a two-track policy including long-term trajectory for trendsetters (shadow trajectory) ▪ Required minimum level of renewable energy in housing ▪ Communicating information on E-level long-term trajectory
	Action 20: development of an integrated calculation method
	Action 21: a path to nearly zero energy for new social housing

Exemplary role of bublic buildings	Action 22: raising awareness among and providing information to governments ▪ Awareness ▪ Best practices ▪ Knowledge development projects for government personnel (with technical responsibilities) ▪ NZE tendering standard for public buildings
	Action 23: NZE public buildings ▪ Local authorities ▪ Building NZE buildings prior to 2019 ▪ Extensive energy renovations ▪ Leasing of NZE buildings

4.3 *Barriers & opportunities*

In order to achieve the targets laid down in the European EPB directive, there are any number of barriers which must be eliminated first. The measures and actions put forth in this action plan are intended to remove these obstacles to the greatest extent possible. These obstacles can be broken down according to their technical, economic, social and policy-oriented aspects. In the same time, some general opportunities have also been explored according to the same structure.

An inventory of the obstacles was drawn up during several stakeholder meetings which were held throughout 2010-2012. These same stakeholders were also consulted on multiple occasions in the course of devising the different regional plans NZEB.




4.3.1 Policy

4.3.1.1 Barriers

- Cost of the measures to be implemented and resources to be used.
- Impact of energy prices.
- The absence of a national (or European) harmonised approach to energy performance policy (method for calculating energy performance, compatible software, accreditation of energy experts) creates problems (subsidy plan, businesses with locations in different regions, etc.).
- There is a need for a single unified system for calculating energy performance that can also be applied to NZE buildings (low-energy and passive buildings). At present the E-level can still end up being fairly high for these high energy-performing buildings.
- The process used by the EPB calculation method to valorise innovative systems and technologies is laborious.
- It is not always possible to obtain NZE energy performance due to external (policy) factors such as spatial planning, cultural heritage sites (exemptions or variances for protected cultural heritage sites) and urban development regulations.
- Less than ten years is a short period of time in which to transition to NZE buildings. Right when the late adopters start getting experience with the new requirements, even more stringent requirements go into effect.
- Problems with building requirements during renovation - such as external insulation permits, exceeding the building line, etc. - discourage people from taking these energy-saving measures.

- The fragmented support policy (federal, regional, provincial, municipal, distribution system operator, etc.) is not transparent enough to the consumer.

4.3.1.2 Opportunities

- Reduce the Region's energy dependency
- Impact on the environment and CO2 emissions
- Contribution to the economic recovery through the business generated in the construction sector and for green enterprises
- Policy on the environment
- Exemplary role of public authorities

More opportunities are worked out directly in the proposed actions and measures.

4.3.2 Financial

4.3.2.1 Barriers

- Ability of households and communities to invest in order to produce energy-efficient buildings and to upgrade the current building stock.
- Cost overruns.
- The potential for increasing the amount of a loan is not linked to the estimated energy consumption (or economic optimum).
- The initial purchase price of a building is often already high, and making extensive energy renovations only increases the cost of the investment.
- Support measures provided by governments for energy-efficient construction/renovation are often unstable and are viewed as poorly organised.
- Tenant/landlord paradigm: how does the investor receive a maximum and direct return on investment? There is no direct benefit to a landlord to perform extensive energy renovations on a piece of rental property. For the landlord, there is a negative 'return on investment'. Tenants have just as little assurance regarding the 'return on investment' from an extensive energy renovation.
- For architects, energy experts and design experts, designing NZE buildings demands a far greater investment of time, especially if they have limited experience. It also entails extra responsibilities. Much more control and coordination of contractors and labourers is needed. Very few private customers are prepared to pay all of the additional costs. There is usually a greater economic incentive to taking the 'business-as-usual' approach to the design process, and offering low-energy design services is far and away a question of an architect's personal idealism/commitment.

4.3.2.2 Opportunities

- Micro-savings (households) and macro-savings (Belgium).
- Creation of jobs.
- Reduce household energy bills.
- Target at-risk populations and provide them special attention.

More opportunities are worked out directly in the proposed actions and measures.

4.3.3 Technical

4.3.3.1 Barriers

While the main principles, as well as the building technologies and systems needed to achieve high levels of energy performance, such as those laid down to achieve NZEB, have been known for a number of years, it is still difficult to apply them and produce a large number of buildings that attain this level of performance.

In terms of design:

- Taking account of the objectives to be achieved from the initial stages of the project. This involves the architect being better trained and more aware of the issues, that he/she has evaluation tools enabling him/her to measure the impact of the choices made and directions taken at this stage. The risks of overheating, the impact of natural lighting and ventilation in particular, must be taken into account at the preliminary project stage.
- Effective thermal insulation, supplemented by a good level of airtightness and efficient ventilation. This involves adapting building systems accordingly. Building nodes need to be particularly well designed.
- In addition to simulation and assessment tools, the products available on the market must make it possible to achieve the performance expected. This means that having access to reliable and certified data about "products" and "systems" is essential.
- Having the right balance between heating (heating and domestic hot water) and cooling requirements and the systems for achieving those needs with minimum consumption, as well as an attractive environmental assessment and optimum comfort is essential. In terms of housing, for example, the levels are reduced, with the amount taken up by domestic hot water becoming proportionately large. The manufacturers of systems need to take account of this and offer solutions that are suited to differing typologies and uses.

In terms of implementation:

- The construction details must be produced accurately and with care.
- Checking actual implementation is crucial, as is commissioning at the end of the works.
- It is essential to have trained and competent workman and engineers when implementing the systems recommended, both in terms of the construction and installation of heating and cooling systems, as well as systems using sources of renewable energy.
- The maintenance, servicing and adjustment of the systems must be taken into account.

In terms of renovations:

- Taking a holistic approach to renovations is not applied sufficiently. A preliminary audit has shown its value as an important tool in aiding decision-making. It must also be possible assess the performance achieved after the renovation works are completed, which involves monitoring the building site and checking on the work done.
- Incorporating sources of renewable energy is still taken little into account or inappropriately so.
- The growing use of electricity from renewable sources involves the network and metering systems being adapted.
- Town planning and development regulations are often obstacles to the implementation of innovative solutions incorporating heating networks, new types of building and the enhanced insulation of existing buildings from the outside.

In terms of general building-related:

- With highly energy-efficient flats, it is difficult to supplement the residual energy demand with renewable energy, though this may be more feasible for the building as a whole.
- Applying innovative materials and techniques often entails a learning curve (insufficient support, limited experience, etc.).
- It is not always possible to build NZE buildings with the current technology due to external factors such as:
    - physical orientation of the building
    - environmental conditions
    - building type
- Installations: design, adjustment, regulation, maintenance, implementation, etc. The complexity of certain (high-tech) equipment can cause the system to function incorrectly or inefficiently. This can result in a failure to achieve the anticipated energy savings or cause problems with indoor air quality.
- More insight is needed into the most suitable approaches for installing systems such as (back-up) heating, ventilation and energy generation. There is no one single type of system that is most appropriate for an NZE building.
- Thermal bridge-free & airtight construction should not to be taken for granted, nor should the long-term sustainability of the airtight seal.
- Substandard low-energy building practices can jeopardise indoor air quality. Poor indoor air quality can have a negative effect on the health of the residents, can lead to building damage (such as the formation of condensation and mould) and can indirectly result in higher energy consumption.

- Electricity that is generated by renewable energy systems such as photovoltaic solar panels, (micro-) cogeneration, etc. cannot necessarily be easily introduced to the grid from any location. Will the electricity networks be able to keep up with advancing trends?
- It is not always possible to install solar panels due to shadows, limited roof area or improper physical orientation of the building.
- It can be difficult to trace the contractor(s) responsible for failing to achieve pre-specified technical targets such as airtightness, systems performance, etc.
- Technical solutions are frequently too narrowly geared toward residential installations, and as a result are not practical for other types of buildings. There is a need for specific, tailored solutions for a range of building types and use profiles.
- The renovation process involves a great deal of discontinuity, leading to low-quality work and the shirking of responsibility. There is a need for a new class of 'energy-renovation contractor' offering a complete package of extensive energy renovations.
- No tool or method for evaluating NZE renovations currently exists.

4.3.3.2 Opportunities

- The gradual introduction of NZEB requirements has a direct implication on the development of the technical solutions available on the market. It is also a question of giving preference to innovation and researching areas connected with the problem.
- These objectives are the driving force behind development for the support lines concerned by emphasising their visibility and accessibility.
- Finally, the resulting measures make it possible to experiment gradually and so consolidate the concepts developed while at the same time adapting them and increasing their application.

More opportunities are worked out directly in the proposed actions and measures.

4.3.4 People

4.3.4.1 Barriers

- The rebound effects should not be neglected. For example, increases in the consumption of electricity in the services and residential sectors.
- The difficulty associated with identifying the appropriate new technology, linked to the level of knowledge, the lack of reliable information about the issues at stake and the real impact on consumption and convenience.
- Education and culture limit the development of solutions such as purchasing groups or collective projects.
- Accessibility for people with insecure earnings.

- Knowledge level, quality and preparedness within the sector regarding energy construction must improve.
- Prejudices on the part of both private builders as well as building professionals: price, health, quality, life span, etc.
- There is insufficient awareness of the arguments for opting to build an NZE building. The economic optimum over the economic life span of the building, as well as a higher rental and sale price, are both examples of strong arguments that can play a decisive role for certain target groups.
- There are several processes which do not go as well as they should during construction (one reason being the absence of a specific coordinator or construction team).
- There is no harmonised system for quality labels for NZE buildings. People must have confidence in the overall quality of NZE buildings over the long term.
- A gap exists between the development of new technologies and the knowledge that is possessed by the building sector.
- With communal housing, it is often the case that all joint owners need to be engaged in the process (in terms of views on the renovations carried out, timing, financial contribution, etc.). It is crucial to encourage joint renovation projects (financial benefit, quality control potential, significant energy savings), but this requires the development of solutions which go beyond the individual initiative of the private owner/tenant.

4.3.4.2 Opportunities

- Act on the energy culture by developing tools and awareness campaigns.
- Increase the wellbeing of occupants (thermal comfort, quality of the building).
- Develop quality frameworks to carry out work and assist users by providing them with the appropriate tools.
- Federate people, public and/or private organisations and creation of win-win situations (For example: ESCOs).

More opportunities are worked out directly in the proposed actions and measures.

4.4 *Actions & measures Brussels-Capital Region*

The construction sector is dominant in the Brussels-Capital Region: buildings are responsible for no less than 70% of energy consumption. This data is hardly surprising since we know that the built heritage covers a surface area of almost 64 million m^2. Furthermore, the buildings are extremely energy-guzzling because they were mainly built before 1970, at a time when the apparent abundance of low-cost energy made insulation measures redundant. The oil crisis seemingly didn't cause sufficient concern to encourage energy savings. In fact, energy consumption per inhabitant followed an upward trend of +12% between 1990 and 2004 owing to the lack of an ambitious policy in terms of energy efficiency in the Brussels-Capital Region.

It was in 2004, just after the regional elections, that awareness and the desire to act took root in the Brussels-Capital Region. At the same time, numerous mechanisms were set up to reduce the energy bill of Brussels' inhabitants (citizens, companies and public authorities). Considering the vast potential to reduce energy consumption, the political choice was to target the "consumption" component of the energy bill rather than the "unit price". A choice that proved to pay off: energy consumption per inhabitant fell by 18% between 2004 and 2010.

One of the Region's flagship projects – the "Exemplary Buildings" project call for the construction and renovation of buildings meeting high energy standards – saw the light of day in 2007. The extent of the Region's ambition was partially revealed: Brussels wanted to abandon its European position as last in class and catch up with the leaders in energy efficiency. This plan explains how such a huge step forward was possible; as much in construction and building renovation as in energy management within the building industry, as well as in terms of training, jobs and innovation.

The Region's ambitious policy is completely coherent with the requirement imposed through directive 2010/31 regarding the "nearly zero-energy buildings" standard for all new constructions, as of 31 December 2018 for public buildings and 31 December 2020 for all constructions. By imposing requirements comparable to the passive standard on all new buildings as of 2015, the Region will already meet the first part of the European definition of NZEB: a building with very high energy performance. According to the experience acquired in Brussels, the passive standard seems to be the ultimate limit in terms of insulation. Demanding more would not be "cost optimum". With the amount of energy required thus determined, it is then necessary to cover "the majority" of these needs with renewable energy produced on site or within the vicinity.

In organising its approach, the Region is developing, in parallel with its objectives, the expertise and resources necessary to respond to the many demands that such objectives will necessarily generate. In other terms, and to use a familiar terminology, the "sustainable building" supply and demand must be balanced.

In order to explicitly reveal the way one responds to the other, this plan has been developed along two major themes: one devoted to demand, and one devoted to the market supply for buildings with nearly zero-energy consumption.

With regard to demand, the measures rely on various complementary aspects:

- regulation;
- the exemplary role of the public authorities;
- non-financial incentives: strong stimulus for construction and renovation of high-performance buildings;
- financial incentives;
- support and communication.

While regulations remain a significant instrument in the evolution of the building sector toward "sustainable building", a certain number of important steps have nevertheless already been taken, with, in particular, the adoption of a decree that imposes observance of "passive construction requirements" on new buildings from 2015. Independently of what is imposed on the public authorities, regulatory action nonetheless remains necessary with a view to, among other examples, removing the various hindrances and obstacles to activities that would allow the energy and environmental impact of buildings to be reduced.

The leading role of the public authorities with regard to sustainable construction will be strengthened; they should in particular occupy very high-performance buildings.

Along with the regulatory framework, voluntary initiatives have contributed a great deal to the development of sustainable construction. These initiatives must be supported and promoted through various fundamental approaches:

- financial support for the projects and activities that participate in the objectives pursued by the Region with regard to very high energy efficiency, as well as easier access to assistance;
- raising the awareness of the public, and if necessary supporting them in activities they propose with a view to improving the energy performance of a property or rationalising energy use.

As for the supply, it should be ensured through support, guidance and development of the economic sectors providing employment, including those related to sustainable construction. This principle is concretely expressed in particular through the Employment-Environment Alliance and its "sustainable construction" sectorial focus. This is based on two imperatives:

- businesses in the building sector must be able to fulfil this demand for high energy and environmental performance;
- workers, especially those who are unskilled, and the unemployed must have access to the new skills required by implementation of sustainable construction.

These objectives are apparent in the proposed measures. They centre around the following aspects:

- regulations;
- training;
- the guarantee of quality;
- support for business development in sustainable construction;
- innovation.

The regulatory aspect thus emphasises the guarantees of professionalism that must be fulfilled by those involved in sustainable construction, guarantees embodied in accreditation or official recognition.

Along with such requirements, the various professionals must of course have access to complete and relevant training, ensuring in this way that unskilled workers acquire new skills.

In an even more fundamental way, the construction sector should be helped to evolve toward sustainable construction. On the one hand, the boom in businesses active in this area and of energy service companies should be promoted; on the other hand, it seems necessary to facilitate access to the labour market for workers trained in the techniques of sustainable construction.

Finally, the concept of sustainable construction will continue to develop as new technologies or innovative solutions appear; energy and environmental performance may constantly improve still more. The measures proposed here should thus be accompanied by action to support applied research.

A third aspect confirms the necessity of monitoring the policies underway and possible sanction of deviations, but also of the importance of communicating the results achieved.

4.4.1 Demand

The aim of this first aspect is to stimulate market demand for buildings with nearly zero-energy consumption.

The philosophy followed in the Region is to let the market experiment with new techniques and demonstrate their advantages. Innovation and excellence are rewarded through the "Exemplary Buildings" call for projects (Action 17) and the "Sustainable Building" quality labelling and certification system (Action 18). In the case of exemplary buildings, this involves demonstrating that it is fully possible to achieve excellent energy and environmental performance while observing certain financial and architectural constraints. The results obtained have exceeded hopes and demonstrated the capacity of the sector to achieve such standards at optimum costs.

The standards achieved on a voluntary basis have then allowed the establishment of new requirements imposed through a strict regulatory framework on the methods for construction and renovation of buildings, first for buildings occupied by the public authorities, which have an exemplary role. In the second phase, the new requirements are imposed on any type of building.

Finally, measures for guidance, financial, technical, and administrative, constitute support offered in specific forms according to the public (private individuals or businesses), to ensure good progress in implementing buildings with nearly zero-energy consumption.

4.4.1.1 Policy

On the basis of the excellent results obtained in the framework of the "Exemplary Buildings" call for projects (Action 17) and the energy subsidies (Action 19), the Brussels-Capital Region established an energy standard comparable to the passive concept as a regulatory framework in 2011 for any new construction as of 2015 (Action 1). The Region has since then involved all those in the construction sector in a dynamic process of active implementation of the energy performance of buildings in the residential and tertiary sectors. By imposing standards comparable the passive standard on all new buildings as of 2015, the Region will already have met the first part of the European definition of NZEB: "a building with very high energy performance". In addition, the Brussels-Capital Region is currently developing integrated air, climate, and energy legislation via the "COBRACE", the Brussels Air, Climate and Energy Code, which is in the process of adoption and aims to:

- Minimise energy needs and energy dependence;
- Use energy from renewable sources and promote rational use of energy (RUE);
- Improve the energy performance of buildings;
- Reduce the environmental impacts of mobility needs;
- Evaluate and improve air quality;
- Reduce the emission of atmospheric pollutants;
- Highlight the exemplary role of the public authorities with regard to both buildings and transport.

The "COBRACE" deals with these different subjects while taking into consideration both the social implications and the various aspects of sustainable construction.

In the building sector, this new legislation thus aims to exploit the enormous existing potential in terms of energy savings. Among other things, the "COBRACE" includes provisions aimed at the current regulation of energy performance of buildings while simplifying it and guaranteeing transposition of Directive 2010/31/EC. The Code also provides for establishment of effective, high-quality energy audit systems (Action 4) and contains the obligation to draw up a local action plan for energy management "PLAGE" (Action 5) to ensure monitoring and efficient management of buildings stock with high energy performance.

On the other hand, measures prior to the Code are cited, such as the decree of 15 December 2011 stipulating that it is mandatory to perform an energy audit (Action 6) for establishments of more than 3500m² not allocated to housing on the occasion of any request for renewal or extension of the environmental permit.

Finally, the Region is considering the possibility of derogation from the urban planning regulations to favour certain work that is especially energetically advantageous.

Action 1	As of 2015, apply PEB requirements comparable to the passive concept for all new constructions, and at the very low energy level for all major renovations

Brussels regulations on the energy performance of buildings, transposed via the Ordinance on Energy Performance and Interior Climate of Buildings of 7 June 2007, aim to achieve buildings consuming less primary energy, and in so doing to reduce production of greenhouse gases. They provide for three major categories of actions:

1. Energy performance requirements imposed on construction and renovation of buildings.

2. The obligation to post, in a way visible to the public, an energy performance certificate for heavily used public buildings (Action 9). This certificate has the purpose of providing information on the energy level of the building; it will be accompanied by recommendations but will not require work to be performed. On the other hand, there is the obligation to establish a system for energy performance certification upon construction or before sale and rental of an existing building or part of a building (Action 2). This certification system indicates the energy level of the building and allows buildings to be evaluated and compared. This certificate will also be accompanied by recommendations, without a requirement to perform work.

3. Energy performance requirements imposed upon installation, replacement or modification of a technical facility for production of heat or cooling (Action 3). Likewise, a system for monitoring and maintaining the existing technical facilities for production of heat or cooling is made mandatory. Monitoring and maintenance will be accompanied by recommendations, but will not require work to be performed.

Regarding the first category, the Decree of the Government of the Brussels-Capital Region determining the requirements with regard to energy performance and interior climate of buildings of 21 December 2007 clarifies the ordinance by providing that the first two increasing threshold requirements are to be observed as of July 2008 and July 2011.

In 2011, via the Decree of the Government of the Brussels-Capital Region of 5 May 2011, the Government set ambitious new threshold requirements for energy performance and interior climate of buildings, aiming at standards comparable to the passive concept for new buildings allocated to housing, schools, and office and service activities for 2015. This new decree abrogates the previous one and represents a genuinely ambitious advance. In quantitative terms, it requires that starting 1 January 2015, individual Housing EPB units[22] have:

- a primary energy consumption for heating, domestic hot water and electrical appliances below 45 kWh per m^2 per year;
- airtightness at 50 Pa below 0.6 per hour;
- a net heating need below 15 kWh per m^2 per year;
- an overheating temperature that can only exceed 25°C for 5% of the time throughout the year.

As for Offices and Services PEB units and Educational PEB units, the decree provides for:

- a total primary energy consumption below (90-2.5*C) kWh per m^2 per year, with C defined as the compactness, that is, the ratio between the volume enclosed and the loss area;
- airtightness at 50 Pa below 0.6 renewals per hour;
- a net heating need below 15 kWh per m^2 per year;
- a net cooling need below 15 kWh per m^2 per year;
- an overheating temperature that can only exceed 25°C for 5% of the utilisation period.

In addition, the Government plans to impose, via an implementing decree, the very low energy concept for major renovations, or a final energy consumption to satisfy annual heating needs of less than 30kWh per m^2 of heated area.

[22]The term "PEB unit" refers generally to complexes of adjacent premises housed in the same building which can be sold or rented independently and which fulfil the definition of an allocation (such as "offices", "education", "housing", etc.).

Action 2	Continue implementation of the energy certificate for buildings built, rented or sold

For all newly built buildings (residential, tertiary or public) for which the town planning permit was introduced as of 2 July 2008, a "new building" type EPB certificate is mandatory. It is issued by Brussels Environment on the basis of the EPB declaration submitted by the EPB advisor who has supervised the worksite.

Buildings put up for sale or rental follow another process. They must have a EPB certificate drawn up by a certifier approved by the Region. The seller or lessor of a property is bound to have a EPB certificate drawn up prior to putting his property up for sale (since 1 May 2011) or rental (since 1 November 2011).

This energy certificate aims to inform the prospective buyer or tenant of the level of energy performance of a building and to compare it to other properties on the basis of a standardised method. It should moreover be easily comprehensible and contain a CO_2 emissions indicator. Penalties[23] are provided against anyone (declarant, EPB advisor, architect, builder, etc.) who violates the rules for proper implementation of this certificate.

This certificate plays an important role, notably in that it allows buildings on the market with high energy performance to be easily and objectively identified.

In addition, implementation of the certificate provides an opportunity to collect data improving knowledge of the energy situation of the housing stock. A databank of certificates for new buildings is being extended to all certificates issued (approximately 70,000 per year for rental alone). This databank will allow anonymous collection and analysis of the data.

Action 3	Reduce the use of air conditioning and increase performance of air conditioning systems

It is well established that use of air conditioning leads to major energy consumption and use of substances with a high potential for global warming and effects on the ozone layer.

Although there are no precise data on the consumption of air-conditioning systems in the Brussels Region, it is reported that use of air conditioning[24] is increasing more and more in our buildings in both the tertiary[25] and residential[26] sectors. Moreover, the increased airtightness of buildings increases cooling needs.

Regulations on air conditioning are dealt with through two approaches. On the one hand, requirements in terms of needs and energy consumption related to air conditioning are currently taken into account in the EPB requirements via the calculation of the E level - the level of primary energy consumption of the EPB unit - for overall performance. Given the level of requirements imposed starting in 2015 (Action 1), use of air conditioning will automatically be reduced. On the other hand, EPB regulations on technical facilities for air-conditioning are treated in the decree of the Government of the Brussels-Capital Region of 15 December 2011 and deal mainly with observance of good practices in installation and management of air-conditioning systems in order to improve their energy efficiency.

Action 4	Establish an efficient, high-quality system of energy audits

[23] See the Ordinance on Energy Performance and Interior Climate of Buildings of 7 June 2007 – Article 34.

[24] Based on a study performed by the IBGE in 2003 and the 'Sitex' databank, consumption of office buildings related to air-conditioning (production of cool air only) could amount to 500 GWh, or 8.8% of the total electricity consumption in the Brussels Region (5.7 TWh).

[25] The percentage of air-conditioning in tertiary buildings is estimated at 52% of the buildings in Brussels (with a percentage that reaches 83% for private offices). Source: Energy Balance for the Brussels-Capital Region, 2009.

[26] There is currently no estimate of the number and consumption of the small air-conditioning units used in the residential sector.

The “COBRACE” contains a provision to establish efficient, high-quality systems for energy audits. The methodology for the energy audits as well as their mandatory or optional nature will vary according to the allocation or area of the buildings. These audits will be performed by accredited auditors.

Action 5	Control energy management by large owners through establishment of Local Action Plans for Energy Management (“PLAGEs”)

The first “PLAGEs” have been in existence since 2006 on a voluntary basis and in the public sector, first in municipalities and hospitals and then in schools, Public Service Housing Agencies (SISP, *sociétés Immobilières de Service Public*; social housing agencies) and collective housing.

The ”PLAGE” methodology aims to establish an organisation and a policy for energy control for owners with a large real-estate holding. This methodology aims to identify the potential energy savings and priorities for action for the buildings in a single holding. It then offers the possibility for progressive implementation of an action plan through a consistent and coordinated set of technical and behavioural measures. Implementation of the action plan is accompanied by monitoring of the variation in energy consumption.

In the context of buildings with nearly zero-energy consumption, the “PLAGE” provides a solid basis for monitoring and good management of the building to maximise the design advantages of this building in the daily use of energy. In fact, the new high performance buildings have been designed according to a standardised cycle of occupation. Any difference in occupation would therefore have repercussions on the actual consumption of the newly constructed building. Only precise monitoring will help detect these unfavourable differences in order to correct them; at the same time, it will also help to adopt a more efficient cycle of occupation than the standardised cycle so that the actual consumption is lower than the theoretical consumption. A period of mandatory monitoring by specialists in the new sustainable techniques will ensure that the results are up to the stated ambitions. This monitoring will avoid cases of “greenwashing” and propagation of non-reliable techniques.

Between 2006 and 2009, seven Brussels municipalities can be cited by way of example among the various parties having participated in a “PLAGE”. Within these, 70 buildings were targeted, representing a total area of 195,789 m² and a gas and electricity consumption of 69,970,471 kWh and 10,315,058 kWh respectively in 2005. This consumption is equivalent to that of 4387 Brussels households. The “PLAGE” methodology reduced gas consumption by 15.82% between 2005 and 2009 and electricity consumption by 4.3% over the same period. In total, 1,326,000 Euros was saved. Another illustration involves five Brussels hospitals that have also been involved in a “PLAGE” since the end of 2006. All these hospitals form a building stock of 483,000 m², representing a total consumption of 186 million kWh, equivalent to the consumption of 11,300 Brussels households. The “PLAGE” has allowed a reduction in electricity consumption by 0.6% and in gas consumption by 14.3%, leading to a reduction in the energy bill for the five hospitals of 2 million Euros in 2009.

In view of the results of the first series of “PLAGEs”, they will be imposed following adoption of the “COBRACE” on large owners (private legal entities with real estate holdings, possibly multiple buildings) of more than 100,000 m², with the exception of social housing. The Region will establish a mandatory system for implementation of a “PLAGE” programme for these proprietors, namely:

- establishing an energy cadastre of their property and installing energy accounting;
- establishing an organisation for energy control;
- identifying the most significant potentials for energy improvement;
- implementing a scheduled action plan with a numerical objective to achieve.

Feedback demonstrates the profitability of this action. Henceforth, the expenses due to this programme will be charged to the proprietors.

Action 6	Implement mandatory energy audits during renewal of environmental permits[27] for large buildings

Voluntary auditing programmes in the tertiary sector have shown that a series of profitable measures exist allowing the reduction of a building's energy consumption by 30%. It is essentially a question of measures, concerning adjustments, the insulation of pipes and even the replacement of boilers, that can be easily implemented in a building which is in the process of being occupied.

In application of the decree of 15 December 2011 on an energy audit for establishments that are large consumers of energy, the energy audit has been made mandatory as of 31 July 2012 for establishments of more than 3500m^2 not allocated to housing on the occasion of any request for, renewal and extension of the environmental permit 1A and 1B every 15 years, the objective being to use the potential for profit (payback period of less than 5 years) easily feasible in occupied buildings.

The energy audit report should include a list of the most profitable energy-saving measures, as well as an overall potential for CO2 savings taking account of the implementation of all these measures. Depending on these results, the auditor, in collaboration with the applicant, will propose an action plan allowing this potential to be achieved according to a schedule. This action plan will be listed in the environmental permit and must be implemented within a period of 4 years after issue of the environmental permit, or 5 years for holders subject to the procedure for public contracts. Those requesting the changes have the flexibility to opt for other measures as long as their aim to reduce energy consumption is achieved on schedule.

Action 7	Evaluate the opportunity for derogation from the town planning regulations of the Region and the municipalities in order to facilitate certain work especially efficient from the energetic point of view

Following the example of the Flemish Region, the Brussels-Capital Region is considering the opportunity of defining guidelines for derogations from the town planning regulations of the Region and the municipalities in order to facilitate certain work especially efficient from the energetic point of view.

The town planning regulations contain provisions on the town planning characteristics of buildings and their surroundings (e.g., size, volume, aesthetics, solidity of the structures). They also enact rules for development of public space. The Regional Urban Development Regulations ("RRU") is hierarchically above the Municipal Urban Development Regulations ("RCU"), so that it abrogates the provisions of the "RCU" that do not comply with it.

Permit requests must observe the prescriptions of the town planning regulations. Nonetheless, it is possible to obtain certain derogations authorised by the delegated official (regional authority). Following this rationale, the delegated official could have guidelines for evaluating the appropriateness of certain derogations from the town planning regulations for work especially efficient from the energetic point of view (elevation of the roof, insulation of the street-side façade from the outside, air vents in the façade, renewable energies, etc.) while taking account of the preservation of the building stock and the aesthetics of the city.

A working group with skills in urban planning, the building stock, the environment and energy would define these guidelines, including those for renovation of small architectural features (stained glass windows, frames, etc.). The results of the studies (like that on the renovation of frames) would be discussed and the recommendations implemented.

