

Brussels National Plan Nearly Zero Energy Buildings

Implementation European Energy Performance of Building Directive
Brussels, September 2012.

TABLE OF CONTENTS

1	INTRODUCTION & CONTEXT	3
2	SPECIFICITIES ENERGY POLICY BRUSSELS-CAPITAL REGION	4
3	DEFINITION OF NEARLY ZERO ENERGY BUILDING	8
3.1	<i>Individual Housing EPB units</i>	8
3.2	<i>Offices and Services EPB units and Educational EPB units</i>	8
3.3	<i>Targets new and existing buildings</i>	8
3.3.1	<i>Individual Housing EPB Units</i>	8
3.3.2	<i>Offices and Services EPB units and Educational EPB units.....</i>	9
4	ACTIONS & MEASURES.....	10
4.1	<i>Overview.....</i>	10
4.2	<i>Barriers & opportunities</i>	12
4.2.1	<i>Policy.....</i>	12
4.2.2	<i>Financial</i>	13
4.2.3	<i>Technical.....</i>	14
4.2.4	<i>People.....</i>	15
4.3	<i>Actions & measures.....</i>	17
4.3.1	<i>Demand.....</i>	19
4.3.2	<i>Supply.....</i>	33
4.3.3	<i>Monitoring (control & improvement).....</i>	38

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).

2 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.

2.1.1.1 *Inventory of Brussels-capital residential housing stock*

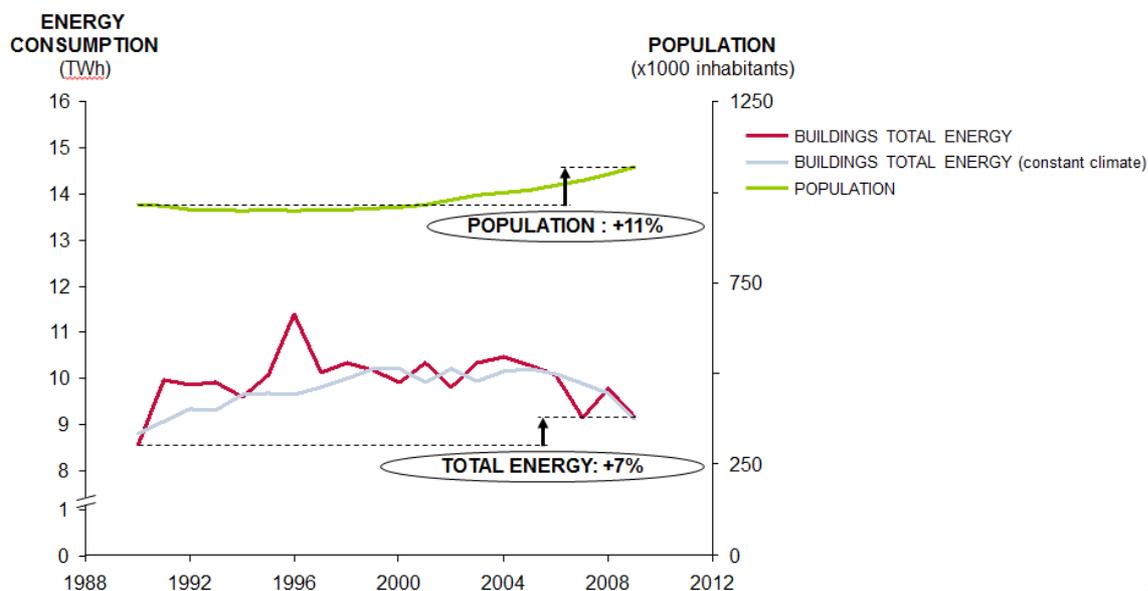
Between 1980 and 2003, the total built-up area increased by 13%, while the non-built-up area decreased by 17%. The surface area covered by office buildings increased by 122% (Source: IBGE, Etat de l'environnement¹).

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 occupied². 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.

2.1.1.2 *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.



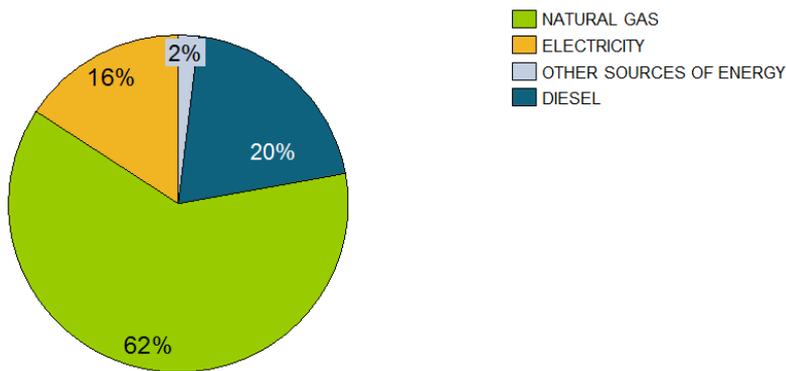
Energy consumption in Residential buildings: Evolution 1990-2009 (Total Energy)³

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 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.