[27]The environmental permit is an administrative authorisation that contains technical provisions that must be observed so that the facilities do not constitute a nuisance or hazard to the immediate vicinity and do not directly or indirectly harm the environment or the health or safety of the population. The environmental permit allows among other things the technical facilities related to buildings of a certain size to be regulated. Among these facilities we can cite HVAC (heat, cooling, etc.) facilities, cogeneration, ventilation, mobility, etc.

Action 8	Green certificates quotas obligation for the electricity suppliers

Every identified producer of green electricity (production of renewable energy and high-quality cogeneration[28]) periodically receives green certificates (according to the installation power; production method, etc.). The producer may sell those certificates to an intermediary or directly to a supplier.

Indeed, all holders of an electricity supply licence have to give back each year to the regulation authority a certain number of green certificates[29]. The quota to give back corresponds to a percentage of the total volume of electricity supplied to customers during the past year. It is of 3.25% for year 2012. It is foreseen to increase the quota for the following years.

4.4.1.2 Public bodies exemplarity

The public authorities are subject to more restrictive or earlier regulation than the rest of the market. This practice not only allows the feasibility of the regulations to be demonstrated, but also gives those involved in the supply of buildings with nearly zero-energy consumption insight into what demand will be so that they will can adjust to it as a consequence.

Action 9	Continue implementation of the energy certificate for public buildings

The Brussels-Capital Region requires that every public building post its energy performance in the form of an energy performance certificate as soon as the total area of the EPB units occupied by public authorities in a single building exceeds 1000 m^2.

It should first be noted what is meant by a public building in the sense of the EPB. A public building is a building occupied in whole or in part by a public body. A public body is:

- a public authority (administration, ministry, public interest organisation, etc.);
- an institution providing a public service in the building (school, hospital, rest home, etc.).

The EPB public building certificate gives the result for the overall energy performance of the property, expressed in one or more numerical or alphabetic indicators based on the actual consumption of the public building; in particular, the certificate gives a bar chart of the actual consumption over the past three years at standardised constant climate or the actual energy bill for the building. A coordinator is named by each public body to collect the consumption data that will be used by the certifier to draw up the EPB public building certificate. The purpose of the EPB public building certificate is to inform users, both occupants and visitors, so that they can be made aware of the actual consumption of the building. It is updated annually and must be displayed in the entry hall of the public building.

The deadlines for this obligation have been split into two phases depending on the activity category of the public building:

- The first phase involves administrative buildings, town halls, sport centres and swimming pools. These bodies should have registered their buildings as of 1 June 2011 and posted the EPB public building certificate as of 1 July 2011;
- The second phase involves all other categories of buildings[30]. These should have registered their buildings as of 1 January 2012 and posted the EPB public building certificate as of 1 July 2012.

[28] *Ordinance of the 19th July 2001 (modified by Ordinances of 1st April 2004, 14th December 2006, 4th September 2008 and 20th July 2011) regarding organization of the electricity market in the Brussels-Capital Region, art. 2 point 7°*

[29] *Ibid*., art. 28 §2

[30] Parliaments, courtrooms and related judiciary and administrative premises, day-care centres, schools from the kindergarten to secondary level, professional and after-hours education, higher education establishments, cultural establishments (museums, theatres, cultural centres, libraries, multimedia libraries and similar services), health and care establishments (hospitals, health centres, rest homes, rehabilitation and nursing homes and similar services), penal institutions, workshops, funeral centres, train stations and depots.

Action 10	Continue implementation of strict energy performance requirements for public buildings

The Government of the Brussels-Capital Region has committed itself in the governmental statement to observing strict energy performance requirements for public buildings, both in new construction (requirements comparable to the passive concept) and major renovation (very low energy concept).

Material aid in the form of training, assessment and methodology is proposed for implementing this action.

Various actions by the Brussels public authorities are already underway, like the construction of the new Brussels Environment building; with 16,000 m², it will be among the largest passive buildings in Europe. The Brussels Regional Development Agency[31] ("SDRB"), the Brussels-Capital Region Housing Company[32] ("SLRB") and the Housing Fund [*Fonds du Logement*][33] have been subject to these requirements in the framework of their management contracts concluded with the Government since 2010. The Ministry of the Brussels-Capital Region has also been committed to such requirements since 2010.

These strict energy performance requirements for public buildings exert a significant knock-on effect on local authorities and on the market in general.

Action 11	Control energy management of owning or occupying public authorities through establishment of Local Action Plans for Energy Management ("PLAGEs")

Public authorities that own and/or occupy buildings located in the territory of the Region which represent together a total area of 50,000 m² will be bound to implement a "PLAGE" as described in Action 5 after the adoption of the "COBRACE".

Among the actions to be implemented in the framework of the "PLAGE", the Government can impose measures on public authorities aiming specifically to improve the energy performance of their buildings, and in particular a level of renovation.

Action 12	Use the "Sustainable Building" quality labelling framework as a tool to promote sustainable construction and renovation of buildings of the public authorities

The "Sustainable Building" quality labelling framework aims to encourage the entire Brussels building sector to adopt exemplary standards with regard to sustainable construction and renovation. This reference system will allow an objective assessment of the sustainability aspects of the building assessed and a rapid comparison between different buildings, just like the EPB certificate.

In particular, it takes into account the following aspects:

[31]The SDRB has the mission of producing housing for households of moderate income in neighbourhoods characterised by a shortage of residential construction in order to keep residents in, or bring them back to, the Region

[32]The "SLRB" is a regional institution in charge of social housing.

[33] The Housing Fund carries out missions of public utility and thus offers households of moderate or low income mortgage financing, construction/renovation-sale transactions, rental assistance, or regional instalment loans for drawing up a rental guarantee.

1° primary energy needs, energy sources and carbon dioxide emissions related to use of the building;
2° consumption of non-renewable resources in the construction, renovation or management of the building and the impact of this consumption on the environment;
3° emissions of atmospheric pollutants related to use of the building, and their impact on the immediate environment;
4° the quality of life that the building offers its occupants.

The Brussels-Capital Region plans to impose certification or "Sustainable Building" quality labelling of their buildings on the public authorities. Brussels legislation ("COBRACE") moreover provides for the possibility of imposing certain requirements on any public authority occupying a building on the territory of the Region. These requirements will be based on criteria related to "Sustainable Building" quality labelling and allow the quality of the buildings of the regional public authorities to be assessed and improved.

In addition, the Region intends to impose a minimum score on the basis of the "Sustainable Building" reference framework for any real estate project with public participation. The various regulations on available aid with regard to real estate investments (neighbourhood contracts, subsidised investments, etc.) will be analysed and their legislative support will be changed as necessary to add criteria for sustainability in the form of a total minimum score. Standard special specifications will have to be prepared for public contracts (call for proposal, negotiated procedure, etc.) from the intended bodies.

Finally, the Brussels-Capital Region is considering the opportunity of progressively imposing the requirement that public authorities occupy buildings recognised as "Sustainable Buildings" (for rental as well as construction and renovation). In the long term, any public authority would, within the limits of constraints related to preservation of building heritage, occupy buildings with a high rating in the certification/quality labelling system as defined in the reference framework.

Action 13	**Establish an energy services company that acts in financing the third-party investor system for buildings of the municipalities and other regional authorities**

The municipalities as well as other regional authorities constitute a major group of owners of tertiary buildings that often have a poor level of energy performance. And yet, owing to the financial burden that some of them have to bear, these owners do not have sufficient resources to make energy-saving investments, even though they would be (highly) profitable. Furthermore, some public owners have already reached their borrowing limit or do not wish to put a strain on their borrowing power to invest in saving energy, often considered secondary compared with the main missions of the municipalities and other regional authorities.

To meet this lack of financial means among the municipalities and other regional authorities, the Region intends to set up a company offering energy services (ESCO) that will finance energy-saving investments; this will be reimbursed through a lease, the amount of which will be less than or equal to the financial saving made on the energy bill by the owner. This way, the public owner of a building can benefit from the renovation of his building without having to invest himself, while also benefiting from a reduction on his energy bill after the period of reimbursement to ESCO.

Hence, ESCO plays the role of a third-party "public" investor. While ESCO's priority would be the municipalities and other regional authorities, it could also offer its financing services to other private owners of large buildings. Furthermore, ESCO could invest in green electricity production means located in Brussels or elsewhere.

Action 14	**Revise the investment rationale for public housing ("SDRB", "SLRB", Housing Fund, etc.) by incorporating occupation cost rationales**

All future social housing construction and renovation projects will include consideration of reduction of energy consumption (Action 10) and improvement of the quality of life of the residents (thermal comfort, good air quality, etc.). After the adoption of the "COBRACE", these construction or renovation projects related to public investments will be founded on minimisation of the occupation cost. The occupation cost of a building consists of the sum of the amount of rent or reimbursement of the mortgage loan for the building and the amount of the charges resulting from energy consumption relating to use of this building.

By adopting the idea of cost of occupation, public housing companies can pass on all or part of the energy-saving investment in the form of an additional charge to the rent. However, this additional "energy-saving investment" charge must be less than the savings from "energy consumption" charge. Subsequently, by respecting this principle, the cost of occupation of a renovated home will be less than the cost of occupation of the same non-renovated home, which is to the social tenants' advantage. At the same time, the public housing companies have additional tax revenues to finance this housing renovation.

This system is already operational for new passive housing constructions.

Action 15	Integrating part of green energy production into the consumption of newly-built public buildings

The authorities in Brussels are encouraged to gradually integrate a proportion of green energy production into the consumption of newly-built public buildings. Moreover, this measure will be included as part of COBRACE. The Brussels-Capital Region's governmental statement has set a threshold of 30%.

Action 16	Energy accounting service available to municipalities via "NRClick"

Since 2005, Brussels municipalities benefit from an assistance for work linked to the rational use of energy. Since 2008, after the audit of their main buildings, municipalities asked for information regarding energy accounting solutions.

The NRCLICK tool is an energy accounting service made available to each municipality (as far as the municipality ratifies the agreement with Sibelga, the only distribution network operator for electricity and natural gas in Brussels-Capital Region).

In concrete terms, the NRCLICK tool is an energy accounting software with a service which follows-up and analyses energy consumptions of the municipalities' real estate. The software lists first :

- Consumption data (water, gas, electricity, heat, fuel) ;
- Other information (temperature, timetables, etc.) ;
- Billing data.

The software allows furthermore :

- To analyse data ;
- To identify possible problems ;
- To quantify the effects which follow investments or other measures ;
- To compare buildings on similar data (« benchmarking »).

The follow-up and analyse service allows municipalities to monitor easily and in real time building energy consumption so that they may identify the most favourable actions in terms of energy savings.

4.4.1.3 Non-financial incentive

In 2004, practices in Brussels in terms of construction and renovation were characterised by a lack of ambition regarding energy, resulting from the lack of a regional policy. Over a two-year period, numerous information and awareness-raising actions led to the development of an initial energy and climate culture. In 2007, the Brussels-Capital Region launched a major stimulation programme for the construction and renovation of very high energy and environmental performance buildings: the "Exemplary Buildings" call for projects. An energy

subsidy for a new (passive) or renovated (very low energy) building was also set up in 2007 to support the policy.

The first feedback from exemplary buildings shows that a quality labelling system leading to international recognition should now be developed for the Region. To avoid "greenwashing", but especially to perform valid comparisons between the performance of various buildings, establishment of a standard is needed; "sustainable construction" must rely on an objective and complete evaluation system on the basis of which promotion of high performance can be ensured. This is the objective pursued by the "Sustainable Building" quality labelling and certification reference framework which is under development with the two other Regions. Complementary to exemplary buildings, it will allow the good practices of the latter to be extended throughout the construction sector.

Action 17	**Support market development toward construction of buildings with nearly zero-energy consumption thanks to "Exemplary Buildings"**

This "Exemplary Buildings: Energy & Eco-construction" call for projects allows the Region to demonstrate that very high energy and environmental performance in the real estate sector are fully accessible to the market both in technical and economic terms.

There are four requirements to be selected as "exemplary building":

- Energy: the project should seek to minimise needs for primary energy and use of conventional energy sources (fuel oil, gas, electricity), and tend toward a zero-energy building (very high performances with compensation of the balance by renewable energies).
- Eco-construction: the project should include measures to limit the impact of the building on humans and their environment with regard to water management, comfort and health, waste management, materials choice, etc.
- Profitability and reproducibility: existing techniques and innovative solutions should be combined in a project that is ambitious but still accessible from the technical and financial point of view for the Brussels market. Furthermore, solutions should demonstrate profitability.
- Architectural quality and visibility: the visibility of the project, its location in the public space and its architectural quality (especially with regard to living comfort, aesthetics and the well-studied use of materials) are also evaluated.

The objective, which has been achieved, has given rise to the selection of 156 buildings (371.000 m²) with high energy and environmental performance[34] requiring techniques and materials that can be easily generalised and are applicable to any Brussels building. The Region' support is twofold: a financial incentive of 100€/m² and a free technical support from the conception to delivery of the building.

This is thanks to this experiment that the Brussels-Capital Region Government has already planned the application of requirement comparable to the passive standard to all new constructions as of 1st January 2015 (Action 1). We can therefore confirm that since 2007, 250,000 m^2 of new buildings have either already been built, are being built or are planned with passive standards.

This call for projects has had a major ratchet effect on the real estate market and led numerous public and private works contracting authorities to enter the market, even outside the "Exemplary Buildings" project call.

Action 18	**Award a "Sustainable Building" label and certificate**

[34] In "Exemplary Buildings" primary energy needs (heat, lighting, etc.) and environmental impact are reduced to a minimum thanks to, among other things, planning taking account of the site into which the building is incorporated, very high insulation and airtightness of the envelope, double-flow ventilation with heat recovery ensuring the quality of the interior air, energy production from renewable sources (solar panels, photovoltaic panels, ground-coupled heat exchanger, etc.), facilities allowing rational use of water and rainwater management, attention to conservation of natural resources in the choice of ecological materials, and finally attention to the requirements of comfort, health and accessibility of the building.

Development of a system for quality labelling (for small buildings) or certification (for larger buildings) should now be pursued at the Belgian level with a view to international recognition (see also Action 12).

The function of this “Sustainable Building” label will be complementary to that of exemplary buildings (Action 17) and will allow good practices in exemplary construction and renovation with regard to eco-construction to be generalised to the entire Brussels building sector. The label will moreover be tested on the exemplary buildings by incorporating the criteria for this label into them.

Start-up of the system will be financed by the three Regions and should ultimately be self-financing. This recognition will be incorporated into Brussels legislation (“COBRACE”).

4.4.1.4 Financial incentive

The demand for the construction of nearly zero-energy buildings is supported by financial aid for investment (e.g. “energy subsidies”), financial aid for the production of green energy (e.g. “green certificates") and financial aid for the financing of “low- or zero-interest loans". The combination of all these types of financial aid will allow the citizens of Brussels (residential and non-residential) to take advantage of a complete package to make energy-saving investments and/or investments to produce green energy.

In addition, at-risk populations receive special attention in the Brussels-Capital Region.

Action 19	**Pursue and improve support for the investment “energy subsidies”**

Subsidies are allocated for high-performance energy-saving investments and consequently concentrate on the most efficient energy savings in energy and social terms.

Subsidies are grouped into various classes[35]. In addition, since 2011, the amount of the subsidy is modulated depending on household income for work on a building in the residential sector. Income ceilings are also increased depending on the composition of the household.

This policy will also encourage applicants to opt for the actions with the greatest long-term impact on the quality of their living space and reduction of the energy bill. The establishment of a roadmap for the subsidies granted (with possibly a progressive reduction in and discontinuation of some subsidies) will allow market participants to plan their investments in the medium term. Social and environmental criteria will continue to be linked to the grant of subsidies, especially with regard to impact on air (interior and exterior), as, for example, reinforcement of the subsidies for installing a green roof or façade, which among other things improves the micro-climate and the local air quality.

Action 20	**Continuation and general implementation of the financial help “loan with a reduced rate”**

The Region is exploring the possibility of offering pre-financing, a so-called “green loans”, to all Brussels residents in order to stimulate energy renovations of the residential building stock. The loan envisaged would be an instalment loan, the amount of which remains to be determined, for pre-financing energy-saving work; currently the maximum amount of 25,000 Euros is envisaged. The reimbursement period would depend on the time for return on the investment. In addition, depending on the public and its income, the rate could be differentiated:

- the rate would be 0% for a low-income population;
- an "at cost" rate would be set, while remaining advantageous (e.g.: 4.5%) for a business public.

Currently, a “social green loan” with a 0% rate is allocated to low-income population (Action 22)

[35]Studies and audits, walls insulation (including green roofs and exterior sun protection), ventilation, high-performance heating, heat balance, renewable energies, heating network, cogeneration, relighting, frequency controllers, high-performance household appliances (for residential use).

Action 21	Pursuing and reinforcing aid for "green certificate" production

The granting of green certificates has been simplified in order to ensure the profitability of green energy production installations. On average, EUR 20 million worth of green certificates are granted every year.

Action 22	Provide special guidance and financing for at-risk populations

Several actions are being taken to support the at-risk population: energy price setting (social rate), social energy guidance[36], special energy activities, social green loans[37], differentiation of the amount of subsidies, etc. These actions will be constantly reviewed and strengthened so that the greatest number will benefit. The aim of this action is to place everyone in Brussels, both those with a high and a low income, on an equal footing in terms of energy consumption (URE measure) and energy-saving works.

Synergies will also be sought with other actions supporting this target public, especially through the Energy House [*Maison de l'Energie*] (Action 25), which ultimately will coordinate these actions.

With regard to the social green loan in particular, its revision should take into account the new initiatives for support and financing offered by the Region and the federal government.

Action 23	Improve support to the non-residential sectors via the financial incentive policy

Aid in the form of energy subsidies (subsidies for studies and audits, insulation and ventilation, high-performance heating, renewable energies, energetically high-performance investments, etc.) is available for buildings in the tertiary sector and industrial buildings.

Aid for production (green certificates) is also available for the tertiary and industrial sector (cogeneration, solar panels, biomass, etc.).

The Brussels-Capital Region also offers (via aid in promoting economic expansion) investment aid[38] with regard to energy savings, energy production from renewable sources or rational production of energy, intended in

[36]Guidance Sociale Energétique (GSE) [*Social Energy Guidance*] falls within the context of the liberalisation of the electricity and gas markets. GSE is defined very generally as support for the disadvantaged with a view to helping them reduce energy consumption in their residence while preserving their comfort level. Practice and experience are allowing this definition to be refined.
The guidance should guarantee that the occupation cost of housing is as low as possible and that energy renovations go in the direction of a reduction in this overall cost.

[37]Since autumn 2008, the social green loan has offered social and financial support to the most disadvantaged residents of the Brussels region to allow them to make investments with a view to reducing energy bills to a zero rate. The originality of the system lies in releasing the funds in instalments according to the progress in work and the deposits required by the contractor. In fact, contractors often demand a 30% deposit before work is started and customers must have the necessary money to pay them. In practice, the Brussels - Capital Region has concluded a partnership with the alternative credit union CREDAL. The intervention of the Brussels-Capital Region allows not only the interest charge related to the energy loan, but also the costs related to personalised guidance of applicants and the risks of non-recovery of the amounts lent to be covered. The works covered are insulation, high-performance heating and thermal regulation.

[38]Investments related to the building are intended for certain sectors and certain tangible or intangible investment programmes related to one of the areas below:
- Shell of buildings: thermal insulation of buildings existing for more than 5 years, with a view to ensuring better energy efficiency;
- Lighting: renewal of the lighting facilities ensuring energy savings;
- Renewable energies: energy production from non-fossil renewable sources of energy (such as, notably, wind, solar, geothermal, hydroelectric, and biomass energies, landfill gas and gas from wastewater purification plants, biogas, and heat pumps);
- High-quality cogeneration, trigeneration: combined production of heat, electricity and, as the case may be, cooling, that saves energy compared to separate production of the same quantities of heat, electricity and, as the case may be, cooling;
- Boiler and burner: replacement of an existing boiler by an approved condensing boiler, of an existing burner by a two-stage burner or modulating burner;
- Control, measurement: addition or replacement of apparatus for measurement, computerised management, control, regulation intended to provide better energy yield of these facilities;
- Cooling system: passive system, without a cooling machine with a compressor, notably free chilling or free cooling, sun protection, etc.
Certain investments for heat recovery are also eligible, such as recovery or recycling of the heat produced by production facilities.

particular for industrial enterprises. Aid is granted to support companies in reducing costs and consequently support studies, training, recruitment or investments.

Action 24	Encouraging the private sector (tertiary and industrial) to make the most of ESCO

Just like the municipalities and other regional authorities (Action 13), the private sector (tertiary and industrial) doesn't always have the financial means to make energy-saving investments. Banks have become extremely cautious as a result of the financial crisis and, especially now, companies are holding onto their funds to ensure their core business and not to make long-term investments in energy conservation.

However, a third-party investor can take on the burden of a loan of an energy-saving investment for his tertiary or industrial customer. This customer will then reimburse the third-party investor through monthly payments that are less than or equal to his energy bill savings. Thus, the third-party investor recuperates his initial investment and the customer can take advantage of an energy-saving investment without having to invest or take care of the design, realisation or management of this investment. The customer will make 100% savings on the energy bill after the contract with the third-party investor has ended. At best, if the monthly reimbursement is less than the savings on the bill, the customer can already benefit from a reduction on his bill as of year 1.

Despite these advantages, the private sector is still reluctant about choosing the third-party investor (ESCO) option. The Brussels-Capital Region will therefore encourage and accompany office owners and companies to turn to Energy Services Companies (ESCO) in order to consent to energy-saving investments or to renewable energies.

Public authorities have the role of encouraging the ESCOs to issue offers proposing rapid improvements or "quick wins" to building owners wanting to renovate the shell of their buildings and/or make use of energies from renewable sources. Various experiments conducted in other countries, in particular in Germany, demonstrate that public intervention is highly profitable if it involves groups of buildings under a single contract[39].

To aid owners of tertiary buildings in renovating via a third-party investor, the Region intends to designate a company that:

- will aid in launching calls for tenders involving groups of buildings with similar characteristics;
- will aid in drawing up specifications;
- will aid in concluding third-party investor contracts with private ESCOs that finance and carry out work in lots of uniform buildings on the basis of contracts concluded with the owners.

This operator could be the Brussels-based ESCO (Action 13). If the Brussels-based ESCO performs this support mission, it obviously won't be able to meet the requirements it has compiled.

4.4.1.5 Communication & accompaniment

The foregoing support activities, which have proven their efficacy, should be extended and encouraged. The creation of a new local service, the Maison de l'Energie [*Energy House*], allows the information given to be standardised and better access to be provided to the services offered. In fact, until recently, the public had access to a number of organisations in the Region to answer their questions with regard to energy and eco-construction; however, the disparity in the services offered made access to information difficult and so hindered the public in their projects for environmentally-aware renovation or construction.

Moreover, non-residential buildings constitute an important reservoir of energy savings. Both for the scale effects and for improved resilience of the Brussels economic fabric in the face of rapid rises in energy prices, special attention is devoted to them.

[39] For example, the Berlin Energy Agency allows owners of tertiary buildings to participate in renovation complexes. These complexes are made up of a certain number of buildings according to the type of construction and the extent of the feasible savings. The Agency then launches bids for tenders for energy renovation of each complex of buildings and manages the entire project, down to signature of the contract. The ESCOs benefit from this, as transaction costs are minimised.

Action 25	**Establish a technical, financial and administrative support service involving Rational Use of Energy (RUE) and eco-construction for households**

The Government of the Brussels-Capital Region has set up the Energy House ("La maison de l'Energie") which brings together 6 local branches. This service is addressed to both owners and tenants. It targets all the social categories and aims to contribute to and accelerate the change in behaviour of households in their relation to energy and eco-construction, in order to allow them to improve the environmental quality of their residence and reduce their energy consumption significantly.

The key to this project lies in the accessibility of the services at the local level and the pro-active nature of the actions developed in order to be able to reach the entire Brussels public. These are local structures autonomously managed with an information desk that constitutes the entryway to several services offered:

- support for households in their relation with providers of gas and electricity;
- home visits to carry out a simplified energy diagnosis of the residence that will result in identification and technical/financial evaluation of the investments to be made;
- personalised advice for improving energy consumption habits;
- immediate performance of small procedures allowing quick energy savings;
- support in ordering and supervising simple renovation work;
- support in assembling the administrative files necessary for access to existing public assistance;
- preparation of the technical/financial files for households with a view to a request that credit be granted and constitution of credit files (technical, financial and social information).

The Energy House will also pay special attention to concern for the quality of interior air. In fact, as an intermediary for the various existing thematic support structures, this structure seems the best placed to resolve any conflicts between energy savings and certain emissions harmful to air quality and health, taking account of the specific features of the building in question.

The missions of the House will be progressively expanded: they will include specific actions for the occupants of housing with especially high-performance systems (i.e. buildings with nearly zero-energy consumption) so that new techniques are correctly incorporated and used; they will also include more complete support for use of energies from renewable sources, etc.

This action is similar to action 24 but focus on the residential sector.

Action 26	**Communicate on and raise awareness of housing with nearly zero-energy consumption through actions and events on a Region-wide scale**

Beyond local actions, actions to communicate and raise awareness will be available to all Brussels residents. Communication will be reoriented toward raising awareness of new techniques for particularly high-performance housing in terms of energy and the importance of ensuring the high quality of interior air. Sustainable construction materials and use of renewable energies will also be highlighted. There is a great variety of means of communication: brochures, seminars, fairs, communication campaigns, site visits, open-door days, etc.

Action 27	**Supporting households to reduce energy consumption (use) in nearly zero-energy homes**

The public are encouraged to change their behaviour in terms of energy management thanks to the "Energy Challenge". Launched in 2005, this challenges any resident, tenant or owner to learn to change his behaviour (without an investment) both at home and in travelling to consume less energy and emit less CO2. The way the

Challenge works is simple: those interested send their energy consumption data to the IBGE and in return receive personalised advice on reducing consumption. For households that have measured the change in their consumption, savings amount to 18% on average, which represents an annual average savings of 380 € per household, as well as one tonne less of CO2.

A "passive housing ambassador" service will be set up to support households who live in passive or even zero energy consumption accommodation to adopt the appropriate actions so that actual consumption is equal to or less than the calculated theoretical consumption.

Action 28	Develop a proactive support service for non-residential buildings

The Region offers a series of free advisory services by means of Facilitators. Facilitators are energy specialists recognised for their expertise resulting from implementation of numerous projects both in Brussels and outside the country. Their mission is to guide contracting clients and building managers independently and impartially with regard to control of energy consumption, RUE and promotion of energies from renewable sources at any stage of advancement of a project.

In order to genuinely support in-depth renovation of non-residential buildings, the Brussels-Capital Region intends to improve this Facilitator service to make it more proactive.

Action 29	Communicate on and raise awareness of non-residential buildings with nearly zero-energy consumption

The already-existing tools and instruments (exemplary buildings, "PLAGE", sustainable building certificate, etc.) for non-residential buildings will be promoted in a cross-disciplinary way. There is a great variety of means of communication: brochures, seminars, fairs, communication campaigns, site visits, open-door days, etc.

4.4.2 Supply

The purpose of this second theme is to ensure a high-quality offer on the market in order to fulfil this new demand for buildings with nearly zero-energy consumption.

Several actions have arisen in the preceding years, such as development of specific training or support to professionals for sustainable construction (notably with the Exemplary Buildings call for projects).

Now it is a matter of, on the one hand, uniting participants and good practices to assist them in continuing the change, and on the other hand allowing a complete transition of the entire construction sector to construction of buildings with nearly zero-energy consumption.

This is why the Brussels-Capital Region wants to convert construction and renovation of buildings and reduction in energy consumption into job opportunities. To do this, the first focus of the Employment-Environment Alliance on Sustainable Construction has been implemented after a development phase of more than a year that involved over 100 participants, both public and private.

Innovation, from the point of view of both research and practical application, should also continue to be stimulated. Consequently, facilitating access to financing for innovative businesses is also fundamental.

4.4.2.1 Policy

Investments in the building sector are often significant and can be less effective or even counterproductive if execution of the work is not up to standard. This is all the more important for buildings with nearly zero or very low energy consumption in which correct functioning depends on all the techniques used.

Action 30	Guarantee the quality of the procedure via an accreditation and recognition system for sustainable building professionals

Accreditation allows the quality of work to be monitored. Once granted, it can still be withdrawn.

There is accreditation when the action is legally required (EPB, energy audit in the environmental permit, etc.). Brussels legislation, via the "COBRACE"[40], provides for five classes of accreditations; in the EPB, for production of energy from renewable sources[41], involving the "PLAGE" programme, for the energy audit and for the "Sustainable Building" reference framework.

When professional intervention is not legally required, but financed partially by public money (for example in the energy advice procedure), the professional will have official recognition (aside from the protected trades) obtained via adequate training.

The Government will assess the opportunity to develop - or expand - the list of accredited or recognised professionals depending on the market response and the new techniques available.

4.4.2.2 Training

Sustainable building techniques are developing rapidly. It is consequently essential to ensure at the same time an ongoing training offering and incentives for a change, on a large scale, to more sustainable practices.

Moreover, the trades in the sector of sustainable renovation of buildings are a source of valuable jobs for Brussels job seekers and/or unskilled workers.

Action 31	**Ensure an adequate training offering for professionals in sustainable building from design to implementation**

It is necessary to ensure that there is a correspondence –in quality and in quantity- between the training offered by the market and the ambitions of the Region with regard to sustainable buildings that tend toward the standards of nearly zero-energy consumption. Consequently, the market for training in sustainable building is supported, depending on promotional needs and the demands of the sector both in terms of content and target public (decision-makers or building trades). Attention is constantly given to guaranteeing that professionals are up to date faced with constantly evolving techniques.

Seminars, colloquia, informative visits and training (regulatory and voluntary) are organised on themes of sustainable building, energy, the EPB, etc for the attention of sustainable buildings sector professional. The training is in cycles (for example, a "sustainable building" training cycle) including several sessions taking place over several months and resulting in a certificate after all the sessions have been attended. They are addressed to a restricted public, specialised and wanting to acquire more advanced knowledge in the technical field in question. As an illustration, with regard to production of energy from renewable sources, decision-makers and building designers are trained in the design and incorporation of high-performance systems into new and renovated buildings.

With regard to required training, up to the present over 1500 authorised heating technicians have been trained; over 1000 residential certifiers, and finally, over 700 EPB advisors have also been trained. On average, 250 EPB advisors are trained each year, with 40 hours of training per person. Since the entry into effect of the

[40] Art.2.5.1 The Government can require the following persons to have accreditation:
1° the EPB advisor;
2° the certifiers cited in Articles 2.2.13 and 2.2.19 ;
3° the technician;
4° the inspector;
5° the auditor;
6° the Energy Manager;
7° the "PLAGE" auditor;
8° the installer of RES R facilities;
The Government can require other professionals to have accreditation in implementation of Article 2.2.17.
In practice, accreditations 1,2,3,4 are related to the EPB, accreditation 8 is related to renewables (they all follow from European directives; accreditation 5 is related to the future energy services directive, accreditations 6, 7 are related to the "PLAGE" (specific Brussels feature).

[41] In accordance with the provisions of Directive 2009/EC/28, the Brussels-Capital Region is implementing a certification/accreditation procedure for installers of residential renewable energy production systems before 31 December 2012. This accreditation remains voluntary at present.

regulations on residential certification in May 2011 (Action 2), over 1000 certifiers have been trained, with 40 hours of training per person, which totals 40,000 hours of training.

As for excellence training (i.e. the "sustainable building" cycle; themes relating to energy, materials, construction waste, etc.) they represent 18,882 man-hours of training* in 2012 and 15,251 man-hours of training* in 2011.

Action 32	**Employment-Environment Alliance: collaborate with the competent authorities to improve teaching in construction**

The first "sustainable construction" focus of the Employment-Environment Alliance aims on the one hand to develop an offering of local businesses in the construction sector capable of responding to the challenge of the new energy ambitions for buildings, and on the other hand to adapt the training offering (continuing training, qualifying training, integration of the unemployed through work) so as to have workers also trained in these new challenges.
This first focus of the Employment-Environment Alliance consists of developing a multi-sectorial pact between public authorities, companies, social partners and those involved in the sector so as to enable Brussels businesses to take advantage of this growth and to realise the significant potential for jobs, including those for the less-qualified, in this sector.

Identification of the recognised needs of businesses and/or the job market remains the *sine qua non* condition for development/creation/improvement of a training offering. Coordination of the "oversight" function is thus essential. The Reference Centre (*Centre de Référence, CDR*) carries out this function by centralising information/indicators and relaying them to the companies in the network for possible use.

After a transition phase, training in sustainable building construction and renovation will be provided by the schools. Training will be adjusted in collaboration with the French Community and the Flemish Community:

- continuing course development, notably the content of training and access to the Energy CTA[42];
- student course content, to be suited to market needs;
- teaching tools;
- promotion of sustainable construction trades (notably in collaboration with the private sector).

[42] Centre technologie Avancée [*Advanced Technology Centre*]

4.4.2.3 *Quality framework*

The issue of quality for sustainable building professionals has already been partially dealt with in the regulations portion (Action 30) on implementation of an accreditation and recognition system.

Aside from the regulatory aspect, quality will also be supported by provision of a whole series of appropriate tools.

Action 33	Develop and consolidate the technical reference and the tools available to professionals in sustainable building

Before 2004, when a designer or decision-maker wanted to set up a sustainable building project, they had few tools (books, references, case studies, specification sheets, standard clauses, training, etc.) to achieve their objective. In addition, the definition of a sustainable building – what is and what isn't one – wasn't always universally recognised, which led to several projects that were close to "greenwashing"...

That is why a large number of tools, training courses and services have been developed in order to fulfil the need for awareness and training of sustainable building professionals. Practical and evolving tools such as the practical guide to sustainable building and the quality labelling and certification system (Action 12) will continue to be updated and promoted. A friendly-user computer version of the handbook "Sustainable Building" is underway.

The energy and eco-construction content will be more and more interwoven with each other and new content will be developed, in particular involving technical details of design and performance of work. More specifically, standards for designing facilities for energy production from renewable sources and methods for profitability calculations will be developed to specify the facility corresponding to an economic optimum as a function of the technical characteristics of the building. Harmonisation of the methods for design and profitability calculations will allow the quality of facilities producing energy from renewable sources to be assessed objectively.

To simplify access to information, standard specifications and tools to aid in decision-making will be developed. Special attention will be paid to transmission of this information to very small companies and SMEs.

Finally, to generalise these achievements, the Region will pursue its policy of openness and partnership with the French and Flemish Communities, the construction sector and its reference and training centres (Action 32) so as to ensure development and then dissemination of technical guides and training tools to the various target publics.

4.4.2.4 *Support to business development*

The Employment-Environment Alliance (Action 32) is now providing increasing momentum for the first successful experiments. The aid of the Brussels Enterprise Agency ("ABE"), in its role of support to businesses in carrying out their development plans in the Region, will continue to be essential, thanks in particular to the ECO-BUILD Cluster.

Action 34	Facilitate the creation of - or the transition toward – businesses active in sustainable construction and offer them support structures

The Employment-Environment Alliance (Action 32) constitutes an important support in creation and transition of construction enterprises toward the sustainable construction sector, and in particular toward the sector of construction of buildings with nearly zero-energy consumption.

In the framework of this Alliance, a whole series of business needs has been identified (knowledge of and competence in the techniques and materials of sustainable construction, a vision of the market, the

competition, and the actual risks, worker training, selling, etc.). Specific and expanded actions fulfilling these needs have then been formulated on the basis of the budgetary and human resources available according to the priority of the measures set by the Government. For example, public authorities and those involved can support businesses in their sales approaches, notably by the introduction of special clauses in public contracts or by providing them with sales arguments intended for contracting clients.

Aside from the Employment-Environment Alliance, support for the creation of innovative businesses will be pursued in particular in the canal zone of the Region listed in the "FEDER" Structural Fund programme 2007-2013. The Greenbizz incubator is a good example. It aims to support the environmental economics sector in urban surroundings (an important aspect of the EPB) and takes advantage of the creation of new companies in this booming sector to offer jobs to a less-skilled workforce. This involves a host structure (personnel and buildings) that supports businesses in terms of logistics and the search for financing. This project is steered by the "SDRB" in partnership with the Brussels Enterprise Agency ("ABE"), Brussels Environment – IBGE and the Scientific and Technical Centre for construction. After evaluation, new spin-off business incubators resulting from research findings will be developed. Establishment of a management canopy for the incubators will also be studied.

Finally, businesses already active in sustainable construction are supported by the ECO-BUILD cluster. This cluster has the purpose of structuring and forming a network in the eco-construction sector with high potential for growth and creation of jobs. This platform favours synergies between the various parties in the sector; it increases the capacity for innovation and job creation through a series of individual and collective advantages. The cluster will continue to be supported.

4.4.2.5 Innovation

The environmental challenges and employment rates with which the Brussels-Capital Region is faced require significant coordinated mobilisation of regional authorities, the public and business. Both fundamental and applied research will be encouraged from the points of view of the exact sciences and the social sciences, especially in regard to behavioural changes.

Action 35	**Finance applied research in the area of sustainable buildings, in particular with regard to the flexibility and adaptability of the buildings and the reuse of construction materials**

Various energy-related initiatives will be supported. These initiatives will involve technical themes like cogeneration, intelligent technologies (electrical network, sustainable materials, energies from renewable sources in the urban environment[43], etc.), and non-technical themes like flexibility and adaptability of buildings and behavioural changes by business and individuals. The innovative materials and techniques on the market are essentially oriented toward new buildings. Consequently, applied research in Brussels will be essentially oriented toward adaptation of these materials and techniques to the issue of urban renovation.

Through promotion and support of pilot and innovative projects specifically adapted to the Brussels context, the Region will encourage development of activities in the public and private research centres of the Region active in the sustainable building sector. Aside from development of a Brussels skills cluster, this dynamism is capable of generating jobs and added value that is "exportable" outside the Region. In particular, the Region is forming a network of the various research centres and stimulating exchanges and sharing of research results.

Action 36	**Allow the concrete application of research results in sustainable building**

[43]Examples of applied research necessary for energies from renewable sources are improvement of the yields of solar panels and heat pumps or research on micro-wind turbines.

The SOIB, “Spin Off in Brussels”, programme aims to transpose results from scientific research into specific applications with a view to creation of new businesses in the Brussels-Capital Region. The programme is addressed to both academic spin-offs (universities and colleges) and industrial spin-offs (businesses and research centres). The projects introduced in the framework of this action aim to economically develop research results, mainly by development of a marketable product, process or service. Each project must imperatively result in creation of a business located in the Brussels-Capital Region. The possibility of including sustainable construction in the strategic foci of this programme is being explored.

Projects linking research, business creation and creation of jobs will be pursued. This involves in particular the Emovo and Greenbizz projects and calls for projects of the "technological innovation partnership" type, as well as work in collaboration with the European, federal, regional and community levels.

4.4.3 Monitoring (control & improvement)

It is essential to monitor the proper development of the policies underway, penalise any deviations, communicate the results and propose the necessary actions for improvement.

Implementation of the measures will be supervised, both from the operational point of view and in terms of impacts. The feedback will be used and the exemplary role of the public authorities will be the subject of an extensive and transparent communication.

Action 37	Monitoring thanks to the Brussels-Capital Region's energy balance

The Brussels-Capital Region has had an energy balance since 1990. The regional energy balance describes the amounts of energy that are imported, produced, transformed and consumed in the Region over a given year. This annual data is put into a table with twelve entries with the amounts consumed per energy vector (oil, natural gas, electricity, coal, butane or propane, wood, etc.) in columns, and the consumer categories (industry, residential, tertiary, transport) in rows.

The energy balance is established on the basis of consumption inventories provided by the energy suppliers, the professional gas and electricity federations and according to surveys carried out among end-customers such as large companies in Brussels.

By drawing up these balances, it is possible to follow the evolution of energy consumption in the different sectors of activity. This information is useful for setting the priorities of the regional energy policy.

Action 38	Every second year, publish a report on the sustainable management of the buildings of the Brussels public authorities

Several actions involving buildings held or occupied by the regional public authorities exist, among them the “PLAGE” mechanism (Action 5) aiming to improve energy management in large holdings of public buildings. It is important to analyse these actions and report the results via a biennial report to the public and the European bodies attentive to the exemplary role of the public authorities[44].

It is henceforth mandatory to display the energy consumption of all existing public buildings[45] in the Region (Action 9). This process allows an energy cadastre of the regional buildings to be built up at the same time.

[44]Directive 2006/32/EC on energy services states in article 5, paragraph 1:
“Member States ensure that the public sector plays an exemplary role in the framework of this directive. To this end, they specifically inform the public and/or business, as the case may be, of the role as an example and the actions of the public sector.”

[45]The PEB Ordinance makes establishment of an energy certificate mandatory (see Measure 1).
The information included in the certificate is:
- The level of energy performance, listed on a colour scale from A to G;
- total consumption costs;
- the variation of consumption over the last three years;
- CO2 emissions;
- the principal recommendations with regard to investment, management and occupation of the building related to energy performance.

Public posting of the energy certificates of pubic buildings in the Region is designed to raise public awareness [37]. It also stimulates managers and users of buildings to reduce their consumption.

Analysis of these data will allow the efficacy of the energy saving policies of the public authorities in the Region to be verified, simplify communication within the administration and to the public, allow the best prices for energy provision in the Region to be negotiated by including environmental clauses (minimum percentage of green energy, etc.) and finally, will allow group purchases to be made, for example of facilities for energy production from renewable sources.

Action 39	Establish a collection of data on the quality of the building stock

It is essential to follow the variation in the rate of building renovation, through in particular the data obtained notably via EPB certificates, the work of the Energy House, via the database on exemplary buildings monitoring or via green energy production facilities monitoring.

This evaluation will be made either on all the certificates issued or on a representative sample. Currently all the data are being collected and centralised. This tool should be complementary to the Brussels housing atlas.

Action 40	Monitor proper implementation of the regulatory and incentive actions and, if necessary, sanction

For the various actions, a system of penalties is planned; for example, for “PLAGEs” (Action 5), fines are planned in the event of non-observance of legislation, or, with regard to subsidies, the penalty is the withdrawal of subsidies.

With regard to the EPB, there are two types of penalties: withdrawal of approval from professionals (see Action 30) who do not observe the rules imposed by legislation (notably based on the control of their work quality), and issuing fines to consumers who have not complied with regulation.

4.5 *Actions & measures Walloon Region*

4.5.1 Demand

4.5.1.1 Regulations on the Energy Performance of Buildings (★)

Directive 2002/91/EC aims at improving the energy efficiency of buildings in the Member States.
In Wallonia, the 2002 EPB Directive has been transposed into the CWATUPE regulations and into legislation on the environment: Framework Decree dated 19/04/2007, WGD dated 17/04/2008 and 18/06/2009, WGD dated 12/07/2007.

The introduction of gradual requirements. The initial phase commenced on 1st September 2008, with phase two coming into effect on 1st May 2010 (see chapter 3).

The EPB requirements have already been tightened twice (on 01/09/2011 and 01/06/2012) and will continue to be so more and more in the future, aimed at achieving the NZEB target by 2020 (see chapter 2).

The introduction of energy performance certificates in the event of a building being sold or leased enables the energy quality of buildings to be displayed.
The certificates feature a performance scale that incorporates the equivalent passive level, as well as the NZEB level. This enables the certified building to be positioned in relation to these references.

4.5.1.2 Example set by public bodies

Controlling energy is a major issue at the centre of the concerns of all local authorities in Wallonia, as well as the Regional authorities themselves in terms of their own premises. As a result, each official body is developing policies on energy management aimed at reducing their consumption of energy and developing the production of energy from renewable sources.

Action taken by the Region in relation to its own premises:

The "SPW Sustainable Development Plan" (SPW = Service public de Wallonie, Wallonia Public Service) is the practical expression of the SPW's desire to go down the path of exemplary administration, being more eco-responsible and more sustainable. The plan was approved by the Strategic Committee at the end of 2011 as part of the Walloon Government's "Plan Marshall 2.vert". Among other targets and objectives, it includes reducing the consumption of energy, supplies and paper, rationalising travel, reducing the quantity of waste produced and reinforcing the policy on making sustainable purchases by inserting environmental, social and ethical clauses in public procurement contracts.

Already many practical and structural programmes have been implemented in buildings owned by Wallonia. These programmes cover both the improvement of energy performance in these buildings, as well as their ability to produce their own green electricity.

- At the locations occupied by Wallonia under various statutes, Wallonia Public Service (DGT2) has conducted an energy audit of its main administrative buildings, whether by size (area >1000 m²) or by increased visibility (e.g. ministerial offices) and over which Wallonia holds a genuine right. 240,000 m² of office space has been audited in this way, subsequently enabling the observations and recommendations of the auditors to be examined in relation to the specific consumption of each of these buildings, both for heat and electricity.

  This process has enabled the investments required to upgrade the energy performance of these assets to be identified and prioritised – an operation that will enable Wallonia's administrative buildings to be kept energy-efficient while achieving structural energy savings for the benefit of the regional budget.

  By doing this, Wallonia intends to ensure the preservation of regional assets that are energy-efficient and responsibly maintained. That way, the Region will be able to deal effectively with its present and future institutional obligations.

- In addition, the Property Management Department has embarked on a broad-based investment programme that will enable it to have a fairly significant capability to produce green electricity at its disposal.

To date, this capability is 1,189,000 KWh, of which 1,063,000 KWh is produced by quality cogeneration, with the balance generated by photovoltaic panels installed on the various roofs of the SPW.

Other similar investments are already scheduled over the coming months and years, which will further strengthen the Walloon Government's autonomy in energy.

As for the revenues produced from selling the Green Certificates generated by these installations, this money is now deposited in a specific fund set up as part of the budget for Wallonia. Over the years, this fund will enable the Region to strengthen the budgetary capacity of the various departments to invest in energy upgrades to their assets.

- The SPW's Operating Directorate for Roads and Buildings (DGO1) has also begun the following processes in regard to its buildings:

  ⇒ In 2012, continuation and finalisation of the energy audit commenced internally in 2009,

  ⇒ The development of an energy strategy for industrial buildings, in conjunction with the working group for "Energy and Environmental Impacts", operating as part of the "Sustainable Development Plan".

  This has enabled a start to be made to the initial programmes aimed at:
  - Implementing water-savings (artesian wells, rainwater recovery tanks, etc.),
  - The feasibility study for installing photovoltaic panels,
  - Monitoring the adjustment of heating boilers and valves,
  - Publication of a good practices guide** to be used by local managers in order to reduce consumption for a range of items

- Finally, it is important to emphasise the aim that Wallonia has set itself: when the Region embarks on new leases or decides to participate in property investments in conjunction with third parties, its participation in any project is subject to a process aimed at achieving the highest energy quality. In the same way, when Wallonia becomes involved in the construction of new administrative buildings, it has set itself energy targets with similar aims (K35 & Ew 60).

All of these measures are enabling Walloon Region to make an active contribution to preserving the planet, while also making budget savings over time by trimming the size of the energy burden covered by its budgets.

Action by local entities (mainly local boroughs):

Wallonia's boroughs are involved directly in a range of programmes aimed at controlling energy and producing power locally from renewable sources. This being the case, the main difficulty remains advancing the money needed to invest in these programmes. Not all boroughs are able to do so.

The Walloon Government distributes an energy newsletter to borough secretaries, the secretaries of public social assistance centres and local authority representatives. As part of the 'eComptes' plan, a pilot project to monitor and audit the energy spending of buildings has been developed in the borough of Estaimpuis with the support of the Region. The plan is to roll out this application to other local authorities, making appropriate adjustments. As a result, the eComptes application could be adapted to include a reporting feature to analyse energy spending and help supply the Region's statistical resources.

With a view to reaching some of the interim targets set for public buildings, the Walloon Government is scheduled to include minimum obligations in the Regional Policy Statement that buildings will have to meet in order to be able to benefit from regional subsidies:
- obligations regarding energy performance,
- obligations regarding the use of project managers who can demonstrate that they are trained in this area and capable of presenting references,
- requirements to conduct thermographic and other inspections subsequently,
- obtaining energy performance labels, etc.

A call for projects could also be launched to local boroughs aimed at producing benchmark buildings quickly: town halls, technical buildings, fire stations, holiday homes, etc., mainly new-build, to take account of the 2018 and 2020 deadlines.

The Union des Villes et Communes Wallonnes (Union of Walloon Towns and Boroughs) acts as the point of contact between the Walloon Region and local boroughs. It is also a unifying body for the various programmes undertaken locally in various Walloon boroughs.

As part of its work, the UVCW has used regional funding to create an Energy Unit. This unit is available for boroughs that wish to use it, providing them with assistance and specialist advice on the energy performance of buildings, the rational use of energy and the production of renewable energy. In order to contribute to the dissemination of "good energy practices" to its members, the UVCW has also developed an "energy space" at its website.

Among the various projects being conducted currently by boroughs in Wallonia, we should mention the following, which are also supported by the Region:

- the POLLEC campaign (standing for POLitique Locale Energie Climat – *Local Policy on Energy and Climate*) coordinated by the APERe. POLLEC aims to encourage boroughs in Wallonia to sign the Covenant of Mayors (a movement that until recently few towns and boroughs in Wallonia had signed up to: by 2010, only Liège and Sivry-Rance had done so) by providing financial support implementing a CO_2 inventory and an action plan on Energy and Climate.
- the promotion of sample projects implemented by certain boroughs, such as the 240 solar panels (PV + thermal) on the council buildings in Mouscron, or the new heating system at the council offices in Fleurus using the biomethanisation of effluent from livestock and plant waste, linked to a cogeneration unit supplying a heat network.
- the signing by some boroughs of the "Commune Energ-éthique" charter under which they commit themselves to the active promotion of RUE at a council level through the support of an Energy Adviser made available to boroughs by the Walloon Government and whose mission is threefold: 1) to improve knowledge and control over consumption in council buildings (energy register + prioritised actions plans); 2) to make local residents aware regularly of the rational use of energy (the technologies and aid available); and 3) to ensure that town planning standards are complied with in terms of energy and more particularly the application of EPB (see below under paragraph 3.1).
- The "Borough Championships for Renewal Energies" (part of the European "RES League" – www.res-league.eu). After registering, boroughs were given a number of months to draw up an assessment of their energy policy, boost their actions on energy and obtain the support of local residents. The borough that put together the most points won the championship. Points were scored based on 1) the renewable energy installations in place within the borough boundaries; 2) past and future campaigns run on sustainable energy; 3) support from borough residents. 67 boroughs took part (i.e. 11.5% of boroughs in Wallonia), with 9 winners and 8 special awards. The biggest benefit gained from the championships, apart from practical commitments made to renewable energy, was the networking and exchange of experiences. Following on from the success of the championships, another round is being planned for 2013.
- participation in various European projects aimed at promoting energy efficiency and sustainability, such as European Renewable Energy Week, the ENGAGE, campaign etc.
- encouragement to introduce a "Borough Energy Assessment" system, supported by the Wallonia Public Service, aimed at supporting local action and consolidating it at a regional level.

In addition to these borough-based programmes, some inter-municipal organisations responsible for managing business parks are setting an example by building infrastructures with a high level of environmental quality, as well as by investing in the waste recycling sector. Particularly worthy of mention are:

- The province of Luxembourg, which also supports diversification to wood-fuelled energy in local sawmills and the creation of cogeneration units.
- EPB in the province of Namur, with the development of Ecolys zoning
- In the province of Brabant, Nivelinvest has invested in a very low-energy building in Louvain-la-Neuve

Action in schools:

The issue of the energy performance of buildings has been around in the world of schools for a few years now, even though this awareness has encountered many obstacles. Indeed, given the moderate age of schools, many of which date back to the 1950s and 1960s, the authorities have been giving priority to "health and safety" investments. This is very understandable and a legitimate concern, but it has put investments in energy efficiency on the back burner. However, in the medium term, it should be the other way round, given the increasingly short recurrence periods of these types of work. But of course, the short-term injection of funds, big or small, creates a

problem for cash-strapped authorities that should not be underestimated. Energy awareness has taken a number of different forms:

- The various RUEPB programmes have enabled many schools to make energy-related investments.
- New buildings that are increasingly energy-efficient: for example by opting to build a passive building and making it part of their teaching projects, some schools are banking on making their pupils (and indirectly those around them) active eco-citizens. The examples also show us how valuable it is to mix school projects with building projects. In other words to take advantage of what's right there in front of us and give it some sense! It's a way of making children accountable and of rallying the community and the various parties involved from the school round a shared project.

One example in Wallonia is the Collège du Biéreau in Louvain-La-Neuve. This 1500 m³ building over 3 levels was opened at the beginning of the school year in late 2010. The building's technical features include mixed construction, with blocks for the internal walls and a concrete floor slab, a timber-framed envelope 30 cm thick for the outer walls and 60 cm for the roof, which are heavily insulated with cellulose flakes. The building makes the most of the sun, with thermal solar panels and air-to-soil heat exchangers to regulate the inside air temperature. Priority is given to natural light. Over time, the investment here should generate savings of 90% compared with the energy needs of an equivalent conventional building. The return-on-investment period is estimated at 12 years.

Another example in a school is the building at the Institut Provincial de Formation Continuée in Nivelles, opened in 2008. Technical features include an 80-metre air-to-soil heat exchanger and dual-flow, mechanically controlled ventilation. The walls are also made from timber with cellulose-based insulation. The floors are insulated with 15 cm of polyurethane, while the roof has 21 cm of polyurethane as insulation.

The School Building Fund run by the Wallonia-Brussels Federation and the office of the Minister responsible for school buildings are currently developing a set of specifications aimed at building five primary schools offering high environmental and energy efficiency, which will be used as models for future school buildings.
This being the case, the main difficulty remains finding the money required to make the investment. Not all schools are able to do so.

The German-speaking Community is running a pilot project based on a public-private partnership for building and upgrading a number of schools:

- Royal High School Eupen (KAE): renovation of the college, including a media library, as well as the construction of a new primary school and a sports hall;
- Institut Robert Schumann (RSI) in Eupen: refurbishment of the existing property (main building), construction of a new building containing workshops, as well as the construction of a new complex of buildings for the Zentrum für Aus- und Weiterbildung des Mittelstandes in Eupen (ZAWM) and the Arbeitsamt;
- Institut der Deutschsprachigen Gemeinschaft für Sonderunterricht in Eupen (IDGS): renovation of the main building and reconstruction of other buildings;
- Autonome Hochschule der DG (AHDG) in Eupen: reconstruction of a complex of buildings on the land at 57 Monschauer Straße, to combine the two specialist departments at AHDG.

The total area of these building projects is 64,000 m², of which 46,200 m² is for new buildings and the remainder for refurbishments.
The Building Principal is paying particular attention to the energy performance of all of the new-build or refurbished buildings. As a result, the new classrooms will achieve "passive" status, with the workshops and sports halls classified as "low-energy" and the refurbished buildings given energy upgrades. As part of the 25-year maintenance contract, the group has also been required to give a financial guarantee as to energy consumption at the schools.
The building/renovation work began in July 2011 and the handover of the final building is scheduled for the end of 2013.

4.5.1.3 Non-financial incentives

4.5.1.3.1 Quality labels/certification

Passive building certification[46] (★)

The Walloon Region subsidises the Passive House Platform (PMP), which is designed to encourage buildings with very low energy requirements, based on the concept of the passive house. The PMP provides advice, information, certification and awareness to all of the parties involved in the building process – private individuals and professionals. As the benchmark player in the energy performance of buildings, the PMP also invests its expertise in research and development.

Reference system for sustainable building[47]

The main aim of this system is to use objective criteria to identify buildings that present genuine environmental and energy-related advances – including in terms of health, comfort and social aspects – compared with other buildings whose sustainability is limited to a marketing pretext.

All three Regions in Belgium have decided to work together to develop a reference system that will enable this aim to be achieved.

The main aims of the system being envisaged are:

- to unite it in all 3 Regions to meet the sector's needs;
- to make it financially accessible for all projects, regardless of their size by being financially more affordable for major projects than the benchmarks currently available on the Belgian market;
- to gear its level of ambition and hence its degree of accuracy to match those for both very good buildings as well as for buildings with a lesser degree of performance;
- for it to be used as a management tool in the various stages of the construction process.

The system will operate on a phase-by-phase basis. This will make it possible to sustain improvements to the building from the outset, as well as to take into account each of the initiatives aimed at enhancing the sustainability of the project, regardless of when they are envisaged or implemented:

- At the time the location is selected
- When the first sketches are made
- When the planning application is lodged
- Once the full set of drawings has been produced
- During the works,
- On provisional/final handover of the building
- When assessment in operating mode is the subject of future developments.

Certification is granted mainly for buildings in excess of 1000 m², while the system of awarding labels, which is less exacting than certification, is for buildings of less than 1000 m².

A 3rd tool, self-assessment, will be developed to enable everyone to check the relevance and value of registering their building as part of a certification/label process. These details will then be available to view free of charge online consultable.

4.5.1.4 Financial incentives

4.5.1.4.1 Energy Bonuses for private individuals

A large number of bonuses are available in Wallonia to provide private individuals with an incentive and encourage them to:

- build new buildings that are energy-efficient. (★)
- install efficient equipment. (★)
- improve the energy performance of existing buildings.