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

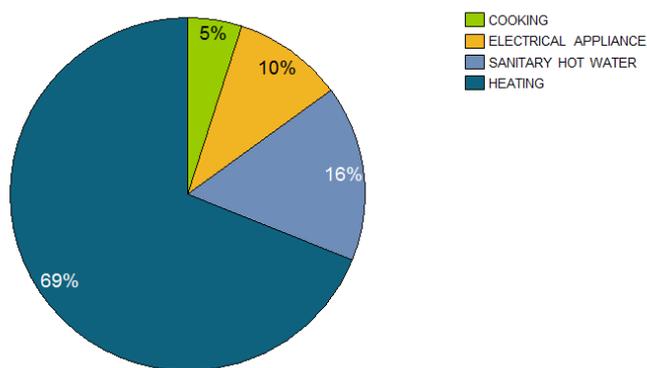
² Reference : Energy Balance of the Brussels-Capital Region 2009 (Bilan énergétique de la RBC 2009 – Bruxelles Environnement)

³ Ibid



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

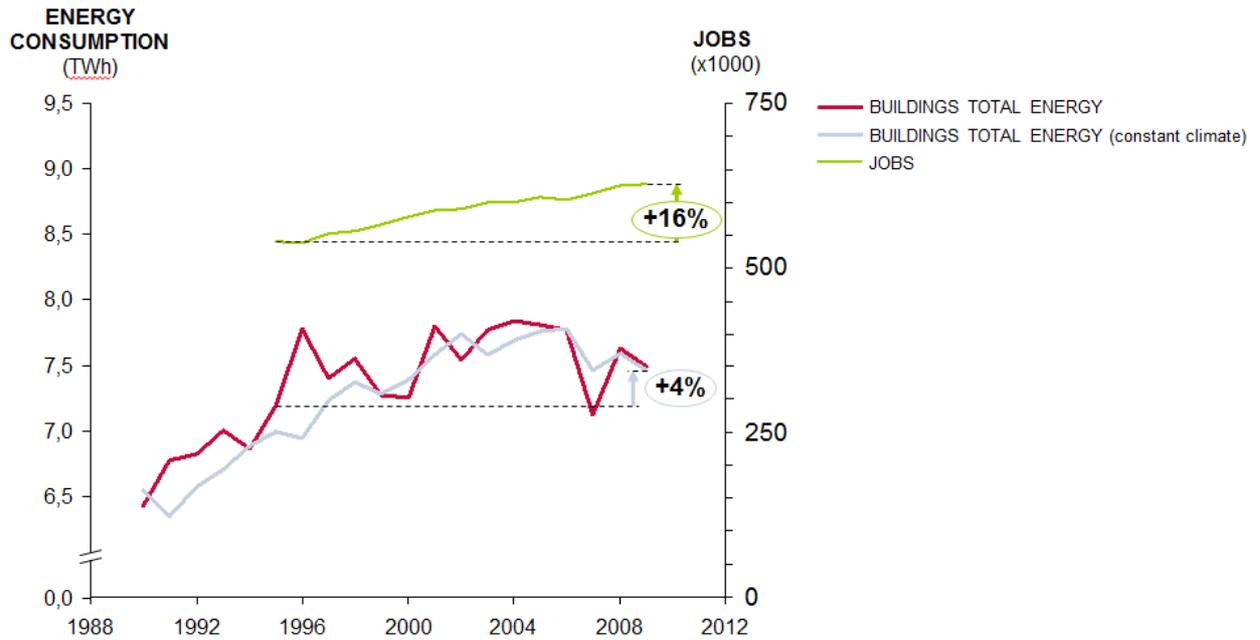
2.1.1.3 *Characteristics of the services sector*

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.

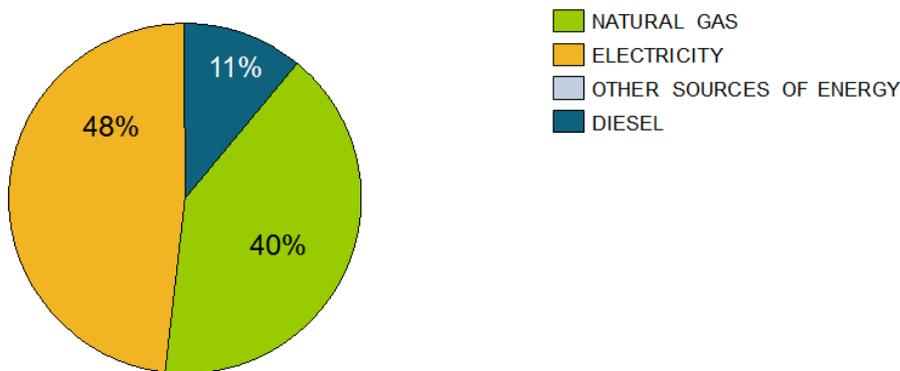
⁴ Reference : Energy Balance of the Brussels-Capital Region 2009 (Bilan énergétique de la RBC 2009 – Bruxelles Environnement)