[46] www.maisonpassive.be
[47] http://www.ref-b.be

	NATURE OF WORKS	CRITERIA	ALLOCATION
ISOLATION	Insulation of the roof of a building by the applicant	The insulation material installed must have an R thermal resistance rating equal to or higher than 3.5 m_2 K/W.	Any building for which the planning application was lodged **prior to** 1st December 1996
	Insulation of the roof of a building by a tradesman		
	Insulation of the walls of a building	The bonus is only granted once an energy audit has been conducted confirming the value of insulating the walls. The insulation material must have an R coefficient rating equal to or higher than: a) 1.5 m2 K/W for insulating walls from the inside b) 1.5 m2 K/W for insulating cavity walls by filling the cavity c) 2 m2 K/W for insulating walls from the outside of the existing wall	
	Insulation of the floor of a building by the applicant	The bonus is only granted once an energy audit has been conducted confirming the relevance of insulating the floors. The R coefficient of the insulation material must be equal to or higher than: a) 2 m2 K/W for insulation "from the basement" b) 1.5 m_2 K/W for insulation "on the slab"	
	Insulation of the floor of a building by a tradesman		
	Double-glazing	The thermal transmission coefficient of the unit frame + glazing (UF) must be equal to or lower than 2 W/m²K	Any dwelling more than 15 years old
NEW DWELLINGS	New dwellings (★)	The single-family house is not equipped with an electric heating system, except for heating the bathroom or shower-room only. The ventilation of the single-family house complies with the regulations in effect on the date of the acknowledgement of the planning application.	Single-family house for which the planning application is **prior to** 1st May 2010
		The ventilation of the single-family house or apartment complies with the regulations in effect on the date of the acknowledgement of the planning application.	Single-family house / apartment for which the planning application is **after** 1st May 2010
	Construction of a passive house (★)	The single-family house must comply with certain conditions on air permeability, ventilation and requirement for heating and cooling.	Single-family house for which the planning application is **after** 1st May 2010
		The single-family house or apartment must comply with certain conditions on air permeability, ventilation, overheating and requirement for heating and cooling.	Single-family house / apartment for which the planning application is **after** 1st May 2010
	Airtightness test (★)	Measuring airtightness must be conducted in line with the rules stated at http://www.epbd.be.	Only applies to single-family houses for which the planning application is **after** 31st December 2009.
EQUI PMF	Installation of a natural gas condensation heating boiler or generator	Installations must be carried out by a registered tradesman. If this tradesman does not have accreditation	For any single-family house or apartment for which the planning application is prior

	NATURE OF WORKS	CRITERIA	ALLOCATION
		for natural gas, the work must be inspected by an organisation accredited to inspect indoor natural gas installations. The boiler must have a minimum partial heat output of 107% compared with the lower calorific value of natural gas.	to 1st May 2010 and for any other building
	Installation of a natural gas water-heater (without pilot light)		For any single-family house or apartment for which the planning application is prior to 1st May 2010 and for any other building
	Installation of heating units generating hot air and radiant heaters		For any type of building
	Installation of a heat pump for domestic water (ECS) (★)	Specifications must be complied with	For any single-family house or apartment for which the planning application is prior to 1st May 2010 and for any other building
	Installation of a heat pump relative to the heating (★)	Specifications must be complied with	For any single-family house or apartment for which the planning application is prior to 1st May 2010 and for any other dwelling
	Installation of a solar water heater - Soltherm (★)	The work must be carried out by an accredited installer. Technical requirements for the panels - The panels must have undergone the tests provided for by standard EN-12975 in accordance with the requirements of the Solar Keymark label or any other equivalent system recognised by the authorities; - The panel must be facing from south to east or west; - For individual installations, the size of the system must allow a minimum solar fraction of 60%. The boiler will be insulated and any calorific losses expressed in kWh per 24 hours will be established in accordance with standard EN12897:2006 Technical requirements linked to the minimum required overall level of performance, presence of the following elements: - a gravimetric or Vortex flowmeter and 2 needle thermometers - an energy meter - a domestic water meter - a temperature probe	For any type of building
	Installation of a micro-cogeneration or cogeneration system (★)	The unit must generate a minimum rate of 10% savings of CO_2 compared with emissions for the separate production of the same quantities of heat and electricity in modern benchmark installations.	For any type of building
	Installation of a biomass heating appliance with automatic supply only (★)	The heating appliance must comply with standard NBN EN 303-5 and have an output calculated in accordance with this standard at 85%	For any type of building

	NATURE OF WORKS	CRITERIA	ALLOCATION
	Installation and connection of a heat network substation		Dwellings
AUDIT	Energy audit	The audit must be conducted by an auditor accredited by the Walloon Region.	Any building for which the planning application is prior to 1st December 1996
	Thermographic audit	The thermographic audit report must mention the possible improvements relating to the building envelope.	For any building
	Installation of a ventilation system with heat recovery (★)	The overall thermal insulation level K of the dwelling must be equal to or lower than 45 or the dwelling must have a "Building with Energy" certificate. The dwelling is not fitted with an electric heating system, except for heating the bathroom or shower-room only. The ventilation will be of the "D controlled mechanical ventilation system" type, with heat recovery via an upstream heat exchanger. The whole of the ventilation system installed must comply with certain requirements.	For any single-family house or apartment for which the planning application is prior to 1st May 2010 and for any other dwelling
	External solar protection (★)	The works relate to the installation, by a registered tradesman, of an external solar protection system, fixed or mobile, such as shutters, blinds or awnings, excluding any glazing, film applied to the glass or plant shading, and designed to protect the windows from the direct sun. The "gtot" factor of the glazing units and solar protection must be equal to or less than 0.3. Solar shades must face between south-east and west and include the south, i.e. from 135° to 270°.	Any single-family house for which the planning application is prior to 1st December 1996

4.5.1.4.2 0% loan - Ecopack

As part of the Employment Environment Alliance adopted by the Government on 15th September 2011, a new scheme was introduced: Ecopack. The aim of Ecopack is to encourage households that without this policy would only carry out occasional ad hoc renovation works, to embark on slightly more ambitious works and therefore have a much greater marginal effect on the quality of their dwelling. The works covered by Ecopack must above all be aimed at the energy performance of the building (insulation, heating system, etc.), but it may be possible to link it with associated works (upgrading of the roof, for example) or minor energy-saving works. Eligible under the scheme are clusters of work (at least 2 items of work included in the table on the next page), of which at least one item of work is included in the table on the next page, left-hand side (energy performance).

In practical terms, Ecopack is a 0% loan that comes with guidance in the processes offered to Walloon households for funding clusters of work that either enables energy to be saved (these are detailed in the table on the next page), or are associated with them. This new scheme takes the form of a 0% loan from which a bonus is deducted. The bonus is calculated based on current bonuses, but the amounts are increased if at least two items of energy-performance work are carried out. As with the "conventional" bonus system, the amounts for the bonuses associated with the 0% loan will be broken down according to earnings. This scheme is managed by the Walloon Social Credit Company (SWCS) and the Wallonia Housing Fund for Large Families (FLW) and is based on a network of energy advisers responsible for guiding households. In practical terms, these energy advisers are tasked to guide households towards the work to be carried out and to put together the loan applications. These energy

advisers are located at existing service centres (social credit desks, offices of the FLW, CIA, energy service counters, etc.). In addition to these, the current information structures are of course still in place.

Works funded via Ecopack:

"Energy performance" works	Associated works
- **Thermal insulation of roofs** - **Thermal insulation of walls** - **Thermal insulation of floors** - **Replacement of window frames or glazing** - Installation of a ventilation system - Installation of a condensation boiler fuelled by natural gas, propane or heating oil - Installation of a heat pump - Installation of a biomass boiler - Connection to a heat network	- Replacement/repairs of the roof - Replacement/repairs of the frame - Replacement of the water mains, cornices, guttering works, etc. - Replacement of floors - Drying out of walls - Installation of external facing or the internal dressing of a wall - Chimney flue
	Minor energy-saving works
	- Thermostat / thermostatic valves - Enclosing of protected space - Insulation of heating pipes - Energy audit
	Works for the production of renewable energy*
	- Photovoltaic panels - Installation of solar thermal panels for domestic hot water and/or heating - Micro-cogeneration

Ecopack features:

- Ecopack is an instalment loan (so there are no documents to be drawn up by a notary and no fees to pay).
- The loan is designed solely to finance clusters of work enabling (at least partly) energy to be saved in the home.
- At least two different items of work must be carried out at the same to time to benefit from Ecopack.
- Ecopack loans are granted at the same rate of interest for everyone throughout the whole of the repayment period: 0%.
- The repayment period varies according to income. The lower the household income, the longer the length of Ecopack agreement, so that the amount to be repaid monthly is as low as possible.
- The amount that can be borrowed ranges from € 2,500 to € 30,000.
- Ecopack is available for owner-occupiers and owners who let the property, as well as for tenants.
- If the household applying for an Ecopack loan has two children or fewer (or none): the SWCS handles the application.
- If the household has at least 3 children: the FLW handles the application.
- The borrower is not obliged to take out insurance to cover the outstanding balance (but can do so if desired and the policy can be funded with Ecopack).

4.5.1.4.3 Subsidies for RUE investments in public buildings (RUEPB)

Assistance with audits, feasibility studies and the setting up of energy metering, works to improve the energy performance of the building.

The conventional and exceptional RUEPB programmes are both indirectly part of the NZEB approach. In fact, they support the energy upgrading of public buildings – upgrades that by their visibility to the public must serve as examples and encourage visitors to take action.

The aim is to reduce dependency on energy (and energy bills) by controlling consumption and through the local production of renewable energy that is consumed on the spot. This approach corresponds entirely with the concept leading to NZEB buildings. In the context of RUEPB, this process is initiated on the basis of simultaneous support for programmes relating to the envelope of the building, the energy optimisation of the systems included in that building, as well as the installation of sources of renewable energy. These various programmes are prioritised through audits and/or feasibility studies and accompanied by monitoring consumption by installing energy metering.

Conventional RUEPB

The "conventional" RUEPB system, in place since 2003, is intended to support public organisations (boroughs, provinces, public social aid centres) and non-commercial bodies that implement an active energy management policy in their buildings, aimed at reducing their energy consumption. The subsidies are organised according to the principle of the "open service window" (with applicants lodging their own applications) based on the resources available. A number of processes may be subsidised:

- Carrying out an energy audit – rate of cover for costs: 50%
- Pre-feasibility study – rate of cover for costs: 50%
- Installation of energy metering – rate of cover for costs: 50%
- Installation of a quality cogeneration system and use of renewable sources of energy – rate of cover for costs: 30%
- Investments aimed at improving the energy performance of a building – rate of cover for costs: 30%

Exceptional RUEPB

In addition to the "conventional" RUEPB, there is the "exceptional" RUEPB, aimed at smaller target audiences (mainly local boroughs/provinces and schools). Two successive calls for projects were issued in 2007 and 2008 (total amount for the programme in excess of € 132 million), with a subsidy rate of 75% (as much as 90% for smaller boroughs). The eligible investments were as follows:

- Thermal insulation of the walls of the building (including replacing window frames and glazing)
- Replacement or upgrading of any heating system
- Installation of thermal solar panels for domestic hot water requirements

An additional "exceptional" RUEPB call for tenders is currently being prepared, again focusing mainly on schools, local boroughs and provinces. The subsidy rate will vary between 60 and 100%, depending on the recipient. The key to the breakdown for project tenders is as follows:

- Schools: 60% of the amount for the overall budget envelope of the tender. The breakdown between networks will be done based on the key of the number of pupils.
  The subsidy rate for schools is planned to be as follows:
  a. Base rate 60%
  b. Bonuses are added to this base rate (that can be accumulated):
     i. Primary: bonus of 2000 base points (making a total of 80%)
     ii. D+ (i.e. 12.5% of schools, which is tranches 1, 2 and 3A of the specialised supervision decree): bonus of 1000 base points (making a total of 70% for secondary schools and 90% for primary)
  c. In addition, education in the Wallonia-Brussels Federation can benefit from a coverage rate of 100%.
- Local boroughs and provinces: 20% of the overall budget envelope of the tender.
  The subsidy rate is 75%
- Associations: 20% of the overall budget envelope of the tender.
  The subsidy rate is 75%

The selection inside each sector will be made on the basis of the criteria of cost / kWh avoided and cost / CO_2 avoided.

Through the intervention of the Wallonia-Brussels Federation, these RUEPB programmes are also linked, at least in the education sector, to funding options for the balance of the investment with a guaranteed loan.

4.5.1.4.4 Grant for Public Service Housing Companies

In the area of new-build, all of the funding orders for the production of public housing were reviewed at the beginning of 2012 in order to incorporate into the amount of grants for new-build projects the cost of the new energy requirements from the 2012-2013 base programme (K35 and Ew60). In addition, an additional grant is provided for new-build projects that achieve the passive standard.
The selection of the operations contained in the 2012-2013 base programme will also take account of the location of properties in order to reduce energy consumption as much as possible.

In the area of the refurbishment of public housing, a programme of green investments (PIVERT) has been developed, injecting € 400 million into the social housing sector. An initial tranche of € 100 million was released at the beginning of 2012. The aim is to make substantial improvements to the energy performance of approximately 15,000 units of public housing. The works receiving grants are energy performance projects, possibly linked with

associated works by energy-saving investments. The subsequent tranches of the grant will be issued based on the results of the register of public housing stock currently underway.

4.5.1.4.5 Green certificates for the production of electricity from renewable sources and from high-yield cogeneration, and the payment mechanism for transfer/supply to the power grid (★)

In application of European directives 2009/28/EC and 2004/8/EC, the Walloon Government introduced a system of green certificates in 2001 with a minimum guaranteed price aimed at supporting the development of the production of electricity from renewable sources and quality cogeneration, thereby simultaneously reducing our dependence on sources of imported energy, as well as our emissions of greenhouse gases.

The basis for the mechanism is an obligation placed on providers. Indeed, each quarter, these providers are required to submit to the regulator, CWaPE, a number of green certificates based on their sales of electricity, otherwise they incur a fine. This quota is set annually by the Government. Management and monitoring of the system are handled by CWaPE

These green certificates are issued on a quarterly basis by the CWaPE to each producer of green electricity, in proportion to the net quantity of electricity produced and based on the one hand on the estimated additional cost of the production of the network and, on the other, on the measured environmental performance (savings of CO_2) of the installation, compared with conventional reference forms of productions. The green certificates are then sold at market price by the producers to power providers or network managers to meet their quota obligations. As an alternative solution to selling green certificates, the decree also provides for a system in which the network manager, ELIA, buys certificates at a minimum guaranteed price. These certificates are then cancelled and cannot be resold again on the market.

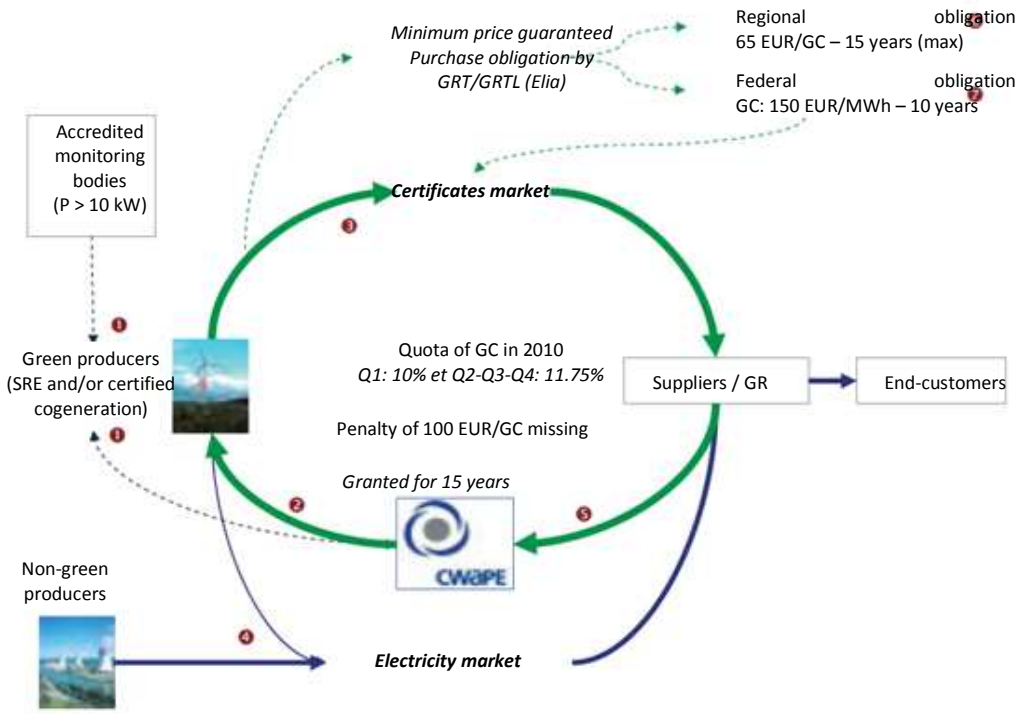


Figure 4: Operating principle

Source for the diagram: CWaPE

Any producer wanting to obtain green certificates (and/or origin guarantee labels) must be certified by the CWaPE. The green certificates (and origin guarantee labels) are issued for the production of electricity from a generation site on condition that a check has been carried out to ensure that the amounts of power produced from that site can be clearly identified and measured. The main intention of this requirement is to be able to guarantee the sources of energy (i.e. the fact that they are renewable) and the efficiency by which it is converted (in the case of cogeneration). In practical terms, an accredited body issues a certificate of conformity, known as an

origin guarantee certificate (OGC), to the installation for which the energy metering complies with the Metering Code.

This mechanism of green certificates is an active part of the various policies implemented to support the development of nearly zero energy buildings. In actual fact, the system described above is specifically suited to small generating installations (≤ 10 kW, i.e. residential producers) that benefit from a simplified procedure (single service counter, origin guarantee certificate issued on the basis of an 'honour' statement and single service counter).

These simplifications to the mechanism for issuing Green Certificates help provide support for another incentive tool aimed at small installations (≤ 10 kW): the principle of offsetting. This offsetting involves an adjustment between the drawing down of power and supplies transmitted to the grid (reverse rotation electricity meter), which enables householders to reduce their power bills, even if production is not simultaneous with consumption (balance assessed for each billing period and by pricing period if system is on a day/night tariff).

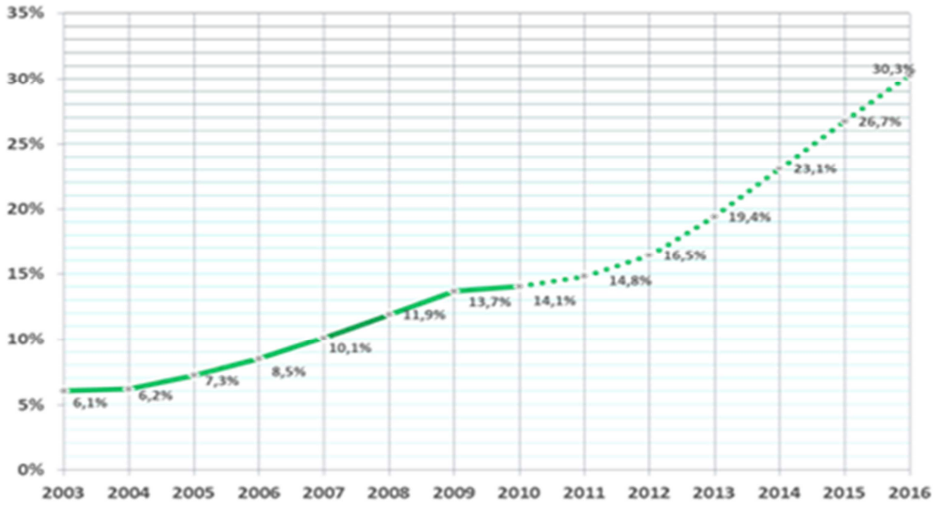
This policy specifically to benefit the residential market has borne fruit in view of the explosion in the market, driven mainly by photovoltaics: in 2011, almost 22,000 applications for certification were lodged in the wake of this simplified procedure, totalling an additional 113 MW or more and raising installed power to 181 MW.
Micro-cogeneration is also supported, but has got off to a more timid start.

For more information: http://www.cwape.be

The Walloon Government's target is to reach 30% production of green electricity by 2016 and 20% of renewable energy by 2020. To achieve that aim, the Walloon Government will be asking energy providers for an increasingly high percentage of green certificates. The level is currently 15.8% and this figure will rise gradually to 30.4% by 2016, representing an annual increase of 3.65%.

The new quotas for green certificates have been set for an 8-year period. This is designed to offer investors greater security and allow for the most attractive and least expensive projects to come to the fore. The target of quotas to be achieved by 2020 has been set at 37.9%.

Percentage of green electricity in Wallonia:



In terms of the proposed breakdown between networks, the indicative annual production targets by 2020 are currently as follows:

- Hydroelectricity: 460 GWh
- Large wind farms onshore: 4500 GWh
- Small wind farms onshore: 90 GWh
- Photovoltaic solar: 750 GWh
- Geothermal (Enhanced geothermal system): 200 GWh
- Biomass (all networks): 2000 GWh

4.5.1.5 Communication & supervision

4.5.1.5.1 Project tenders "Exemplary Buildings Wallonia" (★)

To give a boost to the sector, the Walloon Government is calling for new project tenders aimed at promoting the construction of "Exemplary Buildings" in terms of energy and environmental performance. This tender is aimed at all owners planning to build or refurbish their building, as well as to tradesmen in contact with project principals (architects and design offices). The aim: to demonstrate that it is technically feasible and economically cost-effective (or nearly) to build and/or renovate exemplary buildings in Wallonia.

The first call for project tenders launched in 2012 was for residential buildings, with the second call extended to services buildings.

This initiative is directly in the spirit of European Directive 2010/31/EU, the 'Plan Marshall 2.vert', the Employment-Environment Alliance, the "Build with Energy" programme and the Energy Performance of Buildings.

Projects will be assessed on four criteria:

1. Best energy performance
   Limiting demand for energy (heating, cooling, lighting, ventilation and auxiliary systems) and promoting the use of renewable energy in the most efficient way possible (thermal solar, photovoltaic, geothermal, biomass, etc.).
2. Lowest impact on the environment
   Minimising the impact of buildings on the environment through the efficiency use of resources (choice of building materials and techniques), water management and low-impact mobility.
3. The ability to reproduce the solutions planned cost-effectively
   Opting for solutions that are technically and economically justifiable so that the project can encourage other developers to follow suit in a relatively short period of time.
4. Architectural quality
   The consistency of the architectural solutions used, the success of the aesthetics, the location of the building as part of a consistent planning whole and the quality of the living spaces will also be assessed, as will ease of access and the ability of the project to be adapted to people with reduced mobility and the modularity of the building.

The theme of "energy performance" is particularly important in the call for projects and hence should be studied with special care.
An exemplary building, whether a new or refurbished one, should tend towards being a nearly zero energy building. To achieve this level of performance, it must make it a priority to limit its energy requirements (by acting on its thermal insulation and airtightness, and by using passive cooling techniques, etc.), it must also use highly effective systems and finally it must use a maximum level of renewable energy from local sources.

Those projects that are eligible will be analysed by technical experts. Based on this analysis, a panel of judges will select the winning projects.

On completion of this examination, the winning projects (approximately forty of them for the 2012 edition of the programme) will benefit from financial aid of € 100 per m^2, divided between the developer (€ 90 per m^2) and the project designer (€ 10 per m^2).
The designers and developers will also be given technical support free of charge to help them achieve the quality targets and to give them a promotional boost (via publications, press campaigns, online presence, visits, seminars, etc.).

4.5.1.5.2 Project tenders – large solar thermal systems

To encourage the installation of large systems of solar thermal panels, a call for project tenders for the installation of large solar thermal systems has been decided on and will be launched shortly in 2012. This call for tenders will be aimed at one of the sectors where the installation of panels is an attractive proposition, i.e. collective housing, retirement homes and swimming pools. It will be monitored in collaboration with the large solar thermal systems Facilitator, based on audits conducted by the Facilitator as part of the duties assigned.

4.5.1.5.3 *Project tenders "Sustainable Home"*

In 2010 and 2011, the Government at the initiative of the Housing Minister launched two calls for project tenders designed to support experiments in innovative homes, with a definite bias towards sustainable development.

In parallel with marked and controlled social and economic dimensions, these calls for tender encouraged the winning projects to think very carefully about energy usage, in particular in terms of the performance of buildings through advanced energy quality capable of going as far as passive or zero-energy standards.

In addition to exceeding the standard in effect, the project tenders were required to invest in reducing the consumption of the building's occupants, taking grey energy into consideration through the use of carefully selected materials, as well as in the choice of location and mobility issues in order to minimise the impact on transport.
As a result of the tenders, the Government is now supporting 27 innovative projects spread across the whole of Wallonia, giving them a budget of over € 5 million.

4.5.1.5.4 *EAP energy audit*

The energy recommendation procedure consists of providing a recommendation about energy quality.

This voluntary procedure is aimed both at owners and tenants.

The recommendation consists of an analysis of the envelope of the building (walls, roof, frames, floors), as well as the systems for producing heating and domestic hot water, ventilation and possibly for dealing with the issue of overheating in summer (optional module called 'summer comfort').
The aim is to encourage owners to improve the energy performance of their building by advising them on the most appropriate measures to take from the point of view both of energy and economy.

In 2013, a new version of the EAP energy audit will be introduced: EAP2.
The aim of the EAP2 audit – like the initial EAP audit – is to issue a recommendation relative to the energy quality of an existing dwelling. To do that, the auditor carries out an inspection of the building in order to assess the current situation at the building.

Unlike the EAP audit already in place, the EAP2 audit will also be able to analyse the energy performance of the building in case there are modifications to the enclosed space and/or energy supplies.

Based on each of these situations analysed, the audit will then include two estimates of the cost of the energy improvement work to be carried out:

- the first scenario is determined by the energy improvements envisaged by the client;
- the second "optimum" scenario is the one recommended by the auditor in order to achieve maximum energy efficiency.

The audit will also include a summary of the results from these two scenarios.
This dual scenario will take account of technical constraints, the energy gains hoped for and the estimated return on investment time. The recommendations, accompanied by comments, will be explained objectively and verbally by the auditor as part of an interview with the applicant.

Compared with the more standardised EPB certificate, EAP2 makes it possible to provide more details about the features of the building and to take account of the occupant so that relevant and appropriate recommendations can be made for the purpose of improving performance.

The new procedure (EAP2) is aimed at combining certification and audit into the same tool and providing greater consistency with the EPB method that applies to new buildings.

4.5.1.5.5 *RUE information in public buildings*

- Recommendation regarding the insertion of environmental clauses in specifications for public procurement contracts and good practice guides for government representatives.
- WPS Sustainable Development Plan, through its specific sections on purchasing and managing energy
- "Energ-Ethical Boroughs" Charter, including the services of Energy Advisers in local councils.
- Display of consumption through the display of energy performance certificates in public buildings, in accordance with the transposition of the European Directive on EPB.
- Encouragement to produce Energy Registers of Public Buildings and introduction of energy metering (eligible for RUEPB subsidies)

4.5.1.5.6 Communication campaigns conducted by the Department of Energy and Sustainable Building in the context of EPB

Every programme conducted by the Department of Energy and Sustainable Building is accompanied by a communication campaign and is relayed by the Energy Service counters that are open to the public and located in the main towns and cities in Wallonia.

In terms of EPB, we should mention the following campaigns in particular:

- Publications:
  - DL flyer in French "Pour des bâtiments plus sains, plus confortables et plus économes en énergie – *Healthier, More Comfortable and More Energy-Efficient Buildings*" - 2 versions (general public and trades) – FR – 2 x 5000 copies – June 2008
  - DL flyer in German "Gesündere, komfortablere und mehr Energie sparende Gebäude – *Healthier, More Comfortable and More Energy-Efficient Buildings*" (general public) – April 2009
  - DL flyer in French "Pour des bâtiments plus sains, plus confortables et plus économes en énergie – version 2010 – *Healthier, More Comfortable and More Energy-Efficient Buildings*" (general public) – FR – 20 000 copies – May 2010 - GER – 20 000 copies – September 2010
  - Brochure "Optimise Your House" (general public) – FOR – 20 000 copies – April 2010

- Periodicals (quarterlies) designed to disseminate information about the programmes and measures implemented in Wallonia, including those about energy efficiency in buildings:

  - 'REactif' (aimed at energy professionals and decision-makers)
    For example: Theme "Energy Performance of Buildings" – Reactif n° 63 – July 2008 (10 000 copies)
    Theme "EPB Regulations: Beyond Kyoto" – Reactif n° 63 – March 2010 (10 000 copies)
    Article "Calculating EPB: Non-Residential Lighting in Question" - REactif n° 68 – September 2011 (10 000 copies)

  - 'Energie 4' (aimed at the general public)
    For example: Theme "Energy Performance of Buildings" – Energie 4 n° 13 – March 2010 (12 500 copies)
    Theme "Energy Performance of Buildings" – Energie 4 n° 14 – June 2010 (12 500 copies)

- Posters (for local councils, Energy Service counters, notaries, etc.)

  PEB (A2) – FR – 1 000 copies

- Participation In Trade Shows and Exhibition

Presence of Energy Service counters at trade shows with building and energy themes (recurrent): Batirama Tournai, Batimoi (Marche), Bâtiment Arlon, Batimons, Tendances Maison (Charleroi), Batibouw (Brussels), Bois&Habitat (Namur), Batireno (Namur), Energie201X (Brussels), Batisud (Libramont), Energie+ (Marche), Habitat Liège, Energie&Habitat (Namur); EPB posters showcased at the Wallonia stand at the shows mentioned above.

- Website: energie.wallonie.be

- Information sessions about EPB, certification and audits aimed at professionals in the construction sector

- Sending out of a kit (DL flyer, poster and letter) to notaries and real estate agencies

- Advertising campaigns:

EPB - Healthier, More Comfortable and More Energy-Efficient Buildings (press advertisement) – 2008/2009

Home campaign (Sud Presse) – 10 articles (1/4 page) published each week from March to May 2010

Build smart to consume less + Purchase, rent: buildings display their consumption – April/May 2010

- TV: 30" commercial RTL-TVI, Plug TV and Club RTL (91 TVCs) + La Une, La Deux, BRF TV (144 TVCs).
- Magazines: full pages Ciné Télé Revue, Télémoustique, Télépro, Le Vif, Flair, Femmes d'Aujourd'hui, Paris Match, Le Ligueur, Le Soir Mag, Tu Bâtis Je Rénove (Energy special September 2010, Insulation special October 2010), Je Vais Construire (Interior Climate special + Renovation Guide June 2010, Energy special + Sustainable Energy Guide September 2010, Window Isolation special + New Buildings Guide October 2010, Floor Insulation special + Pocket Guide to Bonuses and Tax Benefits November 2010)
- Daily newspapers: articles 750 (3/4 de page) all French-language dailies + Metro
- Internet: leaderboards at the Dernière Heure La Libre websites, at Le Soir website, on 7 sur 7, on Skynet and on Immoweb

Buildings Reveal Their Performance – December 2010

- Press and magazines: La Libre Immo, DH, Le Soir Immo, Le Soir Mag, Ciné Télé Revue, Télé Star, Sud Mag, Vlan, Tu Bâtis Je Rénove, Deuzio de L'Avenir supplement
- Internet: Immoweb

➢ Press articles. Examples:

Roularta Partnership "EPB Guide 2007 – 2008 – 2009" (general public)

Architrave (architects):

- Article "Energy Performance of Buildings: designing buildings that are healthier, more comfortable and more energy-efficient" – n° 161 – October 2008
- Article "The real Start of EPB" – n° 167 – October 2010
- Article "A guide to Residential EPB" – n° 165 – February 2010

Confluent (general public - Namur)

- Article about EPB and EPB certificates – January 2011

Vivre la Wallonie (general public)

- Article "New Energy Requirements" – n° 2 – December 2008
- Article "Energy Performance of Buildings" – n° 10 – December 2010

Entre Nous (Thomas & Piron)

- Article "Healthier, more comfortable and more energy-efficient buildings thanks to the new regulations" – 2010

Sud Presse (general public)

Report "Let's Save Energy" (certification, EPB) – June 2011

➢ Promotional cards distributed via the promotion network: 110 000 cards on 550 display units

➢ Posters in stations and on buses

➢ Audiovisual

Examples:

G1Plan (video clips of 1'30'' broadcast on La Une and on the web – general public)

- Tighter EPB on 1st May (April 2010)
- What's new in the EPB regulations? (29/09/2011)

Partnership with the television programme "Une Brique dans le ventre" – RTBF – since 2005

4.5.1.5.7 Energy Service Counters

The Energy Service Counters (there are 16 Service Counters located across the whole of Wallonia) answer questions from households about energy and make technical documentation available to them. The Service Counter staff constitute a network of qualified engineers who receive regular training and are coordinated by the Sustainable Building Directorate. Some Service Counters also include energy advisers since May 2012. This is a trend that will continue and intensify throughout 2012, aimed both at strengthening the Service Counters in order and ensuring that there is consistence with the energy adviser programme.

The questions asked cover issues about construction work and the energy upgrading of dwellings, as well as renewable energy and the electricity and gas markets, etc. The aid and bonuses available locally, regionally and federally are also dealt with.

4.5.1.5.8 Single service counters

Single service counters will provide advice and guidance for households wanting to embark on sustainable refurbishment works in their home throughout their project (from the design stage through to finalisation of the works). This is provided on a number of levels:

1. Production of a brief diagnosis of the dwelling. This is done on the basis either of a questionnaire completed at the service counter with the applicant, or, if the applicant wishes, in the home in the form of a free qualitative assessment of the home. In particular, this will enable work priorities to be established (clusters).

Carrying out this diagnosis will also be based on any energy recommendation procedure audits or health surveys that may have been conducted previously;

2. Assistance in assembling the financial and administrative side of the operation for all of the processes required to obtain existing incentives and the establishment of a "passport" for the building;
3. Guidance and supervision throughout the works (from the design stage) in choosing the right methods and materials, even a network of EEA service-providers. A database will be created for this purpose.

The single service counter will be accessible to everyone, providing advice and guidance, even if the person decides not to apply for Alliance funding.

4.5.1.5.9 Creation of the Sustainable Living Home

There are numerous initiatives in Wallonia aimed at increasing the visibility of all technologies, as well as the financial assistance available for the design and renovation of energy-efficient buildings. The ultimate aim is help the NZEB concept to gain penetration. These initiatives include the recent creation in Charleroi of the Sustainable Living Home, run jointly by the SWCS and FLW.

The Sustainable Living Home is a project with two simultaneous objectives:

- First of all, to act as a single information service counter for all citizens about the various public incentives available and the techniques of eco-renovation and eco-construction. The idea is to encourage complementarity between existing public programmes (energy service counter, housing information and advice, town-planning and environment house); to enable the general public to obtain information from professionals about innovative materials and methods, and to create a specialised documentation centre.
- Then to be a technology-based showcase for creating and carrying out renovation and sustainable building works. The sustainable building side features a project for building new public housing with a high level of energy performance, run by the SWCS, aimed at enabling home-related experiments and visualising innovative technologies in practical terms. The sustainable renovation side covers the financing of the high-performance renovation of a building for the Housing Fund for Large Families.

4.5.2 Supply

4.5.2.1 Strategic planning tools

- Regional Policy Statement
- 'Marshal 2.vert' Plan, 1st Employment Environment Alliance
- Plan for the Sustainable Control of Energy
- Air-Climate Plan / future Air-Climate-Energy Plan

4.5.2.2 Training and quality background

4.5.2.2.1 Organising EPB training courses (★)

The work to develop a range of basic and advance training courses associated with EPB is carried out by the Confluence-Construction partners, with the support of the European Social Fund, as part of the Convergence & Competitiveness programmes.

From the outset, it was the intention of the main institutional operators – IFAPME and FOREM – to run the project aimed at developing and organising training courses for the implementation of EPB in Wallonia.

All of this work also provides a major opportunity for incorporating new EPB content in their range of existing courses.

The regional subsidy granted to these operators was designed to support work aimed at incorporating EPB in their respective offerings: creation of specific training courses and the adaptation of existing ones. Part of this subsidy enabled the operators to fund the appointment of an internal EPB adviser, with responsibility for coordinating this work. Another segment was allocated to the partners CSTC – CIFFUL (ULg) – CCW, contributing to the development of this same work. The subsidy also made it possible to finance work conducted by university teams specialising in EPB: Architecture and Climate (UCL) – EnergySuD (ULg) – Energy Faculty (UMons).
Advanced training courses aimed at developers and their staff members are also essential for ensuring the quality of execution: for achieving the targeted level of performance in EPB statements, but particularly for guaranteeing actual energy performance.

Having said that, the partnership is not designed – nor does it have the ability – to control all of the training courses associated with EPB on a Wallonia-wide scale.

The number of initiatives is increasing. These include:

- the 2010-2011 catalogue, the publication of which is coordinated by the Training Fund, presents some 40 courses under the heading of "EPB" provided by a range of operators, FOREM and the IFAPME network, of course, but also social promotion and the private sector;
- architecture practices, self-employed professionals and private training providers also run advance training days on certain topics associated directly with EPB.

4.5.2.2.2 Build Up Skills (★)

From a broader perspective, the construction sector needs to be ready to carry out renovation works with a high level of energy performance, as well as to build new buildings (nearly zero energy). As a result, it needs to have a greater number of qualified workers. Transposing these developments into the appropriate expertise and corresponding qualifications, i.e. recycling, is perhaps the greatest challenge to be tackled.

The European Union shares this concern, which is why the European Union's IEE (Intelligent Energy Europe) launched a call for project tenders in June 2011 for implementing projects in the various Member States aimed at raising the level of qualification of workers so that they are capable of constructing and renovating buildings that meet the new requirements. The call for project tenders is called Build Up Skills.

The Belgian project, agreed to by IEE in 2011, is made up of three main phases:

1. The establishment of a national status quo analysis. This phase consists of drawing up a description of the current situation in energy-related training courses, as well as the targets set for 2020.
2. Creation of a national platform of stakeholders likely to determine a training strategy on renewable energy and energy efficiency in the construction sector. The consortium is made up of representatives from the CSTC (Centre of Science and Technology in Construction), the FFC (Construction Training Fund), the VEA (Flanders) and SPW-DGO4 (Wallonia). The platform is made up of federations from the construction sector and various training partners, as well as the Energy Departments in regional government bodies.
3. Drafting of a phased plan making it possible to establish a qualified workforce of tradesmen in sufficient numbers to enable to targets for 2020 to be reached. This phased plan must be supported by the stakeholders involved. The initiative is focused on continuing the training of tradesmen and other workers on site, as well as system installers in the sector for energy efficiency and renewable energy.

4.5.2.2.3 Quality labels and certification

To improve the quality of the work carried out by professionals and give visibility to companies that commit to this process of quality, a group of systems is in the process of being established. There are three interconnected levels here: the level for companies, which is covered by the quality label system incorporated in the Employment-Environment Alliance (A), the level for installers covered by certification (B) and finally, the level for tradesmen covered by the Build Up Skills project (C). These three levels are applied in parallel to the trades affected by the improvement in building energy efficiency, and in particular insulation and airtightness on the one hand, and renewable energy on the other.

- *Quality labels for companies*

The Employment-Environment Alliance provides for the implementation of a quality label for companies operating in the area of energy efficiency and renewable energy. This tool will make it possible to identify professionals from a quality point of view and also to guarantee clients the quality of the work carried out. The label will be used as a quality reference for the general public and, over time, as a benchmark for granting financial incentives, bonuses and also possibly as a base for some items in specifications. The label will feature a list of companies that have been awarded the quality label, based on a number of different levels.

Work has begun on issuing quality labels for companies that install energy production systems using renewable sources. This will make it possible to coordinate initiatives launched by the various bodies in differing technologies aimed at improving the quality of domestic renewable sources of energy and particularly to ensure proper harmonisation with the process of certification for installers that is currently being developed based on the provisions of the Directive for the promotion of renewable energy (2009/28)

This quality label will be broken down between the various technologies for producing household energy from renewable sources. The label will be granted by a body that is independent of the sector and awarded by the Walloon Region.

Granting the quality label will be subject to a set of specifications that is both realistic and ambitious, containing the following elements as a minimum:

- Access to the profession for specific tasks
- The percentage of certified staff complying with Directive 2009/28 (see below). This will enable the label to establish a link between the level of companies and the tradespeople who work for them – individuals – who are trained in the context of this certification. Commitment to use standard estimates, standard contracts and standard specifications.
- Inspection of at least installation

2012 will be devoted to introducing this quality label place and appointing one or more bodies to award the labels, as well as to drafting standard estimates, standard contracts and standard specifications for each technology (see point 3.3.2.2. above).

The labelling of businesses for aspects associated with the energy efficiency of buildings will correspond with the same overall philosophy, but will be developed to lag slightly behind.

- *Certification of SRE installers*

This certification in this case is aimed at training professionals and installers of systems that produce energy from renewable sources. Certification will be awarded to professionals qualified to supervise the whole of the installation process.

The new European Directive on renewable energy (2009/28/EC article 14 paragraph 3 and annexe IV.) charges Member States to establish regulations for the certification of installers of biomass boilers and stoves, photovoltaic or thermal solar systems, surface geothermal systems and small heat pumps. This work has to be completed by 31st December 2012.

Voluntary installers – individuals – will be certified on the basis of an accredited training course or by an accredited training centre. Accreditation of the training programme or trainer will be carried out by the Member State or by administrative entities designated by the Member State.

The training must include a theory section and a practical section and be completed by an examination that includes an assessment of the installer's practical ability to install biomass boilers and stoves, heat pumps, surface geothermal systems or photovoltaic or thermal solar systems.

Certificates will have a time restriction placed on them and in order for installers to retain their certification, they will be required to attend refresher courses or seminars.
Under the Directive, certificates granted by other Member States must also be recognised (Annexe 1: article 14§3 and annexe IV of the Directive).

In this context, Flanders, Wallonia and the Brussels Capital Region are working together to implement a harmonised system of certification, aimed at training installers who are reliable and of good quality.

4.5.2.2.4 The accreditation of liquid and gas fuel technicians and refrigeration engineers

The Walloon Government Decree issued on 29/01/2009 aimed at preventing pollution of the atmosphere caused by central heating systems intended to heat buildings or produce domestic hot water and reduce their energy consumption states that any company carrying out the installation of central heating systems fuelled by liquid or gas fuel must have at least one accredited engineer combustibles, in accordance with the table below:

Type of fuel	**Type of heat generator**	**Qualified engineer**
Liquid	Any type	Engineer qualified in liquid fuels
Gas	Unit type	Engineer qualified in level GI or GII

	Fitted with a pulse burner	gas fuels Engineer qualified in level GII gas fuels
Solid	Any type	Specialist engineer

The Walloon Government Decree issued on 07/07/2007 aimed at preventing pollution during the installation and commissioning of fixed refrigeration equipment containing fluoridised refrigerant, as well as during maintenance work carried out on this equipment, and to ensure the energy performance of climate control systems, defines the terms on which firms working in refrigeration technology are accredited and the granting of environmental certification in refrigeration technology to refrigeration engineers. This decree is currently in the process of being reviewed. The main aim of the modifications is to make the Decree compatible with the various European regulations that have been adopted since the Decree was published in the Official Gazette (Regulations 303/2008, 1516/2007, 1005/2009). The sector-specific and full wording setting out the terms for operating refrigeration equipment will also be reviewed shortly (Walloon Government Decree issued on 12th July 2007 setting out the sector-specific and full terms relative to fixed installations for the production of heat or cold that use a refrigeration cycle).

Accreditations and certificates are issued once applicants have attended a training course at an approved centre and have also passed the examination successfully.

4.5.2.2.5 Training of Energy Officers in public institutions

To ensure the training and recognition of Energy Officers and to provide them with technical and business assistance and assistance with the human and organisational approach of RUE, the government (Department of Energy and Sustainable Building) has for the past few years appointed the ICEDD in relation to:

- basic training in RUE (cycles of 12 days);
- on-going training in RUE;
- site visits and RUE seminars;

The aim is to train 70 Energy Officers each year.

4.5.2.2.6 Teaching Tools and Practical Guides: (★)

Practical guides and software tools have been developed for building professionals, Energy Officers and the general public. These guides and tools help boost application of the regulations on EPB, or voluntary programmes (EAP) developing a specific methodology aimed at its target audience (architects, trainers, engineers, etc.).
These tools and guides are available from the Energy portal site.

They include:

- The EPB Guide, aimed at EPB managers and architects
- The EPB software, aimed at EPB managers and architects
-
- The Guide “Designing Sustainable, Very-Low Energy Dwellings”
- The Guide “Energy Upgrades to Dwellings” (to be published)
- The ISOLIN Guide and Excel decision-making tool (thermal insulation of walls from the inside)
- The ‘OPTI-Maison’ software: design aid from the first sketches
- The ‘Opti-bureaux’ software (being prepared)
- The Practical Guides for architects (being revised)

Finally, the energy and building reference tool: the Energy+ CD developed by Architecture and Climate at UCL for the energy design and renovation of buildings in the services sector.

The Reference Guide for the energy design of sports centres is available from the DGO5 website.

4.5.2.2.7 ATG and ATG-E – Technical accreditation (energy) of construction products and systems with certification.

The Belgian Union for Technical Accreditation (UBAtc) is the only accreditation institute that issues technical accreditations for materials, products and building systems for installers in Belgium.

The main products of UBAtc are national and European technical accreditations for materials, products and systems.
Voluntary technical accreditation with certification is a statement of quality from a third party that clearly attests to the suitability of the application for use, based on any statutory rules, specifications or documents that reproduce industry standards, as well as requirements for good professional practices directives. This accreditation is granted after an accreditation and certification procedure, which are inseparable from one another and set out in general in a reference system consisting of accreditation guides and certification rules.

ATG is based mainly on the context in Belgium, but also takes account of harmonised specifications and similar quality statements in other countries.
There are certain variants of the accreditation with certification, depending on the subject of the accreditation. The schemes combined with the BENOR system or with other systems (such as KeyMark from CEN) are among the possibilities. Where ATG and BENOR schemes are combined, these are known as BENOR-ATG schemes.

During the process of establishing technical accreditation with certification, UBAtc can decide to award a limited accreditation, before issuing final accreditation, based on the elements of proof already supplied. In individual cases aimed at describing the energy features of products and construction systems, it is possible to issue special statements called ATG-Es.

ATG-Es are designed to describe products and systems in the context of innovative construction designs or technologies and can be used as part of regional regulations relative to the implementation of European Directive 2002/91/EC on the energy performance of buildings.

An ATG-E is limited to energy-based descriptions and does not deal with any performance-related technical characteristic. Nor does it express a view as to the application's suitability for specific or general use.

In terms of monitoring the quality of an ATG-E, a regular production inspection of the relevant energy properties of components is organised by the manufacturer, along with external monitoring by an external certification institute designated by UBAtc.

4.5.2.2.8 Facilitators

The Facilitators are in place to conduct information and advisory assignments with target audiences (professionals, design offices, companies, etc.) in relation to topics such as EPB, RUE and the methods associated with sources of renewable energy.

EPB Facilitators:

The "Energy Performance in Buildings" Facilitators are given the task by the Walloon Region of conducting information and advisory campaigns with building professionals to help them to implement the new regulations.

In practical terms, the Facilitators are responsible for:

- providing information and awareness to the parties affected by EPB (mainly architects, design offices, companies);
- providing personalised guidance on EPB projects for architects and design offices;
- making sure specific tools are made available (FAQ, etc.);
- taking part in the technical committee supervising the development of EPB training courses organised by IFAPME.

The work of the EPB Facilitators is carried out by UMons (Energy Faculty) and ULg (DGSE). Their target audience includes architects, EPB managers and design offices.

EPB certification Facilitators:

The certification Facilitators provide guidance to accredited certifiers and provide standby telephone backup to answer their questions. An FAQ has been drafted and is updated regularly.

RUE Facilitators:

A public procurement process has been conducted and allocated with a view to rationalising the range of services offered to the industrial and services sectors. This service, known as "RUE Facilitators", makes it possible to provide assignments covered previously by the Chambers of Commerce and Industry, UCM and UNISPO through a network of experts. This network is made up of a single point of entry for those aspects that related to the HVAC envelopes and systems of non-residential buildings, as well as for the aspects that relate to industrial processes. This covers all sectors: services, manufacturing, non-trading, professions and artisans.

Renewable Energy Facilitators: biomass, photovoltaic, heat pumps, large solar systems, etc.

The Walloon Region finances theme-based "Facilitators" for each section of renewable energy. These Facilitators provide general guidance about existing technologies, equipment suppliers, existing financial aid and the administrative procedures and pre-sizing tools of renewable energy production systems. They also provide technical advice about the various stages of progress in a "renewable energy" project, such as rereading feasibility studies, specifications, estimates, etc. As part of their tasks, Facilitators also organise seminars and site visits.

4.5.2.2.9 Passive House platform

See 4.4.1.3.1

4.5.2.2.10 Energy Advisers and Energy Units in federations

Wallonia grants subsidies to:

- some local boroughs for the recruitment of energy advisers;
- certain federations for implementing Energy Units.

As part of this, the following operators carry out their tasks:

Energy advisers in local boroughs:

Apart from the assignments described in point 4.3.2., the energy advisers in local boroughs also check compliance with the regulations on the energy performance of buildings as part of applications for planning permits. Before the arrival of energy advisers in local boroughs, this "compliance" task was carried out almost exclusively on an ad hoc basis by the regional government alone. This meant that the likelihood of an architect being inspected on this point during his or her career was very small and as a result, there was virtually no fear of being checked.
The action of these energy advisers led to the gradual introduction of a genuine progressive dialogue between architects, applicant builders and the borough aimed at finding solutions for improving the performance of the project and promoting low-energy buildings. This resulted in more full applications in terms of energy and a reduction in the errors picked up (calculations, taking areas of heat loss into consideration, consistency between the plans and the values stated, etc.). Project developers and architects are also now invited to consult the energy adviser upstream of the application being lodged to discuss any possible improvements that can be made to the project in terms of energy.
Their action is also preventative: it enables the parties involved to be informed, made aware and generally advised as early in the project as possible – and to ensure projects are in compliance before the planning permit is issued and particularly before the building is built.

Finally, it should be noted that following the extension to the documents and works not requiring the assistance of an architect, many private individuals are now consulting the energy adviser to help them complete the "energy" forms to be attached to the planning application. The energy advisers can then take advantage of this opportunity to make these refurbishment applicants aware of the value of renovation, better insulation and the implementation of devices to ensure the supply of air when replacing windows.

Energy Unit of the Union of Towns and Boroughs in Wallonia (UVCW):

The Union acts on behalf of the Region to provide day-to-day assistance and advice provider to its members in the form of a telephone standby service every morning and answering questions received by e-mail and letter. There are a great many questions relating to EPB and these constitute the vast majority of the questions submitted to and handled by the Union's Energy Unit.

The Union also supervises the "Energ-éthiques" programme of energy advisers in local boroughs. One of their tasks is to monitor compliance with EPB requirements as part of planning applications. The Union has organised the networking of energy advisers in order to encourage and facilitate exchanges between all advisers and hence share and pool their experience. Through this network and operating in the form of a mailing list, the Union's Energy Unit sends out joint responses to matters relating to the application of the regulations in processing planning permits.

Finally, on a broader base, action by the UVCW also includes providing information and training to boroughs, as well as acting as a contact point for Wallonia for escalating practical problems encountered in the area of applying policy. For example, the UVCW regularly published a range of articles and good practices regarding the control of energy through its various media (website, Municipal Movement periodical, newsletter). Each year, it also organises technical training courses (often about EPB) and an 'energy crossroads' (about public lighting, implementing local energy policy, reference framework for wind power, etc.) for all boroughs.

Energy Unit of the Walloon Union of Architects (UWA):

The UWA was given a subsidised assignment by the Walloon Region to set up an active "Energy Unit" working with architects. The aim is to enable the passing on, across the profession, of information of value for implementing the energy policy established by the Walloon Government.

This enables the Unit to act as an interface between the political world by relaying observations gathered in the field about the application of regulations and by communicating the point of view and experience of professionals to the business world.
To create its Energy Unit, the UWA put together a team of architects that includes a Board of three experts.
This Board is responsible for defining the tasks to be carried out and the targets to be reached.

The energy 'referee' has the responsibility for conducting programmes. The referee is provided with secretarial support, as is an architect counterpart. A communication assistant is also provided.

The main tasks set by the Board are as follows:

- identify the needs of architects in terms of information and training;
- the widespread dissemination of information through specialised media for architects (Architrave, Arch-Index.fr, the websites of the UWA and professional unions);
- close monitoring of any event, seminar, training course and information relative to the issue of energy in buildings;
- facilitate progress through the stages set for EPB (enhancements to requirements from September 2011, taking account of nodes from 2012, etc.);
- gather questions asked by practitioners in the field, through local associations. Then contact is made with the government in order to obtain the answers requires or to improve certain points in the regulations.

Energy Unit of the Walloon Construction Confederation (CCW)

The Energy Unit established by the CCW in collaboration with local Chambers and with the support of the Region helps members on a day-to-day basis to prepare for changes in the regulations in Wallonia and to become aware of new tenders.
Businesses can come to the Unit for individual assistance that is both personalised and free of charge in the following areas:

- Regulations relative to the Energy Performance of Buildings (EPB)
- Searches for building products that improve EPB
- Information about the energy bonuses granted when insulating a building, replacing a boiler, etc.
- Identification of parties in Wallonia involved in EPB: architects, design offices, energy facilitators, associations, etc.
- The "Build with Energy" programme and the training cycle associated with it
- The training courses available in Wallonia covering all aspects of EPB; insulation, heating, renewable energies, etc.

4.5.2.3 Research and Innovation

4.5.2.3.1 Development of systems and buildings innovative in EPB using the equivalence principle

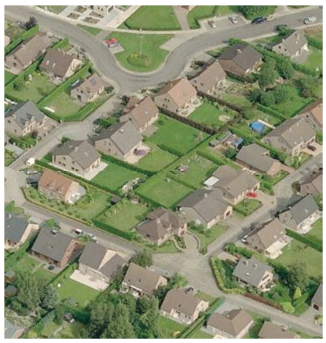
Article 237/7 of the CWATUPE regulations provides for the ability to organise a search for an alternative method of calculating EPB when innovative technologies or concepts are used in a building not taken into account in the method of calculation used currently.

The Walloon Government decree issued on 17th February 2011 relative to the alternative method of calculating innovative concepts or technologies sets out the procedure and terms of application.

The equivalence application procedure for innovative systems is based mainly on technical energy accreditations (see 4.4.2.3).

4.5.2.3.2 SAFE (Suburban Areas Favouring Energy efficiency) Programme

Single-use, low-density urban sprawl out beyond the limits of the traditional town is one of the major phenomena of the way the use of land has developed since the Industrial Revolution. This is still very much the case in Wallonia, when large numbers of low-density housing estates have developed over the past fifty years. Against this background, the SAFE (Suburban Areas Favouring Energy efficiency) research project tackles the question of the energy assessment and upgrading of the existing areas on the outskirts of towns in Wallonia. The main feature of this research is that it delves into the energy needed to heat buildings at the same time as the energy required for people to get about.



The aims of the SAFE project are:

- To study the energy consumption of dwellings and existing districts on the outskirts of towns in Wallonia
- To link energy consumption for heating buildings with energy consumption for transporting people
- To develop cutting-edge methods that can be adapted to other contexts and regions
- To highlight the renewal strategies most appropriate to each case
- To provide clear, useful results for all players in Wallonia, including private citizens, through the creation of an interactive tool that can be accessed online

The IT tool developed is an interactive tool that can be accessed free of charge online. It features three energy assessment tools that can evaluate the energy consumption associated with the heating in a dwelling or residential district, as well as the journeys that the local inhabitants make. It can compare them and use the information obtained to identify the most efficient programmes that need to be put in place to reduce their overall energy consumption. It is a decision-making tool used by government departments, political decision-makers, designers and project developers.

The energy modelling section for buildings in these typical districts fairly closely reflects the issues at stake for the sustainable refurbishment of buildings. The dynamic simulation software enables the user to upgrade each floor, changing them from buildings with un-insulated walls to buildings with low-energy, very low-energy and passive standards. Variations in climate, as well as the impact of the occupants' ways of life are also taken into account.

The tool has been accessible online since the end of June 2012 via http://www.safe-energie.be.

4.5.2.3.3 Aid for energy research and development

Energy is one of the 5 main lines of Wallonia's research strategy. The focus in the context of aid for energy research and development is also part of the basic concepts of NZEB. Indeed this aid is designed to support the implementation of local cutting-edge skills in the sectors for energy efficiency (for buildings, systems and equipment), as well as in the sector for the various production areas of renewable energy. These two sectors are very much the main pillar of the NZEB concept. Among the many projects underway, those specifically mentioned here are more in correlation with the NZEB concept.
Support for research, development and innovation in Wallonia is governed by the Decree issued on 3rd July 2008. The Decree aims to optimise the resources granted for R&D and encourages partnerships between companies (particularly SMEs), and between companies, universities, high schools and research centres.

In this context, calls for tenders on specific projects are issued regularly, with pre-allocated amounts. The winning bids receive subsidies or advances that are recoverable and the amounts granted are based on the legal status of the partners and the type of partnership, as well as their project (industrial research, experimental development, process or organisation innovation). This means that research costs can be covered up to 80% for industrial partners and even as much as 100% for academic partners.
Aid more specifically dedicated to research supports the creation of partnerships between all of the links in the energy chain, from exploratory research through to the promotion and distribution of innovative technologies.

This aid for energy research is managed in concerted fashion

- by the Operating Directorate General for Town Planning, Housing, Heritage and Energy – Department of Energy and Sustainable Building
- by the Operating Directorate General for the Economy, Employment and Research – Department of Research Programmes

For more information:
http://energie.wallonie.be/fr/aides-r-d-energie-en-wallonie.html?IDC=7409

Calls for tenders for energy research projects

Since 2000, various programmes have been launched to encourage research and development and to demonstrate energy efficiency and renewable energies. These programmes have enabled the development of expertise and research potential in energy so that Wallonia is able to play a role in innovation, not only for its own development and energy independence, but also to become integrated in the European movement.

Here is a quick overview of the various calls for tenders issued in recent years:

- 2012: Reliable
- 2011: Erable
- 2008: R&D Solwatt
- 2008: Energywall

For more information:
http://energie.wallonie.be/fr/historique-des-appels-a-projets-et-projets-retenus.html?IDC=7713

'Reliable' stimulation programme

Based on the observation that the harmonious integration of locally generated, on-demand electricity such as the power developed by renewable sources of energy represents one of the great challenges of the years ahead and will require the electricity grid in Wallonia to be adapted. The "RELIABLE" stimulation programme (taken from the French 'Réseaux Electriques Intelligents et durABLEs' – 'Intelligent and Sustainable Power Grids') is part of the 'Marshall 2.Vert' Plan and has a budget of € 6.8 million. RELIABLE covers the topic of research into developing an intelligent power grid in its entirety, for which five main lines of research have been defined:

- grid management,
- integration of stakeholders and green energy,
- cost-effectiveness and consumers,
- sociological approach,
- equipment manufacturers and the storage of energy.

This research is designed to be channelled, over time, into applying the results in businesses that already exist or that are yet to be established, and in our power grid so that jobs and added value can be created in Wallonia.

By focusing on the power grid, this programme is a little removed from the concept of buildings that are virtually self-sufficient in energy. However, the trend in buildings is for them to be increasingly electrified in terms of their energy sources. They also require the ability to generate that own power renewably and typically on-demand and there is an increased need to monitor both their consumption and production, which brings them closer to some of the topics included in the RELIABLE programme, such as smart grids and smart homes. The proposals currently in the pipeline (the panel met to make its decisions in June 2012) include the breaking down of electricity consumption, the management of local on-demand sources of power, the management of micro-grids, the automatic management of buildings, etc.

For more information:
http://energie.wallonie.be/fr/programme-mobilisateur-reliable.html?IDC=7635

‘ERable’ stimulation programme (★)

The 2011 ‘ERable’ stimulation programme, introduced as part of the ‘Marshall 2.Vert’ Plan and backed by a budget of € 10 million is designed to strengthen the scientific and technical potential of universities, high schools, research centres and companies and to encourage it as part of the fabric of industry in Wallonia through the funding of research projects into energy efficiency and renewable energy. These projects are designed to be channelled, over time, into applying the results in businesses that already exist or that are yet to be established so that jobs and added value can be created in our region.

They are also designed to support society benefiting from the research results through designers and design offices, developers, project principals and consumers.

The programme covers projects deemed to be technological, as stated in the decree issued on 3rd July 2008 relative to supporting research, development and innovation in Wallonia, as well as non-technological projects aimed at the better implementation and acceptability of new technologies and concepts, while avoiding issues such as the rebound effect that are part of the strategy of the ‘Marshall 2.Vert’ Plan and one of its main pillars, the Employment-Environment Alliance.

The programmes various areas of research are clearly in step with the target for the increase energy independence of buildings:

- The efficient use of energy and energy-savings (in industry, living spaces, buildings and mobility)
- The production of renewable energy (wind, hydro, solar in all its forms, geothermal, biomass and bioenergy)
- The conversion and storage of energy

Of the many projects retained, here are some that come under nearly zero energy buildings:

- DuraPerf: sustainability of the performance of elements enhanced in terms of energy
- aPROpaille: towards recognition of the use of straw as an insulating material in construction.
- DREAM: Determining the performance and sustainability of the airtightness of products, partitions and assemblies; impact on the rules for implementation, known in French as ‘DuRabilité de l’Etanchéité à l’Air des produits, des parois et des assemblages; iMpact sur les règles de mise en oeuvre’.
- SOLEN: SOLution for Low Energy Neighbourhoods
- GeoTherWal: optimising geothermal sensors in sealed systems
- PROSOLIS: The energy characterisation of solar protection systems and their visual impact on users, known in French as ‘PROtections SOLaires et de leur Impact sur la perception viSuelle des utilisateurs’

For more information: http://energie.wallonie.be/fr/programme-mobilisateur-2011-erable.html?IDC=7406

4.5.2.3.4 Participation of research teams and design offices in certain International Energy Agency projects (★)

The results of this work are produced in Wallonia in the form of practical guides and case studies made available to the general public and building professionals (architects, design offices, companies).

The main projects conducted since 2010 are:

Accord Solar Heating and Cooling:

- Advanced Housing Renovation with Solar & Conservation
- Solar Energy and Architecture
- Renovation of non-residential Buildings towards Sustainable Standards
- Advanced Lighting Solutions for Retrofitting Buildings

Energy Conservation in Buildings and Community Systems:

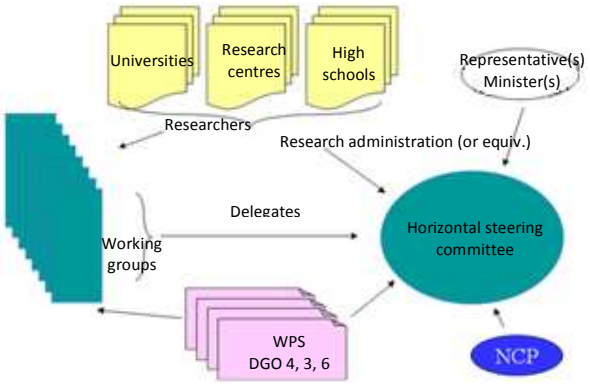
- Cost Effective Commissioning of Existing and Low Energy Building

Accord PhotoVoltaic Power System: participation in annexes:

- Performance & reliability of photovoltaic system
- High penetration of PV (photovoltaic) systems in the electricity grid.

4.5.2.3.5 WARE: Virtual Energy Research Centre

WARE (Wallonia Alliance for Research in Energy) is a de facto association founded on 4th February 2011 for the purpose of uniting the various parties in the Wallonia-Brussels Federation in energy research (energy efficiency; production of renewable energy; conversion, management and storage of energy).



The aim of WARE is to increase cooperation and coordination between players in the scientific community to enable them to achieve the critical size required for them to participate in European such as SET-Plan and especially EERA.

Spurred on by the Walloon Region, which is committed to acting as a point of contact on a European level and taking responsibility for logistical aspects, WARE is organised into theme-based working groups or interest groups, bringing together the work of research units on a specific theme. The aim of each working group is to ensure the visibility, consistency and coordination of research, to take part in the networking side of the joint programmes run by the European Energy Research Alliance and to participate in calls for tenders on energy research projects in the European Union. WARE also provides links with manufacturers in the sector.

Participation and involvement in these working groups is voluntary (membership of a charter). The various themes are:

- The “Bioenergy and Combustion” Working Group
- The “Capturing and storing carbon” Working Group
- The “Fuel cell” Working Group
- The “Geothermal” Working Group
- The “Methodology and modelling” Working Group
- The “Smart cities” Working Group
- The “Smart grid” Working Group
- The “Photovoltaic solar” Working Group
- The “Thermal solar” Working Group
- The “Wind” Working Group

For more information:
http://energie.wallonie.be/fr/centre-virtuel-de-recherche-en-energie.html?IDC=7431
http://energie.wallonie.be/fr/ware.html?IDC=7716

Wallonia also funds studies and research to support implementation of the transposition of the EPB directive and its ongoing enhancement.

4.5.3 Monitoring (control & improvement)

4.5.3.1.1 Monitoring of EPB regulations + energy certification

As part of EPB regulations, EPB databases will enable the on-going follow-up and monitoring of the performance of buildings undergoing construction or refurbishment works or which are being sold or leased.

4.5.3.1.2 PAEE monitoring, monitoring of bonuses, etc.

The Department of Energy and Sustainable Building at the WPS has set up an "Energy Information System (EIS)" unit, whose assignments include monitoring and assessing the various measures on energy.

This is the unit that designed the tool that gathers and processes data enabling compliance with the requirements of the "Energy Services" directive 2006/32/EC, via the 2nd Action Plan on Energy Efficiency (APEE2).

4.5.3.1.3 Monitoring the proper implementation of the EEA

An effective evaluation of the impact of the implementation of the EEA needs to be based on as comprehensive as possible an assessment of the variables to be evaluated. These include the characteristics of the housing stock, the professional trades concerned directly and indirectly of the first AEE, supply and demand for the trades concerned and access by households to means-tested aid mechanisms. Some valuable data is not yet available.
An inventory will be drawn up featuring a full analysis of the value chain in the construction sector and an assessment of building developments.

4.6 *Actions & measures Flemish Region*

In this chapter, proposals are formulated for measures and actions designed to eliminate as much as possible the obstacles which stand in the way of achieving NZE buildings as of 2021 (2019 for public buildings). These actions are geared toward the trendsetters and toward the 'widening' of the systems, technologies and services used by trendsetters (closing the chasm pictured).

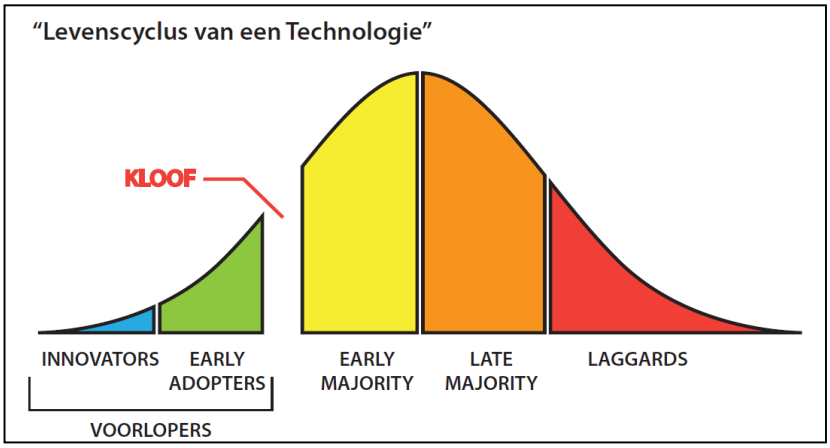


Chart 5: illustration of 'Technology Lifecycle'

The proposals for measures and actions are divided into 5 pillars:

1. Innovation
2. Quality framework
3. Communication
4. Funding
5. Energy policy

It will be determined in a subsequent phase which actions and measures will be coordinated, implemented and supported by which organisations. Once this is clarified, the implementation schedule will be worked out in further detail.
A great deal of actions and measures have already been initiated in the meantime.

4.6.1 Innovation

The transition to the NZE requirement by 2021 (2019 for public buildings) will need to be marked by faster progress in the way of energy performance of buildings than was achieved over the course of the past 10 years. As a result, an accelerated market launch of available systems, technologies and services that have a higher energy performance is also needed.
The development potential of NZE buildings is great, but innovation will be necessary if we are to keep pace with the proposed experimental growth trajectory without sacrificing construction quality and living comfort.

In its white paper submitted to the government entitled 'Innovation in Construction', the Flemish Building Confederation points to the crucial role played by the building sector in the quest for affordable, sound, comfortable and technically sustainable solutions to four major social challenges:

- building Flanders into a pivotal green logistics hub;
- **increasing the energy efficiency of our buildings**;
- reducing the consumption of raw materials;
- erecting adapted forms of housing (for the ever growing and aging population).

The building sector was seeking to clarify its needs concerning innovation with this white paper.

The expansive field of (energy-efficient) construction does not (yet) count among the research priorities in Flanders. At present, innovation in construction consists primarily of the optimisation of existing building methods. Illustrating this is the fact that, of all subsidies at the Agency for Innovation by Science and Technology (IWT), only 2% are destined for construction-related research. This share is too small, especially when considering the fact that 12% of employment in Flanders depends on construction.

Construction must not evolve into a high-tech sector, but should instead pursue a goal of becoming a mid-tech sector over the next 10 years. Extensive research is needed into the most efficient way to arrive at NZE buildings (prefabrication, collective systems of energy supply, etc.). New agreed-upon methods must be developed to increase the energy efficiency of existing non-insulated Flemish homes – homes which often lack a cavity wall - within ten years, and to do so in a well thought-out, efficient and affordable way. This transition will undoubtedly present the building sector with new economic opportunities. An increased focus on innovation will lead to new activities within the sector – new materials, design concepts, technologies and services – which will in turn create additional jobs in Flanders[48].

In 2010, the Flemish Building Confederation conducted a survey of its membership concerning their efforts to innovate. Half of all respondents working in the building sector - largely SMEs - were making no effort to innovate. Of those who were trying to innovate, a third were acting on their own accord, with the rest working with other enterprises (mainly suppliers). This leaves a minority of construction companies as pioneers. This is an important minority that could topple the market.
To be able to implement NZE buildings by 2021, integrated technological solutions and 'cross-sectorial' innovation will be needed, whereby a range of building systems (insulation, heating, cooling, ventilation, lighting, glazing, solar protection and renewable energy technologies) are optimised in an integrated way.

At the direction of Flemish Minister of Innovation Ingrid Lieten, the Flemish Council for Science Policy (VRWI) launched the Construction innovation steering group in the autumn of 2011. The goal of this steering group is to design a medium-term strategic innovation policy.
A report containing policy recommendations was produced in spring of 2012, and served as input for the Construction Round Table (within the context of 'White Paper: New Industrial Policy').
In the report, the construction innovation steering group defines the building sector in broad terms. In addition to the residential and non-residential housing market, the sector includes many other domains, such as waste and materials management, infrastructure sector, transport sector, water sector (including dredging operations) as well as other subsectors. Due in part to its cross-cutting or horizontal nature, this sector is accorded a key position within the Flemish economy.

The recommendations are divided into those which are intended to have strategic impact and those which entail specific measures for the short and medium term.
From a strategic standpoint, the Flemish building sector is clearly in need of an economic and systemic transformation. This means that a holistic and strategic vision for the future of the sector must be developed, a vision which is rooted in an ecosystem perspective. This strategy must then be translated into a concrete timeline for the implementation of a number of objectives, as well as a corresponding investment plan.

4.6.1.1 Research & Development

4.6.1.1.1 Action 1, optimisation of research and development into innovation

An innovation policy will strengthen the support and encouragement of the development of/research into innovative systems, technologies or services which improve the energy performance of buildings. The Government of Flanders will continue to increase the budget for innovation in the years to come as well.
Government resources for innovation must contribute to the effort to take on the major social (including energy-efficient construction) and economic challenges that confront our society and our economy. Innovation can help shed light on social problems and can contribute to the valorisation of economic opportunities.
Efforts to innovate which are supported by the government must sufficiently address the social and economic challenges that we are increasingly facing. This is why they must provide a fairly tangible contribution to solutions for these challenges.
There are a number of research areas which offer a large amount of potential for innovation. The government will therefore invest primarily in research in the following areas[49]:

- logistics and transport;
- ICT in the healthcare sector;
- nutrition and health;
- new materials and nanotechnology;

[48] According to the Flemish Building Confederation's white paper on innovation, this could lead to the creation of 70,000 jobs
[49] From Flanders in Action – Action Plan #2: Focusing on key areas

- **energy** and the environment.

Green energy (energy efficiency, renewable energy and clean technology) is being viewed as a multidisciplinary crossroads of innovation. This stems from the inherent linkage of the key priorities for innovation with the big social and economic challenges.
The innovation crossroads are being fine-tuned from the standpoint of their orientation to the big social and economic challenges.
Innovation steering groups are being brought together by the Flemish Council for Science and Innovation (VRWI) with the goal of designing a strategic medium-term innovation policy. The VRWI was contracted via the 'Construction' innovation steering group to develop an innovation policy. In the spring of 2012, this advisory report served as input for the Construction Round Table (in the context of 'White Paper: New Industrial Policy').

The yet to be established Flemish Energy Company also has an opportunity to support innovation in the realm of rational and sustainable energy use. The Flemish Energy Company will be able to make a clear name for itself by doing the following:

- Stimulating the market launch of innovations in environmentally-friendly energy technologies, systems and services.
- The development, acquisition and accumulation of comprehensive knowledge relating to energy management and the implementation of energy-saving and environmentally-friendly energy projects.

One of the IWT's goals is to encourage the transfer of knowledge between the academic and business communities. The IWT is thus searching for suitable partners for businesses to carry out specific research projects, and guides researchers and companies towards participation in European projects.

Based on the barriers (chapter 4.3, p.39) and discussions with the stakeholders, the following proposals for innovative studies and research projects were identified as high priorities:

- Making a survey of (European) research into the extensive energy renovation of buildings.
- Research into the relationship between theoretical (EPB and EPC) and actual energy consumption while taking a number of parameters into account, such as family situation, hours spent at home, temperature setting, etc.
- Innovative tendering procedures for new technologies of energy-saving measures.
- Joint systems for heating and hot sanitation water (such as district heating, hot sanitation water for collective housing, collective solar thermal energy, heating networks, etc.)
    - Which collective systems for heating and hot sanitation water take priority and are feasible for Flanders? What is most important for the social housing sector?
    - What is the residual heat demand of NZE buildings (high & low temperature), and could the output of a distribution network be enough to justify its creation in Flanders?
- Creation of a 'heat demand map' for Flanders[50].The viability of local energy companies, and what is the best way to develop them?
- The best regulated ventilation systems.
- Double façade systems.
- Industrialized or prefab building systems for NZE buildings, for both new constructions and renovations.
- Creation of a platform to facilitate the development of combinations of integrated product technologies in test and demonstration settings.
- Integrated systems for sustainable energy applications.

A wide range of R&D support mechanisms for energy and innovation is available at the European level. Flemish actors must gain maximum access to European financial resources such as Intelligent Energy Europe, Smart City Call, European Economic Recovery Plan, Seventh Framework Programme, etc.
This should be approached from the following three angles:

- Be proactive: don't simply wait for the various actors to come forward with questions - seek out potential candidates and educate them. Research should be conducted into the obstacles as well as the prospect of Flemish partners getting 'cold feet' prior to participating in or submitting European projects.
- Support the submission of projects: seeking out foreign partners (within the scope of the on-going bilateral cooperation agreements), sending foreign applications to interested Flemish candidates, providing feedback on project dossiers, making referrals to the most appropriate support programmes, etc. Special attention should be paid to the obstacles referred to in the previous point.

[50] Example from the United Kingdom: http://chp.decc.gov.uk/heatmap/

- Coordinate with Flemish energy policy: find out which European priorities coincide with those of Flemish energy policy, and take advantage of the inherent opportunities; make a survey of and integrate European projects carried out by Flemish (Belgian) actors, implemented with an added value for Flemish energy policy. The implementation of relevant Belgian projects without being integrated into policy must be avoided at all costs.

A key added value that comes from maximising European resources for Flemish research and development projects is the opportunity for Flemish expertise and knowledge to manifest itself at the international level, and moreover the potential to promote and develop it as an export product.

4.6.1.1.2 Action 2, conduct analysis of trendsetter target group

1) Supply-side trendsetters

The trendsetters on the supply side (contractors, installers, architects, design offices, suppliers, etc.) play an essential role. Several initiatives have already been launched in order to analyse this group. Consideration must be given as to whether these initiatives need to be further expanded and/or require continued follow-up.

2) Demand-side trendsetters

Less research has been done on the motivation and characteristics of the trendsetters on the demand side. It is still important to study this in order to ensure that actions and measures targeting these groups are as effective as possible.

A study of demand-side trendsetters is being conducted which focuses on socio-economic factors (family situation, motivation, wages, education level, etc.) and technical building factors (implemented techniques, obstacles, energy-saving measures, etc.). The focus will initially be on residential builders - both new constructions as well as renovations. If the findings are clear and prove useful for further studies, a similar study could be initiated for non-residential buildings.

The 'trendsetter target group' could be analysed with the help of findings from this study. This will facilitate the direct flow of innovative systems, technologies and services to the trendsetters, and will also allow for more targeted communication with the trendsetters.

4.6.1.1.3 Action 3, EPB framework for valorisation of innovative systems or technologies

A flexible mechanism must be incorporated into the calculation method for the energy performance of new and existing buildings which facilitates and valorises innovative systems or technologies in a thorough yet smooth way (for both new construction as well as existing buildings).

4.6.1.1.4 Action 4, promote airtightness and ventilation

1) Promoting the airtightness of the building envelope

From an inspection of dossiers qualifying for a reduction in withholding tax on income from real estate, as well as an inspection of the analysis of the EPB declarations, it appears that the 'low-energy' level is currently being attained mainly through the use of technologies such as ventilation system D, the heat pump, the solar boiler and photovoltaic systems. Trendsetters are clearly quite focused on renewable energy applications, but the number of homes exhibiting inherent construction quality, such as thorough insulation or airtightness, is still low.

Because more attention to airtightness is absolutely essential to achieve the NZE level, actions must be taken to vastly improve the airtightness of the building envelope.

The following recommendations are aimed at promoting airtight construction[51]:

- Regulation-driven: airtightness must result in a clear improvement in the E-level yielded by the EPB calculation, and this must be coupled with a mandatory measurement or other quality system that guarantees airtightness. Support measures will encourage this.
- Technology-driven: cooperation with and support of building professionals via the development of practical tools, demonstration projects and research projects.
- Market-driven: the dissemination of information regarding airtight construction (among various building professionals and builders) aimed at a specific target group.

[51] Recommendations from the ASIEPI

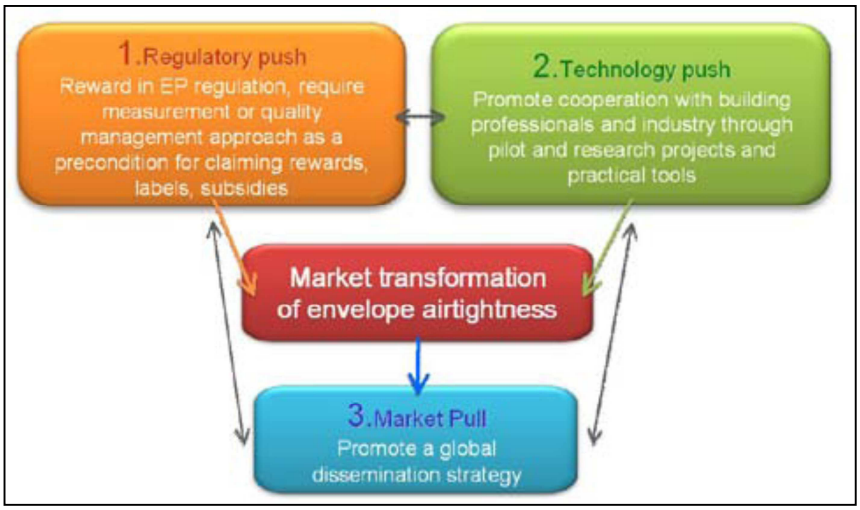


Chart 6, three factors involved in promoting the airtightness of the building envelope, according to the Rennings approach (2005)[52]

Because envelope airtightness can be degraded through the actions of any given subcontractor, coordination is needed between the various building partners. If there is not enough up-front coordination, it will be difficult to determine exactly which subcontractor is responsible if the envelope fails an airtightness test later on. A general contractor, should one be attached to the project, would be the one ultimately responsible.

2) Study of minimum airtightness requirements

It is clear that it is going to be a major challenge to achieve satisfactory to excellent levels of airtightness in buildings on a large scale within the scope of the NZE attainment targets. There are currently plenty of examples available of specific projects which demonstrate the attainability of excellent levels of airtightness. Passive houses, for example, satisfy the $n_{50} = 0.6h^{-1}$ requirement.

A consensus has arisen among experts and the primary stakeholders alike that more attention needs to be given to airtight construction. On the other hand, there is much discussion as to whether or not it makes sense to institute minimum airtightness requirements and, if so, what those requirements should be.

A study is being conducted which will result in a highly substantiated report that will be run by all the relevant stakeholders. This report will compile the various arguments in a structured fashion. This is an issue that transcends the Flemish Region, and this is why it is also important to link ongoing international initiatives to the study or to include international experts as well. This study will form an important basis for both the Government of Flanders and the relevant stakeholders when formulating their viewpoints and determining what specific actions to take.

An inquiry could also be made into whether it is necessary to differentiate between new construction and renovation, and between residential and non-residential.

3) Promoting the top-quality installation and optimal use of ventilation systems

The more airtight a building, the more important the role played by the ventilation system. Knowledge regarding the right flow-rates, systems, installation, use, etc. exists, but it is still all too often not applied, or is applied incorrectly. The top-quality installation and optimal use of ventilation systems and ductwork must therefore be addressed from the perspective of an information and quality framework.

This is covered in the chapters ‘

[52] Source: ASIEPI project

Quality *FRAMEWORK*' and 'Communication'.

TRANSITION TO A VOLUME MARKET

4.6.1.1.5 Action 5, from a demo market to a volume market

A partnership is being set up with consortium partners from the building sector, each of which is planning to build a large number (approx. 50) of demo NZE homes over a short period of time (max. 5 years). As part of this effort, it will be important to pursue collaboration with supply-side trendsetters – mainly SMEs – so as to provide them with sufficient opportunity to participate.
Repetition and scaling will have a positive effect on (financial) viability. The implementation of a large number of NZE buildings will also be an important means for quickly identifying compatibility issues between new products and concepts. At the same time, these projects will double as key showcases designed to convince all construction stakeholders of the 'sense of urgency' regarding the challenges we currently face.[53]

In order to motivate property owners to build/renovate at the NZE level, each of the different target groups (buyers, social tenants, private tenants) require a unique market approach.
Major improvements in the energy performance of buildings have been achieved primarily through the enforcement of energy performance requirements. Existing buildings (including rented flats) must not get left behind. In order to minimise the discrepancy between new construction and renovations, the proposed demo projects will be geared to both types of construction.

For renovations, cooperation is being launched into prefabricated systems. These systems must be developed in such a way as to make extensive renovations efficient and financially feasible. Completed Belgian and European studies, as well as example projects, could serve as a guide for developing these systems. It is therefore advisable to take an inventory and draft an advisory report aimed at the various actors involved in extensive renovations. This was also cited earlier in Action 1.

The increasing significance of collective housing projects is a key factor in speeding up the renovation process. Taking a more collective approach will mean more opportunities to build NZE buildings on a large scale. This will allow the design costs and the costs involved in arriving at an economic optimum for the different components to be spread over several homes, and it will also make it easier to standardise the techniques which are used. It makes sense to devise innovative and efficient working methods in order to limit the number of hours on-site and to subject the building elements to better quality assurance.

[53] Source: 2010 Vision Report, Flemish Building Confederation

4.6.2 Quality Framework

The creation of a socially-supported policy framework that declares NZE buildings to be an attainable standard constitutes a major social challenge. This will require massive investments on the part of builders, businesses & industry, and the government. It is important that these investments be made correctly in technical construction terms and that they have a long life span.
The lack of a solid quality framework would run the risk of providing inadequate support for the large-scale introduction of NZE buildings.

Ensuring high-quality workmanship is therefore an essential precondition for conducting a large-scale market launch. This can only happen within an **integrated quality framework** which addresses knowledge enhancement (via retraining, specialisation, etc.), the valorisation of knowledge via the certification of individuals and the support of individuals in companies and institutions which themselves have developed an integrated quality framework. Within this context, a broader framework could also be pursued in which issues such as the environment, safety and product quality are addressed as well.

4.6.2.1 knowledge enhancement

The first step towards creating an integrated quality framework is to increase knowledge in the building sector. In order to build NZE buildings of the highest quality, the knowledge necessary to do this must be conveyed by means of training, retraining, specialisation, etc. Continual and lifelong learning must be promoted as much as possible.
Frequently encountered obstacles and problems include the importance of airtight construction, the presence of thermal bridges, the insulation of existing walls, improperly sized installations, etc.
Knowledge enhancement is one way to raise awareness within the building sector, but this must be backed up by valorisation mechanisms. Awareness among those on the demand side is raised through communication (see chapter '*Awareness & information campaigns*', p.106).

4.6.2.1.1 Action 6, knowledge enhancement in the building sector

The level of knowledge in the sector is crucial to the development of high-quality energy-efficient buildings. The importance of achieving the right design and solid workmanship is only becoming greater as energy-efficiency requirements are tightened.

When it comes to education, the building sector is atypical compared to other sectors. Because of its distinctive characteristics, it presents both barriers as well as opportunities:

- cancelling work due to freezing weather is an excellent opportunity to provide training. This training has to be provided quickly and flexibly;
- tight deadlines that don't allow time for training;
- when work is scarce and there is plenty of free time, people do not earn enough to pay for training;
- 'volatile sector': it is easy for trained personnel to switch companies;
- language problems: many employees do not have a sufficient command of Dutch.
- …

Several actors in the sector are aware of the need for knowledge enhancement and have already launched specific initiatives.

- The Fund for Professional Training in Construction (FVB) provides support for education in construction, boosts the construction skills of the unemployed and organises the retraining of construction workers.
- The Adult Education Centres (CVOs) are currently developing training profiles within the Construction study area in order to provide training in 'sustainable building'. Some of the training profiles being developed in individual working groups include: low-energy home builder, passive house builder, low-energy home wood framing, passive house wood framing, installer of renewable energy systems (heat pumps, photovoltaic cells, ventilation techniques, new and small-scale alternative techniques).
- Vormelek is the centre for education and vocational training for electricians.
- Educational institutions and training centres such as Syntra, KaHo Sint-Lieven, and Cedicol provide relevant training.
- Professional associations such as Bouwunie, the Flemish Building Confederation and Nelectra offer their members specific training.

In order to maximise the enhancement of knowledge, it is essential to develop knowledge-enhancing initiatives within the building sector that address specific target groups.
On-going initiatives must evolve so as to prepare the building sector for the challenges of the future, and new initiatives must be launched as needed.

1) Overview and roadmap of professional training in the building sector
There is a need for a transparent and structured overview of all existing NZE-related education and professional training. Once complete, a projection towards 2020 could be made which would require the building sector to be capable of building NZE buildings by that time.
The 2020 projection could then be compared to the prevailing state of affairs so as to identify gaps (what education/training still needs to be developed or modified to attain NZE targets?). The process of eliminating these gaps, as well as the developmental trajectory towards 2020, will be finalised in the form of a roadmap. This roadmap will need to be completed in a subsequent phase. It is important to arrive at a consensus on this and to get the relevant stakeholders involved in this process.

The IEE 'Build Up Skills' initiative (see 2.2.4) provides support for the implementation of this process.
In June 2011, the consortium consisting of the FVB Constructiv[54] (coordinator), the Belgian Building Research Institute, the SPW[55] and the VEA submitted a project proposal under the name of Build Up Skills Belgium for the training of construction workers. The objectives of the project proposal are:

- establishing a stakeholders platform;
- surveying the current state of training of construction workers in Belgium;
- identifying gaps in the training provided to construction workers which is designed to facilitate the construction of NZE buildings by 2020;
- developing a roadmap to 2020.

In November 2011, the Belgian project application was approved and the project was initiated. In January 2012, the stakeholder platform was launched.
The IEE call of 2013 was followed by a new 'Build Up Skills' project call to implement the roadmap which had been completed at that time.

2) From energy-conscious to NZE architect
In current practice, many architects only incorporate energy-saving measures towards the end of the design process. This is due not only to the architect; it is often the case that the builder is wary of taking on the additional costs associated with these measures. It is nevertheless crucial that energy-saving measures be implemented at the beginning of the design phase. As someone whom the builder can rely upon throughout the construction process, the architect plays a vital role in the effort to raise awareness about energy-efficient building practices. But it is difficult for potential builders to find architects who possess expertise in advanced energy-efficient building techniques.

In 2008, the two Flemish professional associations for architects (NAV and the Federation of Flemish Architects) launched the initiative 'Energy-Conscious Architect' with the support of the VEA. The goal is to award a label to architects who are seeking to actively promote themselves as an 'energy-conscious architect'. Potential builders can find these architects via the website[56].
The voluntary retraining that is offered to architects addresses issues which are key to the successful construction of energy-efficient buildings: adequate insulation, building airtightness, ventilation, energy-efficient techniques, economically sound low-energy construction, etc. Architects who are able to demonstrate that they already have enough experience in energy-efficient building are not required to take the training. Architects who are awarded the label sign a declaration of commitment whereby they commit to carrying out a project within two years that achieves an E-level of less than E-60. More than 500 architects signed this declaration of commitment in 2008, with 700 signing it in 2009 and another 400 in February 2011.

Changes will need to be made to the 'energy-conscious architect' project to address the NZE requirement. Possible changes include:

- modular training;
- requiring an exam;
- more in-depth content, plus expanding it to include extensive energy renovations;

[54] Fund for Professional Training in Construction
[55] Department of Energy and Sustainable Building – Public Service of Wallonia
[56] www.energiebewustarchitect.be

- more rigorous follow-up of the commitments;
- label guarantee;
- strengthening the declaration of commitment.

Care must be taken to ensure that this is not accompanied by unnecessary administrative burdens and costs. This kind of project owes its success in part to the low-threshold concept, which gives rise to broad acceptance among architects and builders alike.

3) Energy-conscious contractor

In conjunction with professional associations, a similar labelling process could be set up for contractors and installers along the lines of the 'energy-conscious architect' project. It is important that the focus be placed on achieving the NZE level so that contractors and installers receive the input they need to facilitate the transition to 2020. The training must be geared toward the work in which the contractors are actively engaged, and they must be able to apply what they learn in actual practice.

4) Specific info/training sessions for building professionals

Training sessions are being developed as part of an effort to certify installers in renewable energy and energy-efficiency (Action 7.2).

These specific info or training sessions for building professionals will serve as a supplement to the certified training. Specific info sessions do not involve an exam. They address different subject matter and are generally shorter in duration. Possible subjects include:

- prevention of thermal bridges (in new construction and renovations)
- airtight construction;
- energy renovations;
- ventilation systems;
- prevention of overheating;
- small-scale decentralised energy generation.

These info or training sessions could be organised by:

- Flemish Service for Employment and Vocational Training;
- Fund for Professional Training in Construction (FVB) and EDUTEC;
- Vormelek, the centre for education and vocational training for electricians;
- training centres;
- professional associations such as Bouwunie, the Flemish Building Confederation, Fedelec, Nelectra;
- specialised organisations such as the Passive House Project, CEDUBO, Dialoog and Kamp C.

5) Educating the real estate sector & property owner associations

The real estate sector and the owner associations can play an important role in providing energy-saving recommendations for housing. A good opportunity to focus attention on energy-saving measures comes during the negotiation and purchasing process. Short training sessions could be organised to raise awareness among the real estate sector and the owners' associations of their advisory role.[57]

6) Training builders

The training of builders is relevant to 'do-it-yourselves', but it might also serve as way to control the quality of the building process.

To be organised in cooperation with the stakeholders (local governments, training centres, specialised organisations such as the Passive House Project, CEDUBO, Kamp C, etc.).

7) Training the builder of the future

A constant influx of competent building professionals is needed in all subsectors of construction and at all levels (architects, contractors, labourers, engineers, etc.). Only qualified personnel can guarantee the development of innovative solutions and high-quality workmanship.[58]

Universities, colleges, secondary institutions and training centres that provide training to the building professional of the future must not only further integrate knowledge on energy-related measures (EPB, insulation techniques, airtight construction, renewable energy systems, etc.) into their curricula, but must also integrate broader competences which underpin high-quality workmanship: cooperative relationships (construction teams), project management, etc.

[57] Similar initiative in the Netherlands: www.agentschapnl.nl/nieuws/cursus-wijst-makelaars-op-sleutelrol-bij-energiebesparing
[58] Taken from the proposal report of the Construction innovation steering group

8) Train the trainer
Finding qualified trainers is frequent problem when developing education and vocational training. This is the case in other European Member States as well. Because of the professional background of the students, instructors are required to possess theoretical knowledge, practical experience and an educational background. In order to guarantee the quality of the training, a programme must be devised in order to support and 'train the trainers'. The trainers must also be given the opportunity to maintain their level of expertise as developments in the industry require.

4.6.2.2 Valorisation of quality

Enhancing knowledge in the building sector is necessary, but it is not enough to guarantee the quality that is required. This is why it must be incorporated into an integrated quality framework so that it is possible to guarantee high-quality workmanship.
The creation of quality labels for companies, such as 'Quest' and 'Construction Quality', is one sign that the building sector is becoming increasingly aware of the importance of a reliable quality framework.

Construction Quality is a joint initiative of the Flemish Building Confederation and its three regional affiliates, the BCCA (Belgian Construction Certification Association), the BCQS (Belgian Construction Quality Society) and the Federal Insurance Company. Construction Quality organises, develops and guarantees the promotion within the building sector of a voluntary labelling system that satisfies the appropriate quality and competence criteria in accordance with a consistent, strict, independent and impartial reference framework.
QUEST is an independent quality centre specialising in renewable energy which was established by expertise centres and professional associations. QUEST's mission is to create quality references for both installation companies as well as products, and to label companies by means of a neutral and independent verification procedure.

4.6.2.2.1 Action 7, creation of a quality framework for the building sector

1) Developing a vision for an integrated quality framework in the building sector
A vision for a quality framework in the building sector is being developed which must address the specific quality risks associated with technology as best as possible.
The Government of Flanders must devote itself to the creation of an integrated quality framework in cooperation with a range of partners, such as the Federal Public Service for the Economy, the Belgian Building Research Institute, Bouwunie, the Flemish Building Confederation, BCCA and Quest.

The following are defining characteristics of an integrated quality framework for the building sector:

- multi-stage implementation;
- minimal administrative burden;
- integration of existing systems;
- clarity for businesses and consumers: minimising the number of labels and straightforward communication;
- involvement of all relevant actors;
- clear added value for the consumer.

Support from the Government of Flanders for an integrated quality framework could be provided via four different channels:

1. **Communication** support, whereby consumers see the government as a reliable source.
2. **Financial** support for the initiation or continuation of a label.
3. **Link to subsidies**, as will apply to the technical specification for cavity wall insulation starting in July 2012. The Walloon Region links subsidies for the installation of a solar boiler to the Soltherm certification scheme. This has led to a marked improvement in overall quality, though the quality of many installations is still unsatisfactory.
4. The **mandating** of a quality label scheme for performing (specific types of) work. This is difficult to implement, provides no guarantee of quality, and moreover lies outside the authority of the Government of Flanders.

The feasibility of developing a quality framework for an 'NZE building' as a final product must be studied. Perhaps this could be done by means of an ATG (voluntary technical approval).
2) Individual certification of installers

The Renewable Energy Directive (2009/28/EC) states that certification schemes or equivalent qualification schemes must be available by 31 December 2012 for installers of renewable energy applications at the household level (biomass, solar photovoltaic and solar thermal systems, geothermal systems and heat pumps). A nationally harmonised approach is being pursued via the ENOVER 'Certification of Installers' working group for the development of certified training in accordance with the Renewable Energy Directive. This will result in an individual certification that is based on training and an exam. This individual certification can be incorporated into – and is compatible with – a quality label awarded to the company (see point 3).
Communication regarding this individual certification is on the one hand geared towards raising awareness among companies and individual installers of the training, but it is also aimed at the training centres in order to promote the availability of the training.
The potential exists that the three regions of Belgium will develop training in a subsequent phase for energy efficiency that is in line with the methodology used to certify installers in renewable energy.

3) Energy efficiency & renewable energy quality label for companies
It is difficult for private individuals, and often for architects as well, to find a qualified contractor or installation company that specialises in the type of advanced energy performance techniques used in NZE construction: the installation of solar panels, energy-saving ventilation systems, specific insulation applications, etc. An increasing number of techniques are being used in new buildings, either individually or in combination with each other, and this presents important new opportunities. But in order to arrive at a good end result, it also requires more cooperation than ever with designers, manufacturers and construction engineers from different disciplines.

An individual certification, such as the one awarded for implementing the European Renewable Energy Directive, would serve to supplement a quality label that is awarded to a company.
A quality label awarded to a company imposes certain conditions on that company, such as customer service, product standards, technical competence, etc. Individual certification could be incorporated into the conditions for technical competence.
The criteria for the company labels could be adapted to the relevant procedure or technique, and when a technical specification or voluntary technical approval is available, these criteria could include a requirement to follow these provisions.
The advantage of incorporating individual certification into a company label is that the 'mutual recognition' among different countries that is required by the Renewable Energy Directive could be linked to individual certification in Flanders (Belgium). Policy support (communication, financing, link to subsidies or quality label mandating) could be linked to a quality label for a company.
It is important to clearly communicate the benefits of a company label to both the consumer as well as the sector. Lists of certified contractors and installation companies with their contact information must be made available. One positive development is the creation of a Quest-Construction Quality label for both renewable energy and energy efficiency. The other regions of Belgium support these developments as well.
In order to maximise government support, it is essential that a quality label involve all relevant actors in the sector. We must moreover never lose sight of the ultimate goal: providing the consumer with pure added value.

4) Promoting construction teams with an energy consultant
In order to build NZE buildings, the different techniques that are used (insulation, ventilation, building envelope, heating system, etc.) must be coordinated with each other to the greatest extent possible. This requires a sophisticated design and thorough preparation. All of the specialists who work on a building are party to this process, and they must coordinate their work with each other as best as possible. The composition of the construction teams must also be promoted. These construction teams encourage dialogue between the different parties in order to promote high-quality workmanship.
Research must be conducted into the added value rendered by the inclusion of an energy consultant (who guarantees quality) in a construction team in order to assess a project's financial viability. The responsibilities of an energy consultant could perhaps be assumed by someone who is already part of the construction team, as long as that person has the proper training. Preferably, this role would be assigned to the energy liaison (for new construction) or the energy expert (for renovations).
It is easier for the builder to negotiate and enforce an outcome agreement when there is one member of the construction team who takes ultimate responsibility for the work.

4.6.3 Communication

It is possible to reduce the primary energy demand of buildings to the nearly zero-energy level or beyond using current systems, technologies and services, but the various actors involved do not possess adequate knowledge of these issues. This gives way to misconceptions, faulty decision-making, improper execution, poorly organised renovations, etc. Communication – the goal of which is to provide information and raise awareness – is absolutely necessary in order to make the right decisions.

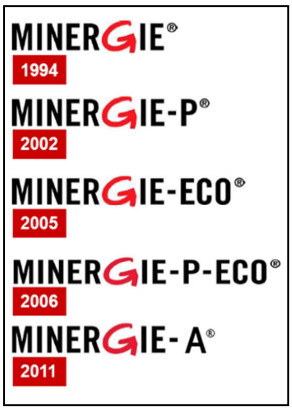
Both communication and knowledge enhancement play an essential role in the creation of an integrated quality framework and an effective awareness campaign. This theme could have been addressed in this chapter as well, but in this action plan the decision was made to include it in the Quality Framework chapter.

4.6.3.1 Awareness & information campaigns

4.6.3.1.1 Action 8, 'NZE' trademark branding

In order to develop a branding strategy to bring attention to NZE buildings, a trademark for NZE buildings is being created. This is a logo that could be used by contractors, financial institutions, architects, design offices, etc. and which could be made available to trendsetters.
The extent to which this logo could be used by contractors with a subspecialty in addition to general contractors – such as installers specialising in NZE techniques – is being studied.

Examples of branding from other countries[59]:



[59] USA, Singapore, Luxembourg, Singapore, Switzerland

Proposal for NZE logo

The key concepts which served as a basis for the design of the communication concept:

- simplicity of the concept;
- a recognisable, universal message concerning sustainability;
- logo that can appear anywhere;
- straightforward;
- positive message;
- future-oriented.

A full-blown communication campaign is being designed to promote the NZE concept.

4.6.3.1.2 Action 9, establishment of knowledge platforms

It is possible to implement NZE buildings using current construction technologies and techniques. To do this, it is crucial that the available knowledge filter through to all actors in the building sector. Here it is advisable to establish, or provide additional support for, knowledge platforms which would engage stakeholders – stakeholders who in turn would contribute to it.

The following are current knowledge platforms:

- Construction innovation steering group;
- Green Energy innovation steering group;
- Construction Round Table;
- Duwobo (Sustainable Living and Building).

4.6.3.1.3 Action 10, awareness & information campaigns directed at trendsetters

Builders matching the trendsetter profile are notified (and encouraged) about specific topics through information campaigns:

- total cost over the economic life span;
- NZE renovation;
- NZE new construction;
- construction of NZE collective housing;
- certification and quality guarantee;
- construction teams;
- etc.

These campaigns will be primarily aimed at builders who match the trendsetter profile. It will be examined to see whether similar campaigns could be directed at companies, installers, architects, etc. (i.e. supply side) that match the trendsetter profile.

4.6.3.2 Demonstration projects

4.6.3.2.1 Action 11, development of demonstration projects

A number of demonstration homes have been built in Flanders, but opportunities to tour these homes are limited. There is a great deal of interest on the part of specific segments of the population as well as the general public for touring demonstration projects. The low-energy and passive homes which open their doors to the public during the annual 'Ecobouwers Open Door'[60] receive a large number of visitors. Other successful annual visitor events include 'My house, my architect'[61] and 'Flemish Renovation Day'[62].

In the autumn of 2011, the Government of Flanders began issuing calls for innovative energy technologies and construction/renovation concepts within the scope of the demonstration programme. The financial support amounts to 35% of the costs that are eligible for a subsidy, and is limited to EUR 150,000 per project.

The Flemish Institute for Technological Research issued a call in 2011 for the submission of example projects in sustainable building, and specifically for those focusing on the topic of 'the integration of sustainable techniques, materials, concepts, and systems into new residential and non-residential construction'.

The project call must be repeated as time goes on, and even expanded if possible.

There is an ongoing call for projects in the Brussels-Capital Region known as 'Demo buildings and sustainable districts'[63] Winners of this competition are awarded financial support for their energy-efficient and sustainable home. In exchange, builders make the commitment to publicise their construction project and experiences and to open their doors to visiting groups. In the Brussels-Capital Region, more than 120 such demo buildings have received this award.
The Walloon Region is also planning to launch a similar project which is designed to support demo buildings.

1) Residential demonstration projects
In cooperation with DUBO partners (Sustainable Building) and the private sector, several NZE demonstration homes could be built in which the energy-saving techniques that have been utilised are demonstrated in such a way as to target a specific audience.
These demonstration projects must encompass as wide a range of construction categories as possible: new construction, renovation, social housing, collective housing, solid construction, wooden frame construction, etc.
The residual energy demand of these demonstration projects must be supplied to a considerable extent by energy from renewable sources, and must be generated on-site or nearby[64]. 'Nearby' is not defined as such, but it does serve to indicate that joint installations at the building or district level will be playing a more prominent role in the attainment of NZE targets for housing.
Initiatives whereby (private) builders receive support for a demonstration project on the condition that the project is innovative and open to others would receive priority for initiatives which are not used on a daily basis.

2) Non-residential demonstration projects
There is great potential for non-residential demonstration projects which would be widely accessible to the general public (libraries, schools, sport centres, office buildings of the Government of Flanders, etc.) to play the role of trendsetter.
It is not practical to maintain non-residential buildings solely for demonstration purposes. The 'auxiliary role' of demonstration projects must complement the building's primary purpose.
Large demonstration projects could play a major role in the development of joint installations for renewable energy generation.

[60] Organised by Federation for a Better Environment
[61] www.mijnhuismijnarchitect.com
[62] www.devlaamserenovatiedag.be
[63] www.leefmilieubrussel.be/Templates/news.aspx?id=28822&langtype=2067
[64] cf. definition of nZE building p.6

4.6.3.3 Non-financial support

4.6.3.3.1 Action 12, advice for NZE projects

1) Advice for residential buildings

Comprehensive planning advice and construction guidance that is provided by the architect as a supplementary service creates added value by making it more feasible to build NZE housing. It is important to support the development of the market without having a disruptive effect on it at the same time.

Private individuals with construction or renovation plans could receive tailored construction advice at the provincial support centres. Advisers would screen construction projects for sustainability – preferably in as early a stage as possible – with the energy aspect forming a key component of this. They would scrutinise the project closely and provide tips for improved energy and water performance, sustainable energy sources, healthy indoor air quality, building accessibility, etc.

The amount of planning advice that is provided must be increased substantially, and for new construction, the focus must shift to the NZE level. Extensive energy renovations must be encouraged as much as possible for renovation projects so that they might attain the NZE level where possible.

When the planning advice is aimed directly at the architect, its impact is maximised because the architect can then incorporate this advice into future designs. In practice, architects have very little time for this, and the builders are normally the ones who receive planning advice.

It is important that (planning) advisers take a uniform approach and possess the relevant expertise. The provincial support centres could assume a coordinating role in this effort and monitor quality.

The degree to which planning advice could be expanded to include guidance on aspects of the construction process in the form of site visits, mediation, airtightness checks, thermophotography, etc. – without having a disruptive effect on the market – must be studied.

The 'Flemish standard for sustainable living and building' was made available in 2011. This tool is geared toward the private builder who, along with the architect and the contractor, can use it to gain insight into the sustainability of the construction project as it relates to different topics such as 'water', 'energy' or 'materials and waste'. The project could then be assigned a 'sustainability score' based on the standard. The use of this measuring tool is voluntary. It will be heavily promoted through the provincial support centres, among other means. Similar measuring tools could also be developed for other types of construction projects which are relevant to local and regional governments, such as hospitals, retirement homes, districts, etc.

2) Advice for non-residential buildings

General awareness and information aimed at governments is detailed further on.

Distribution network operators EANDIS and INFRAX are also offering advice to municipalities within the scope of their ESCO initiatives. More on this can be found in '*Action **18**, third-party financing for extensive energy renovations*',

4.6.3.3.2 Action 13, manual for NZE buildings

Because buildings are increasingly evolving into high-tech 'machines', builders and end users need guidance on how to manage this technology. When these techniques are not properly followed-up on, the extra investment often does not pay off, and these technological changes end up being seen in a negative light.

A grid is being developed that can be used by the building sector as a 'manual-tool' that contains the necessary information concerning the use, maintenance and potential repair scenarios for technical systems.
A separate guide (documents) is being provided for:

- the end user: simple and straightforward explanation regarding operation (with a focus on user-friendliness);
- the building manager: maintenance, including enough details for technicians.

This information could take multiple forms, such as individual brochures (print and digital), demo panels, etc.

The Flemish Social Housing Company can support this action by taking an inventory of existing manuals for the home and having end users try it out.

4.6.3.3.3 Action 14, manual for extensive energy renovations

In terms of energy efficiency, a comprehensive and extensive renovation is the best option, but this is very often not financially feasible. This is why renovations are often carried out in multiple stages. This frequently causes problems; sometimes individual renovation stages are executed in the wrong order, and other times future decisions are either improperly accounted for or are not taken into account at all.
The so-called lock-in effect, which would effectively prevent the attainment of the 2030-2050 targets, must be avoided when carrying out extensive renovations.

Based on the results of a study conducted by the Flemish Institute for Technological Research and the Passive House Platform and commissioned by the VEA, recommendations will be formulated along with advice on extensive energy renovations and aimed at various target groups.
The most promising solutions will be chosen on the basis of an inventory of Flemish, Belgian and European studies and example projects.

4.6.4 Financial initiatives

One issue of concern is the need to keep NZE buildings affordable. It is not easy to get the funding for the initial additional investment costs of an energy-efficient building. Financial incentives and alternative financing schemes which account for the total cost over the entire economic life span are necessary to transition from a trendsetter market to a growth and volume market. Adequate funding can have an effect on a large scale.

The number of financial institutions in Flanders offering specific products for new low-energy or zero-energy housing is still rather limited at this time. The maximum amount that can be borrowed is usually calculated on the basis of income and the estimated value of the home. A majority of financial institutions do not take the estimated total cost (including the energy costs) into account, nor do they account for the ever-increasing added value that is afforded by an energy-efficient building. The cost of energy is one of the most important consumption costs associated with running a building. It must become more feasible to pay off a home that has a low E-level.

4.6.4.1 *financial support*

4.6.4.1.1 *Action 15, adjusting the conditions for incentives*

The conditions for awarding financial support measures must be adapted to conform to changes in the required E-level as well as changes in the market. This must be a clear and transparent process. Adjusting these conditions could be done through a **two-track policy** which is linked to the long-term trajectory outlined for the trendsetters (Action 19). The concept of generalised subsidies will evolve into subsidies for specific target groups, such as trendsetters, the disadvantaged, seniors, tenants and landlords.

4.6.4.1.2 *Action 16, linking support to an overall improvement in energy performance*

Support for energy renovations aimed at achieving the NZE level will no longer be based on individual subsidies per measure, but instead on the overall improvement in energy performance that is realised. The assessment that is carried out of the overall improvement, based perhaps on the EPC, must be extremely reliable.
For extensive renovations, the issue of whether or not a complete E-level calculation is still going to be possible must be revisited.

4.6.4.2 *Financing*

4.6.4.2.1 *Action 17, recognition of energy performance by the financial sector*

Banking sector initiatives in other Member States
There are various banking sector initiatives in other European Member States – some in conjunction with the government, some not – which take the energy performance of the building into account during the financing process.

In the Grand Duchy of Luxembourg, a number of financial institutions (including Dexia, Fortis, ING, Raiffeisen) offer an interest rate discount of 0.125% for energy-efficient new construction. In exchange for this, the Ministry of Economy and Energy handles communication relating to this and provides the banks with a label/trademark (EE Partner) that they can use.
Experiences with this project have been positive. Banks which at first declined to participate in this initiative have since decided to join, or are now offering an identical service. This is an indication that the promotional potential of these initiatives maintains a certain appeal for the sector.

In Germany, support programmes for energy-efficient homes are managed by the government-owned KfW bank.
Inexpensive loans are one way that the construction and renovation of energy-efficient homes is promoted. The better the energy performance, the more favourable the terms of the loan.[65]
This support is provided to private individuals via the majority of private banks. Most of these banks make use of the KfW-label for marketing purposes.

In the Netherlands, mortgage lending rules are defined by the Ministry of Finance. The new Code of Conduct for Mortgage Financing, which lays down stricter mortgage standards, went into force on 1 August 2011. These tightened standards bring mortgages more in line with the value of housing.
There are now fewer exceptions made to the income requirement for the borrower, but there are still some cases in which exceptions apply, including the installation of energy-saving equipment and the purchasing of a home with an A-label.

Flemish energy policy agreement
There is clear interest within the financial sector for developing a credit policy which would support the financing of NZE buildings. In early May 2011, Febelfin approved an action plan to support potential action of this sort on the part of lenders.
Febelfin has made the following recommendations to its members:
1) provide information about energy savings through the banks;
2) take the E-level into consideration when formulating credit policy.
No specific commitments were made or proposed within the scope of these recommendations.

In addition to these recommendations from Febelfin, it seems appropriate to pursue a second track which could lead to concrete actions and results. The Government of Flanders could negotiate an 'energy policy agreement' with another party who would commit to obtaining or encouraging a pre-stipulated improvement in energy efficiency within an agreed-upon time frame.
This energy policy agreement would need to specify which measures are required of the parties.

Some measures which the banks could commit to undertaking include:

- Integrating planned energy performance into the risk calculation that is made by the banks when defining the terms of the mortgage loan so as to mitigate the risk and make it possible to loan a **higher amount**.
- Encouraging energy efficiency through loans offering **financial incentives** for low E-levels.
- For new construction and renovations carried out by the banks themselves, the banks could establish energy performance standards which are even stricter than the current requirements. This would mean that these banks would then assume the role of trendsetter, bringing them in line with the objective of the European 'Energy Performance of Buildings Directive'.

In exchange, the Government of Flanders could:

- Support the communication process along the lines of the Luxembourg example. A label is being developed which would advertise a nearly zero-energy home (or building) and its inexpensive loan via marketing campaigns (linked to '*Action **8**, 'NZE' trademark branding*').
- Participating banks would be allowed to use this (registered) label, with the Government of Flanders publishing a list of the parties permitted to use it.
- The VEA could conduct a study to compare the theoretical energy performance of a home with its actual energy consumption. This study would account for several parameters affecting consumption (family situation, temperature level in the home, etc.)

Lenders are demanding access to an objective and neutral tool capable of calculating a building's theoretical energy savings. A preliminary energy audit could serve as an additional resource. This would allow a multi-step plan to be developed in which initial investments would go toward the optimisation of the 'envelope', followed in a later stage by additional investments in supplementary measures such as solar panels.
The credit sector continues to advocate for a (Flemish) alternative, and if possible even for a potential extension of the since abolished federal measure on 'green loans with interest relief'.

[65] http://www.kfw.de/kfw/en/Domestic_Promotion/Our_offers/Housing.jsp#Energy-efficientConstruction

4.6.4.3 Third-party financing

4.6.4.3.1 Action 18, third-party financing for extensive energy renovations

The pre-financing of NZE renovations forms an obstacle for several target groups. A third-party financing scheme could fund extensive energy renovations. This carries huge potential for energy savings, and this is why it must be further expanded and facilitated.
The proposal for the European Energy Efficiency Directive focuses heavily on the promotion of energy services and access to those services for SMEs.

A third-party financing arrangement, as well as the specification of the measures for improving energy performance via Energy Saving Performance Contracting, is being coordinated by an Energy Service Company (ESCO). There are different ways that ESCO services can be structured:

- with or without an energy-savings guarantee;
- with or without the integration of a feasibility study of energy-saving measures;
- …

Due to high overhead costs, ESCO services are usually more appropriate for larger projects:

- collective housing;
- social housing;
- (municipal) public buildings;
- office buildings;
- industry;
- …

Distribution network operators Infrax and Eandis have already entered into ESCO agreements with the cities and municipalities (partners) for the buildings they manage. Experiences have been positive, and the municipalities which have already carried out an ESCO project are in many cases requesting new ESCO agreements. The services are only offered to cities and municipalities by the distribution network operators.
Public buildings which are not owned by cities and municipalities, such as community schools, are not allowed to make use of the ESCO services offered by the distribution network operators.
ESCO services are also available in the private market, either with or without an energy-savings guarantee.
For the private market, Agoria provides a free sample contract for ESCOs that contains a performance guarantee[66].

There is great potential for third-party financing for social housing and public buildings. For individual residential buildings, the administrative costs associated with third-party financing are often too high.
One of the responsibilities of the Flemish Energy Company is to **develop energy services** to implement energy-saving measures and generate environmentally-friendly energy. Mechanisms could be put to use to appeal to third-party investors to contribute to this effort.
The expertise developed by BELESCO (Belgian Federation of Energy Services) and FEDESCO (Energy Service Company of the Federal Government) might serve as inspiration for this.

[66] Available for download at www.greenbuildingplatform.be

4.6.5 Energy policy

4.6.5.1 E-level long-term trajectory

There is still quite a bit of confusion within the building sector about the long-term trajectory of the required NZE energy performance levels for 2019 and 2021. The 'what, when and how' regarding implementation has not yet been fully established, and this is causing uncertainty.
There is a clear demand from the building sector, local authorities and various organisations for a long-term vision on the tightening of energy performance regulations, including a definite implementation horizon (especially for public buildings). Transparency and clarity will create a stable environment within which to motivate development.

4.6.5.1.1 Action 19, defining and communicating the long-term trajectory of energy performance regulations

This action is comprised of multiple subtasks.

1) Establishing the timeline for tightening energy performance regulations for new buildings
The outline of this long-term trajectory must be supported by the different actors (building sector, architects, individuals, etc.).[67] Key elements of this include a transparent timeline for implementation, a clearly-defined slew of incentives for following up on measures, enforcement and effective systems for auditing and monitoring.[68]

On 20 May 2011, the Government of Flanders approved the next two intervals for tightening regulations (2012 and 2014). A 'nearly zero-energy building' will be defined in early 2012 along with the rest of the timeline for tightening those regulations in consultation with the actors involved (see chapters 4 and 5). In accordance with the recast of the Energy Performance of Buildings Directive, the remainder of the timeline for tightening regulations up through 2021 will be laid down in a subsequent amending act (2012). A parallel timeline for tightening regulations will need to be established for governments; it will have to be determined if this will run concurrent with the other non-residential buildings up to 2018 and then tightened to the NZE level starting in 2019, or if the tightening of regulations will advance more quickly.
Consideration must be given to exemption measures when creating the timeline for tightening regulations. The system must be flexible enough to account for certain obstacles.

2) Establishment of a two-track policy including long-term trajectory for trendsetters (shadow trajectory)
Parallel to the long-term trajectory for energy performance requirements, a trajectory designed to support trendsetters could be devised that could eventually evolve into a two-track policy. Incentives and targets could be linked to this shadow trajectory. For instance, when the required E-level is E60, only limited support would be provided for E50, while greater support would be provided for E35.

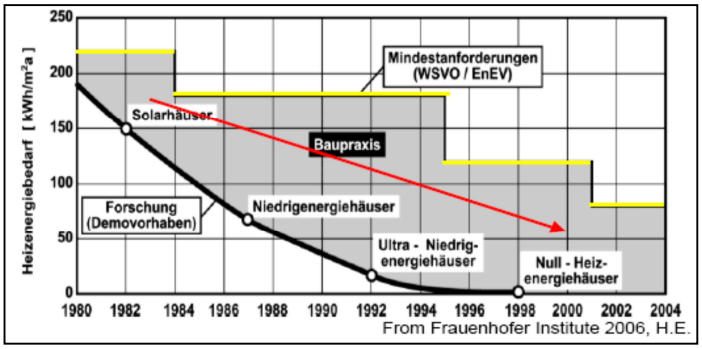


Chart 7: German two-track policy for improving the energy performance of buildings

Based on this long-term trajectory, a chart analogous to the chart 6 could be made that delineates the energy performance requirements, the trendsetter policy and the average building practices.

[67] Based on the first stakeholders meeting, it was clear that a multi-year vision for the E-level was necessary
[68] Taken from the McKinsey report entitled 'Pathways to world-class energy efficiency in Belgium'

3) Required minimum level of renewable energy in housing
As indicated in the chapter entitled 'Required minimum level of renewable energy in housing', a standard is being introduced that requires that a minimum share of energy consumption in new and extensively renovated buildings come from renewable energy sources. Currently, the EPB calculation method already calculates primary energy consumption and the share of this energy that comes from renewable sources. This is why the energy performance regulations are an ideal tool for implementing a requirement for a minimum share of renewable energy sources in all new or extensively renovated buildings for which an E-level calculation is required.

It is often not technically feasible to apply certain techniques to either new or existing buildings. This is why it is important that the minimum level of energy from renewable sources that is imposed be attainable through flexible means.

A few European countries (including Germany, Ireland, Portugal and Spain) have already incorporated minimum requirements for the use of renewable energy into their national building regulations. In Austria, most regions only award subsidies if the heating system meets certain environmental standards (combined system using solar energy, wood boiler, heat pump or district heating).[69]

4) Communicating information on E-level long-term trajectory
The long-term vision concerning the tightening of energy performance regulations will be communicated in a transparent and straightforward way. This will have a big effect on market development.

4.6.5.1.2 Action 20, Development of an integrated calculation method

The feasibility of developing an integrated calculation method for the energy performance of new *and* existing buildings is being explored. An integrated calculation method would make it possible to compare different levels of energy performance and to establish uniform support measures.

The Flemish Energy Agency has drawn up an implementation plan for the development of an integrated calculation method for different levels of energy performance in buildings.
This strategic plan entails the parallel monitoring of 'EPC non-residential' and 'study of other specific purposes' (development of a calculation method for new non-residential buildings), with the two being aligned with each other as much as possible in order to arrive at an integrated method for new and existing non-residential buildings. In addition to the calculation method, it will also be necessary to classify complex buildings according to their purposes (functions). Based on the experiences with non-residential buildings, it can then be decided whether or not to carry out a similar process for residential buildings.
Both of the projects being monitored for non-residential buildings are currently being carried out in cooperation with Belgium's other regions. Within the scope of the evaluation, the extent to which a cooperation agreement would be possible between Belgium's three regions for the further development of the integrated methods will also be explored.

4.6.5.1.3 Action 21, a path to nearly zero-energy for new social housing

An important social responsibility of social housing companies is to provide energy-efficient housing. Many social tenants have only limited financial means. Reducing their energy costs by offering them energy-efficient subsidised housing will have major repercussions for their living situation.

The Flemish Social Housing Company (VMSW) must reconcile a range of policy objectives within their current budget: provide a sufficient number of subsidised housing; increase the energy efficiency of existing subsidised housing; build new energy-efficient housing.

The exemplary role of subsidised housing is confirmed in the Housing policy memorandum, along with provisions for the research into possible support for innovative forms of energy utilisation within the social housing sector, such as the utilisation of residual heat, cogeneration, etc. In consultation with the VMSW and the social housing companies, a trajectory that includes guidelines and support capabilities could be developed whereby new social housing will eventually be built according to NZE standards. This trajectory could even be sped up relative to the long-term trajectory for the E-level that is required for new construction, with the VMSW imposing these energy requirements on the social housing companies. Financing, however, will remain a stumbling block. The potential

[69] Source: www.solarthermalworld.org

for third-party financing must be studied, perhaps in cooperation with the yet-to-be-established Flemish Energy Company.

A parallel long-term trajectory must be developed for carrying out extensive energy renovations on the existing social housing stock. The awarding of subsidies linked to an improvement in the EPC, or the creation of a demolition subsidy for those buildings which are best off being replaced, would be ideal.

The VMSW provides interest-free loans (0% interest rate) up to a maximum ceiling. There are currently no options available for borrowing above this ceiling, though such options could be linked to the energy performance of the social home.

4.6.5.2 Exemplary role of public buildings

The Energy Performance of Buildings Directive includes a provision requiring Member States to incorporate measures into their national planning to encourage public agencies to make improvements in energy-efficiency at an early stage and to carry out the recommendations contained in the energy performance certificate as soon as it is feasible. Additionally, beginning in 2019 the government will only be allowed to place new buildings that they own and operate into service if they are NZE buildings. A prominent exemplary role played by the governments (national, regional and local) in the implementation of NZE buildings – for both new construction and renovations – will have a positive effect on the market development of NZE buildings.

The different governments (regional, provincial and local) will together determine how Actions 22 and 23 should be developed. The guide entitled 'Assessment of Office Buildings', which might be updated with the energy performance requirements for NZE buildings, could provide some direction.
The remainder of the timeline for tightening EPB requirements for public buildings is also being stipulated in the Flemish energy performance regulations.
(Flemish) government buildings located in the Brussels-Capital Region must comply with the energy performance regulations of the Brussels-Capital Region, but are nonetheless in a position to play an exemplary role.

4.6.5.2.1 Flemish Policy Framework: what is being undertaken?

The 'Energy Management in Flemish Public Buildings' action plan

The 'Energy Management in Flemish Public Buildings' action plan is being coordinated by the Department of Environment, Nature and Energy and is aimed at achieving the rational use and sustainable generation of energy in Flemish public buildings. The target group is made up of all Government of Flanders officials, with a specific emphasis on energy officials, environmental policy contact persons, building managers and superintendents, maintenance companies, builders and purchasers.

The action plan consists of four components, each of which is worked out in further detail in the form of individual attainment targets and actions:

- Creation of a permanent consensus on energy management, backed up by senior officials.
- Recording of energy usage via energy accounting methods, and the conducting of energy audits.
- Reduction of energy consumption by creating, executing and adjusting a strategic plan for energy management, raising awareness among employees and adjusting purchasing procedures.
- Introduction of environmentally-friendly energy.

On 29 May 2009, an interim report detailing the current status of the action plan's implementation was submitted to the Government of Flanders. The final report containing the results and evaluation for the entire 2006-2010 period will be submitted to the Government of Flanders in 2011.

Guide to the assessment of office buildings

For the Government of Flanders, the Agency for Facility Management (AFM) uses the guide entitled *'Waardering van kantoorgebouwen - op weg naar een duurzame huisvesting voor de Vlaamse overheid*' (The Assessment of Office Buildings - a Path to Sustainable Housing for the Government of Flanders)[70] when an office building is built or purchased. This guide is used as the basis for requirements that are imposed on new Flemish Administrative Centres.

Exemplary role of schools

By investing in energy-efficient school buildings and taking a rational approach towards energy use in schools, a structural reduction in the energy costs incurred by schools can be achieved. For teachers and students, this will also serve as concrete evidence of what is possible in the way of energy savings. After all, when teaching students - the future generation - the basics of rational energy use and impressing its importance upon them, it is much easier and far more persuasive when the concepts which underpin rational energy use are being applied by the school itself.

Construction of new energy-efficient school buildings

[70] The guide entitled 'Waardering van kantoorgebouwen - op weg naar een duurzame huisvesting voor de Vlaamse overheid' can be found at http://www2.vlaanderen.be/facilitair_management/vastgoedbeheer/20101224_Waardering_van_Kantoorgebouwen.pdf

Following a scientific study which showed that E70 was the optimal economic energy performance requirement for new schools, the E-level requirement applied to all subsidised new school constructions for which a building permit was applied after 1 January 2008 was lowered to E70 (Flemish Parliament Act of 7 December 2007 on energy performance in schools). Additional investment costs needed to meet the E70 level are being fully subsidised via AGIOn.

As part of a pilot project, 25 passive schools are being built throughout all the provinces. It is hoped that these example projects will greatly expand the market for products used in the construction of passive buildings, and provide architects, design offices and contractors with more experience in passive construction, thus resulting in a reduction of overall building costs for passive schools and other passive buildings. The financial standard used when building in accordance with the passive house standard was set at EUR 1,410.00/m² (gross surface area). This represents an increase of EUR 235.00/m² relative to the financial standard used for school buildings. The additional costs associated with passive construction are being fully subsidised. A separate budget totalling EUR 21 million is available for these pilot projects. AGIOn's call for proposals for the construction of passive schools resulted in 75 applicants. A selection commission evaluated the projects based on a number of predefined criteria. Issues which were taken into account included the speed at which the project can be completed, how representative the project is, the willingness to monitor energy performance on a permanent basis and to open up the project to interested parties, and the overall vision of sustainability maintained by the organising body. In the end, 25 projects were selected from all educational networks for a combined surface area totalling 65,565 m². Construction will begin on the first project in 2011.

AGIOn is taking a number of additional actions which are aimed at increasing the energy efficiency of the school building stock:

- REG (Rational Energy Use) subsidies;
- Public-private construction partnership (Design Build Finance and Maintain) in order to speed compliance with strict energy-efficiency regulations applying to the construction of schools[71];
- Together with GO!, AGIOn published a resource guide for sustainable school buildings in 2010[72]. This guide was developed in the same spirit as the Flemish standard for sustainable living and building as well as the existing guide for neighbourhood development;
- A study carried out by AGIOn to define a cross-compliance framework for passive schools;
- Agency for Innovation by Science and Technology (IWT) project for innovative tendering procedures[73]: together with Flanders Heritage, the Flemish Infrastructure Fund for Person-related Matters and the Flemish Social Housing Company (the promoter), a project is being designed to invite innovative solutions for a variety of critical issues involved in energy-efficient construction while maintaining the priority of accessible pricing.

The Flemish Infrastructure Fund for Person-related Matters

All subsidised construction projects within the Welfare, Public Health and Family Policy Area are covered by the regulations of the Flemish Infrastructure Fund for Person-related Matters. Since June 2003, these construction projects have been subject to the requirements contained in the circular entitled 'evaluation criteria for environmentally-friendly building'. A number of these requirements go further than the provisions stipulated by Flemish energy performance regulations.

Flemish Social Housing Company (VMSW) regulations

In 2009, a new social housing unit in Flanders achieved a minimal energy performance rating of K40 and E85, and it did this without any additional measures and without exceeding the maximum price standard. The C2008 (concepts for social housing - guide for builders and designers) contains specific VMSW regulations for energy performance and indoor air quality in order to standardise these requirements for all new social housing construction[74].

The following specific VMSW regulations for new and renovated social housing are specified in the C2008:

- E-level: The maximum E-level per housing unit shall be E80 for new constructions and all other kinds of work which fall into the same category (cf. classification of legal requirements).
- K-level: the maximum K-level, as calculated in accordance with the NBN B62-301 and/or by EPB software, shall be K40.

[71] www.agion.be/inhaalbeweging%20schoolinfrastructuur.aspx
[72] www.agion.be/templates/standaard.aspx?ID=20110208152059Z
[73] www.innovatiefaanbesteden.be
[74] Source: www.vmsw.be

- Maximum U-values for new construction projects and new additions when renovating (according to the table contained in the C2008 document).
- Thermal bridges: temperature factor > 0.7.
- Overheating: the overheating indicator may read no more than 17,500 Kh. Additionally, the necessary measures will be taken to guarantee a comfortable temperature in the summer and to keep the (nominal) cooling load as low as possible.
- Ventilation:
    - the ventilation system will be designed in accordance with NBN D50-001;
    - for systems A and C, class P4 self-regulating vents are specified;
    - system B will only be used when it is impossible to use either A or C;
    - system D will only be used in combination with heat recovery, and only in low-energy homes or passive homes, unless its suitability or necessity can be clearly demonstrated;
    - a self-contained ventilation hood is only suited for intensive ventilation systems, not for basic ventilation;
    - systems using individual fans will not be considered appropriate for basic ventilation, except in cases of renovations in which there are no other options.

The role of the social housing sector as trendsetter

The VMSW regulations set out in the C2008 document were more stringent than the required E-levels at the time it was published. This was done in response to the announced tightening of the energy performance regulations (from E100 to E80). It takes longer for documents to be processed at the VMSW than it does with ordinary private projects.
New preliminary drafts always take future minimum energy performance requirements into account. New drafts must strive for E60 (goes into force in 2014).
The VMSW is also considering imposing airtightness requirements for new constructions in the near future.

The VMSW realises how vitally important it is to keep its target group's energy consumption - and thus its living expenses - low. But if it is to assume the role of trendsetter, it will need additional financial support. This is why the rent that is charged by social housing companies is based exclusively on the income of the tenant. Even though improved energy performance results in reduced living expenses, the rent cannot be raised.
An 'energy adjustment' is currently being devised which may go into force in 2013: an energy discount will apply to homes which do not meet the ERP2020 targets (single-pane glass, no roof insulation, antiquated heating system), and a surcharge will be applied to homes having an energy performance (EPC) that is substantially higher than average.

The VMSW provides no-interest loans (0%) which are subject to a maximum ceiling. Additional credit options for improved energy performance which exceed this maximum ceiling are not applicable at this time. In spite of financial constraints, some social housing companies are nonetheless succeeding in implementing ambitious projects by means of European support projects, for instance.

In conjunction with the Agency for Innovation by Science and Technology, the VMSW has launched a pilot project which makes use of a more flexible procurement mechanism. This facilitates the implementation of innovative techniques. The current procurement mechanism does not always allow certain innovative techniques to be implemented.
The viability of the passive home standard within the sector is being researched by way of three 'social passive housing units' pilot projects.

Initiatives on the part of provincial authorities

1. Provincial support centres for sustainable building

In recent years, Flemish provinces have worked to address sustainable living and building. In Limburg and Antwerp provinces, for instance, much effort has been put into Dubolimburg and Kamp C. Various initiatives were organised in the other three provinces as well, such as training, awareness-raising campaigns and information sessions.

In early 2011, the Flemish transition agenda for sustainable living and building was implemented at the provincial level: the Government of Flanders signed a cooperation agreement with the five provincial governments to provide support to a provincial support centre for sustainable living and building in each province, thus putting Flemish policy into action at the provincial level.

The provincial support centres all share the same responsibilities. They will become the discussion partner and adviser to as broad a target group as possible (private individuals, local governments, building professionals, NGOs, educational institutions, etc.) and will promote sustainable living and building through a variety of activities. The support centres will be viewed as a cooperation partnership in which different knowledge partners from the sector, specialised NGOs and other experts will take an active role in promoting sustainable living and building in each province.

2. Climate-neutral Limburg

In 2009, Limburg provincial authorities set the ambitious target of being climate-neutral by 2020[75]. A scientific study laid the basis for a climate plan.
To gain insight into the greenhouse gasses which are emitted in Limburg as well as the share of those gasses which are attributable to different sectors, a scientific study was carried out by a consortium of climate specialists.
To meet this challenge, the provincial authorities are counting on the help and commitment of all sectors which are in a position to yield environmental gains: the energy and transport sector, industry, trade and service, agriculture, etc.

3. Antwerp provincial administration - climate-neutral entity

The provincial administration of Antwerp is seeking to become a climate-neutral entity by 2020 through the minimisation of greenhouse gas emissions and compensating where needed.
In order to guarantee that greenhouse gas emissions are reduced as much as possible, an interim attainment target has been set: by 2017, greenhouse gas emissions will be reduced by at least 50% compared to 2006 emissions.[76]

The Covenant of Mayors

In 2009, more than 635 European cities signed the Covenant of Mayors, including Antwerp, Genk, Ghent, Hasselt and Ostend. The Covenant of Mayors called upon cities to pursue a trendsetter policy. As such, these cities have undertaken to surpass the energy target that was set by the EU: a 20% CO_2 reduction by 2020. In this forum, established at the initiative of the European Commission in cooperation with the Committee of the Regions, the cities commit themselves to a common goal: the reduction of their CO_2 emissions through increased energy efficiency and the use of renewable energy sources.
Examples of initiatives which have been pursued within the framework of this covenant:

- Ghent: the CO_2-neutral Linnenstraat neighbourhood centre (under completion);
- Ghent: the Gasmetersite urban development project 'Tondelier';
- Antwerp: CO_2-neutral electricity contract for city services;
- Antwerp: annual investment of EUR 13 million to make city buildings more energy-efficient;
- Antwerp: Eco House association providing information regarding subsidies, green loans, advice from the Eco House doctor, etc.;
- Ostend: creation of the SEAP (Strategic Energy Action Plan), including sustainable energy policy in the Port of Ostend - Ostend Green Port.

Ambitious local energy policy

1. Energy 2009-2014 policy memorandum

From the Energy 2009-2014 policy memorandum: '*More and more people are being persuaded by the benefits offered by energy-efficient living. We are researching ways to give local authorities the latitude to respond to this and to pursue an ambitious policy. Examples might include prescribing more stringent energy levels for innovative construction projects via a building regulation through which local governments could impose additional requirements for energy savings and energy recovery. This will allow for the creation of innovative eco-districts when new land is developed.'*

2. Ambitious local energy performance requirements

Building regulations are usually drafted at the local level (municipalities) in the form of land parcelling regulations, regulations for construction projects, municipal spatial implementation plans, etc. This could also be expanded to include guidelines for social housing.

[75] http://www.limburgklimaatneutraal.be
[76] http://www.provant.be/binaries/KLIMAATPLAN_basisdocument_20111117_tg_tcm7-142676.pdf

Municipalities can tighten their own energy performance requirements via their conditions for sale, but imposing a more stringent requirement on everyone by way of an urban plan is not possible. The Association of Flemish Cities and Municipalities (VVSG) is advocating for the right to develop a more ambitious policy at the municipal level with regard to energy-efficient construction. To this end, the VVSG has specified the following desires:

- Municipalities want more room for subsidiarity.
- For specific zones at first, then municipality-wide at a later date.
- Embed it in the Flemish Energy Act.
- More rigorous enforcement by the VEA.

Municipalities can take initiatives on their own which are incorporated into this action plan, including by providing trendsetters with tailored financial support.

An amendment was included in the Flemish Energy Act which stipulates that municipalities – under certain conditions – may establish a more stringent K- and E-level for certain zones.
This has not been implemented yet because the Government of Flanders still has to develop this further in a resolution; this will take place in the context of establishing a timeline for tightening the EPB requirements by 2021. The legal enforcement framework for more stringent municipal requirements has already been developed.

When new land is developed, there must be plenty of opportunities to develop innovative eco-districts (or 'nearly zero-energy districts').

Recovery fund: local initiatives to promote energy efficiency and renewable energy

In July 2009, the European Economic Recovery Plan (EERP) was set up to aid the economic recovery in Europe by spending EUR 3.98 billion by the end of 2010. The remaining funds (EUR 146 million) were placed in a new fund for projects that was aimed at local governments and intended to promote energy efficiency and the use of renewable energy. These projects are designed to have a rapid, measurable and sizable impact on the economic recovery and to contribute to the other objectives of the fund.

A geographically-balanced approach will be taken when allocating the aid (each Member State must be allowed to receive aid). The fund will be launched in 2011 and will be managed by one or more financial intermediaries (such as the European Investment Bank).
The aid will be divided into two categories: financial support and technical assistance (limited to 15%). Amounts/subsidies will not be provided directly; financial support mechanisms having a greater leverage effect, such as security grants, will be used.

4.6.5.2.2 Action 22, raising awareness among and providing information to governments

1) Awareness

Governments must be informed in a timely manner on the 2019 timeline for tightening requirements. It is essential that all governments realise as soon as possible that all new buildings must be built to NZE standards by 2019. Measures must also be taken to expand the number of buildings which are extensively renovated. For most governments, this is going to constitute a huge challenge.

2) Best practices

The purpose of this action Action is to familiarise local authorities with Flemish and European example projects. This could be done in different ways.

Visit to European demo districts

In 2008 and 2009, the Association of Flemish Cities and Municipalities organised study visits to Freiburg for representatives and officials from a variety of governments. Inspiration taken from these visits has had an influence on current project planning. Following the example of the Association of Flemish Cities and Municipalities, various municipalities have requested information and organised visits themselves.
Besides Freiburg, there are other interesting example projects in neighbouring countries:

- ECOCITY site in Tübingen-Derendingen, Germany. (link to folder).
- Sustainable district of Lanxmeer, Culemborg, Netherlands.
- The 'Solarsiedlungen' project in the North Rhine-Westphalia, Germany.

Many good example projects have also been implemented in Flanders.

The Government of Flanders could take the initiative to expand the availability of excursions to example projects in conjunction with other bodies such as the Association of Flemish Cities and Municipalities.

Publication of best practices regarding NZE buildings in Flanders and other Member States on the energiesparen.be website (or in cooperation with partners on a separate website).

3) Knowledge development projects for government personnel (with technical responsibilities)
Information days and training sessions for technical government personnel take place on a regular basis, and cover a variety of issues related to energy-efficient construction. In order to have a structural impact, these must be organised on a permanent, ongoing basis throughout all of Flanders.
A few Flemish cities (including those participating in the Covenant of Mayors) as well as some provincial authorities already possess a great deal of in-house expertise regarding energy efficiency, both in terms of their own infrastructure as well as providing information to their citizens.
The degree to which larger cities might be able to take smaller surrounding municipalities under their wing and provide them with support will be examined.

4) NZE tendering standard for public buildings
Good sample specifications which are specifically geared toward NZE buildings or extensive renovations must be developed. These could then be used during a public tendering procedure.
In the case of design offices, this could translate into specially-adapted and results-oriented award criteria and penalty clauses. Recent cases of this resulted in very few bids. It is reasonable to expect this to change, but it is clear that new rules need to be spelled out for the advisory sector in order to prevent – in an initial stage – a constriction of the market.

The award criteria and penalty clauses may need to remain in effect for a longer period of time. The standard period of one year until final delivery will only be long enough to resolve initial growing pains (especially for buildings with a higher level of complexity), and not long enough to evaluate the building in stable operation. Tangible results of the design bureau's project will only become clear after three years.

4.6.5.2.3 Action 23, NZE public buildings

1) Local authorities
In the strategic policy plan for the next legislature (2013-2018), local authorities must include clear-cut commitments regarding a local action plan for energy-efficient construction and renovations which are in line with the requirements imposed by the new European Energy Efficiency Directive.

2) Building NZE buildings prior to 2019
Beginning in 2019, all new public buildings that are constructed must be NZE buildings. If we wait until then to start building according to NZE standards, we will end up contending with an enormous amount of problems. Governments should gain experience in the interim by carrying out a number of projects in advance of this deadline. Given the lead time required for larger projects, E-level targets should be set very low for those projects which are already in the pipeline.

3) Deep energy renovations
Maximum progress must be made towards the deep energy renovation of public buildings - not only in the energy-efficiency level of these buildings, but also in terms of the number of renovations which are carried out. According to the current proposal for the recast of the Energy Efficiency Directive, central governments are supposed to renovate up to 3% of their own building stock annually, up to the cost-optimal level.

4) Leasing of NZE buildings
Governments must move as quickly as possible to make NZE a requirement for new buildings, and must also make it a priority to strive for more energy efficiency when making renovations. If only NZE buildings were made available for lease, it would send a strong signal to the market. A dialogue on this must be initiated between the relevant government bodies.

<u>Flemish Policy Framework: what is being undertaken: Guides for the sustainability of buildings</u>

Guide to the assessment of office buildings
In February 2008, the Agency for Facility Management (AFM), in concert with the Department of Environment, Nature and Energy, published the first guide entitled 'Waardering van kantoorgebouwen - op weg naar een

duurzame huisvesting voor de Vlaamse overheid' ('The Assessment of Office Buildings - a Path to Sustainable Housing for the Government of Flanders').[77] This reference guide makes it possible to assess the sustainability of office buildings, and was updated in late 2010. The guide can be used to impose minimum requirements (based on a score) when a new office building is acquired or built.

Flemish Standard for sustainable living and building

In early 2012, the Government of Flanders approved the Flemish standard for sustainable living and building. This standard is intended to become the reference framework for sustainable living and building in Flanders. This instrument will be used to determine how the Government of Flanders defines sustainable living and building. Until now, this has not always been clear given the range of Flemish, European, and international instruments available with which to measure the degree of sustainability of buildings. Each of these instruments has its value, but the sheer volume of instruments causes confusion. In addition, the aspects of sustainable building have not always been fully incorporated into the existing instruments. Deficiencies in these existing instruments were eliminated and in turn incorporated into the new instrument to the extent possible. This has resulted in an instrument that is based on internationally recognised systems but which has been adapted to Flemish legislation.

The new Flemish instrument for measuring sustainable living and building has been subjected to a participative process in which all actors were allowed to contribute their findings and experiences.
This instrument is currently geared toward the private builder, who can utilise it along with the architect and the contractor. An additional aim is to develop similar measuring instruments in the near future for other types of construction projects which are relevant to local and regional governments, such as hospitals, retirement homes, neighbourhoods, etc.

The instrument is designed to provide architects, contractors and builders with insight into the sustainability of their construction project, and has accordingly been divided into topic-based chapters, such as ‘water’, ‘energy’ or ‘materials and waste’. Each topic-based chapter contains a series of measures intended to promote sustainability and which apply to one or more phases of the construction project – from site selection to completion and initial move-in. Points are earned for each measure which is implemented. After using the instrument, the user will be able to estimate how he/she scored per topic and for the entire project overall.
The use of this measuring instrument is optional; it was decided not to require it and to instead push for its general acceptance. This instrument will also be heavily promoted by the government, including by the five provincial support centres.

[77] The guide entitled ‘The Assessment of Office Buildings’ can be found at http://www2.vlaanderen.be/facilitair_management/vastgoedbeheer/20101224_Waardering_van_Kantoorgebouwen.pdf

4.7 *Actions & measures Federal Government*

The Federal Government doesn't have a specific Nearly Zero Energy Building policy, however takes measures to promote and realize a reduction in energy consumption. The following measures can support the Regional Nearly Zero Energy Building policies.

4.7.1 Fedesco

Fedesco is a public Energy Services Company (ESCO) set up in September 2005 on the initiative of the federal government as a limited company governed by public law. It carries out energy savings projects in the federal government buildings. Fedesco applies the principle of third-party financing. Its expertise consists in analyzing the needs, identifying and benchmarking of potential buildings, as well as following up the technical stages of projects. For some of these projects Fedesco works with "La Régie des Bâtiments – De Regie der Gebouwen" (the Belgian Buildings Agency), the estate expert of the Federal Government, which also sees energy efficiency as a priority. Both organizations pursue the realization of the lowest possible energy consumption in federal government buildings. Fedesco also plays an essential role as the 'federal knowledge centre for energy efficiency'.

4.7.2 Public procurement

Through the 'Sustainable Procurement Guide' (www.gidsvoorduurzameaankopen.be, www.guidedesachatsdurables.be), knowledge is transmitted regarding the ecological and ethical requirements, ensuring that the federal Government is able to strive for the 50% sustainable procurement procedures for all federal public contracts. Most federal agencies also seek to attain the EMAS label. These measures can promote energy efficiency and support the exemplary role of the government in realizing low energy buildings.

4.7.3 Tax deduction for investments in energy efficiency and renewable energy in dwellings

(Article 145[24], § 1, Tax Income Code 1992)

Since fiscal year 2004 (income 2003), the Belgian federal government offers a tax deduction for individuals undertaking energy efficiency and certain renewable energy investments in their homes. As from fiscal year 2006 (income 2005) renters can also apply for the tax deduction.

Tax deductions were offered for expenses relating to:

- the maintenance of heating boilers (since fiscal year 2007 – 40 pct.);
- the replacement of old heating boilers (15 pct. – 40 pct. as from fiscal year 2006);
- the installation of solar water heating systems (15 pct. – 40 pct. as from fiscal year 2006)
- the installation of photovoltaic panels (15 pct. – 40 pct. as from fiscal year 2006);
- installations to produce energy of geothermal origin (since fiscal year 2005) (15 pct. – 40 pct. as from fiscal year 2006);
- the installation of double-glazed window units (40 pct.);
- roof insulation (40 pct. – 30 pct. as from fiscal year 2013);
- floor and wall insulation (40 pct.);
- the installation of thermostatic valves or a thermostat with clock (40 pct.);
- an energy audit of the dwelling (40 pct.).

As from 2010 (fiscal year 2011) the deduction for the maintenance of heating boilers, the replacement of old heating boilers, the installation of double-glazed windows, roof, floor and wall insulation , and the installation of thermostatic valves and a thermostat with clock was only granted if the works in question were done in homes of over 5 years old.

As from 2012 (fiscal year 2013) the tax deduction is only granted for investments in roof insulation.

The percentage of the tax deduction has varied over times, as has the maximum amount of the deduction, ranging from € 500,00 (non-indexed amount) for fiscal year 2004 to € 2000,00 (non-indexed amount) as from fiscal year 2008, to be increased by € 600,00 (non-indexed amount) for investments in solar panels.

As from fiscal year 2010 a carry-over system was put into place for certain deductions that exceeded the maximum amount of the tax deduction of a fiscal year. As from fiscal year 2013 (income 2012) this system has been abolished (exception: transitory measure).

The tax deduction relative to certain expenses in the years 2009 – 2012 can be transformed into a tax credit.

4.7.4 Tax deductions for dwellings with low energy consumption

(Article 145[24], § 2, Tax Income Code 1992)

Since fiscal year 2008 (income 2007) a tax deduction has been granted to individuals investing in passive houses (= dwellings consuming less than 15 kWh/m2 and with excellent airtightness), amounting to € 600,00 (non indexed amount) for 10 successive taxable periods. As from fiscal year 2011 (income 2010) low energy houses (= dwellings consuming less than 30 kWh/m2) also entitled to a tax deduction amounting to € 300,00 (non indexed amount) for 10 successive taxable periods and the tax deduction for zero energy houses (= passive houses in which the remaining demand for energy is compensated by renewable energy produced in situ) was doubled to € 1.200,00 (non indexed amount).

The tax deduction has been abolished as from fiscal year 2013, but is still granted (for the remaining of the 10 year period) for dwellings that were certified as low energy, passive or zero energy houses in 2011 or before. As a transitional measure certificates for which an application was submitted on 31 December 2011 at the latest and that were issued on 29 February 2012 at the latest, are considered to be certificates issued on 31 December 2011.

5 ABBREVIATIONS

ABE	Brussels Enterprise Agency
AEE	Employment-Environment Alliance
AGIOn	Agency for Infrastructure in Education (Flemish Region)
ASIEPI	Assessment and Improvement of the EPBD Impact, for new buildings and building renovation – European project
ATG	voluntary technical approval
COBRACE	Brussels Air, Climate and Energy Code (Code Bruxellois de l'Air, du Climat et de la maîtrise de l'Energie)
Construction iSG	Construction innovation steering group
EACI	Executive Agency for Competitiveness & Innovation
EFRO	European Fund for Regional Development
EIB	European Investment Bank
EPB	Energy Performance & Indoor Air Quality
EPBD recast	recast of Energy Performance of Buildings Directive
EPC	Energy Performance Certificate
EPU	Calculation method used by the EPB software for utility buildings
EPW	Calculation method used by the EPB software for residential buildings
ESCO	Energy Service Company
FVB	Fund for Professional Training in Construction
HES	Renewable Energy Systems
HSW	Hot Sanitation Water
IBGE	Brussels Institute for Environmental Management
IEE	Intelligent Energy Europe
IWT	Agency for Innovation by Science and Technology (Flemish region)
KUL	KU Leuven
NZE	nearly zero energy
NZEB	nearly zero energy building
PLAGE	Local Action Plans for Energy Management
RCU	Municipal Urban Development Regulations
ReSHAPE	Retrofitting Social Housing and Active Preparation for the Energy Performance of Buildings Directive
RRU	Regional Urban Development Regulations
SDRB	Brussels Regional Development Agency
SLRB	Brussels-Capital Region Housing Company
UA	University of Antwerp
UGent	University of Ghent
VEA	Flemish Energy Agency
VITO	Flemish Institute for Technological Research
VRWI	Flemish Council for Science and Innovation
VSDO	Flemish Strategy for Sustainable Development
VUB	Free University of Brussels
VVSG	Association of Flemish Cities and Municipalities
WTCB	Belgian Building Research Institute (BBRI)