⁵ Ibid



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

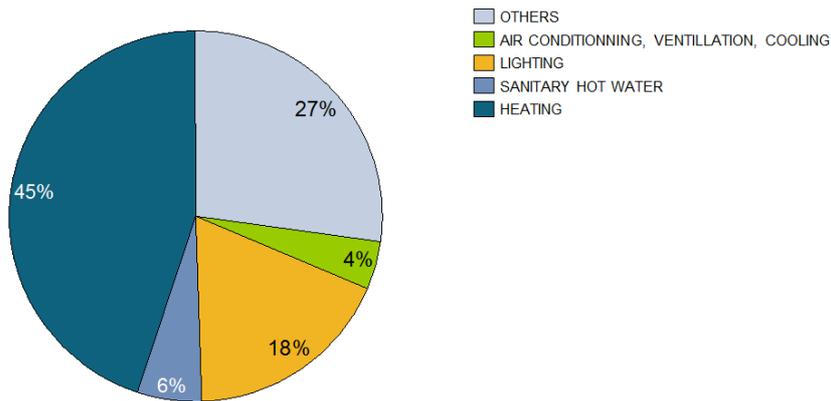
What regards the energy types consumed, electricity comes first in the services sector but it is closely linked by natural gas.



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

2.1.1.4 *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)

3 DEFINITION OF NEARLY ZERO ENERGY BUILDING

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).

3.1 Individual Housing EPB units

- a primary energy consumption for heating, domestic hot water and electrical appliances below 45 kWh per m² 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/m².K for opaque walls and 0.85 W/m².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.

3.2 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.

3.3 Targets new and existing buildings

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

3.3.1 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.

3.3.2 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.

4 ACTIONS & MEASURES

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 Overview

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 permits ⁸ 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

⁸The 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 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 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 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.



4.2.1 Policy

4.2.1.1 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.

4.2.1.2 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.

4.2.2 **Financial**

4.2.2.1 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.

4.2.2.2 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.

4.2.3 Technical

4.2.3.1 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.

4.2.3.2 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.

4.2.4 **People**

4.2.4.1 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.

4.2.4.2 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.

4.3 *Actions & measures*

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 m². 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.

4.3.1 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.

4.3.1.1 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 to 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
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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 units⁹ have:

- a primary energy consumption for heating, domestic hot water and electrical appliances below 45 kWh per m² per year;
- airtightness at 50 Pa below 0.6 per hour;
- 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.

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 m² 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 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.

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 m² of heated area.

⁹The 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
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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 CO₂ emissions indicator. Penalties¹⁰ 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
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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 conditioning¹¹ is increasing more and more in our buildings in both the tertiary¹² and residential¹³ 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
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¹⁰See the Ordinance on Energy Performance and Interior Climate of Buildings of 7 June 2007 – Article 34.

¹¹Based 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).

¹²The 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.

¹³There 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”)
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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 permits¹⁴ for large buildings
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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 3500m² 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
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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.

¹⁴The 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
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Every identified producer of green electricity (production of renewable energy and high-quality cogeneration¹⁵) 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 certificates¹⁶. 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.

4.3.1.2 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
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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 m².

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 buildings¹⁷. These should have registered their buildings as of 1 January 2012 and posted the EPB public building certificate as of 1 July 2012.

¹⁵ 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°

¹⁶ *Ibid.*, art. 28 §2

¹⁷Parliaments, 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
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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 Agency¹⁸ (“SDRB”), the Brussels-Capital Region Housing Company¹⁹ (“SLRB”) and the Housing Fund [*Fonds du Logement*]²⁰ 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”)
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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
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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.

¹⁸The 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

¹⁹The “SLRB” is a regional institution in charge of social housing.

²⁰ 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.

In particular, it takes into account the following aspects:

- 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
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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
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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
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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”
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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.

4.3.1.3 *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”
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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 performance²¹ 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 m² 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.

²¹In “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.

Action 18	Award a “Sustainable Building” label and certificate
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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”).

4.3.1.4 *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”
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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 classes²². 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”
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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;

²²Studies 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).

- 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)

Action 21	Pursuing and reinforcing aid for "green certificate" production
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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
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Several actions are being taken to support the at-risk population: energy price setting (social rate), social energy guidance²³, special energy activities, social green loans²⁴, 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'Énergie*] (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
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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 aid²⁵ with regard to energy savings, energy production from renewable sources or rational production of energy, intended in

²³Guidance Sociale Énergétique (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.

²⁴Since 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.

²⁵Investments 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;

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
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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 contract²⁶.

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.

4.3.1.5 *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'Énergie [*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.

- 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.

²⁶For 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.

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.

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

4.3.2 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.

4.3.2.1 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
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	recognition system for sustainable building professionals
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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”²⁷, provides for five classes of accreditations; in the EPB, for production of energy from renewable sources²⁸, 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.

4.3.2.2 *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
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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.

²⁷ 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).

²⁸In 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.

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 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
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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 CTA²⁹;
- student course content, to be suited to market needs;
- teaching tools;
- promotion of sustainable construction trades (notably in collaboration with the private sector).

²⁹ Centre technologie Avancée [Advanced Technology Centre]

4.3.2.3 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
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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.

4.3.2.4 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
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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.

4.3.2.5 *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
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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 environment³⁰, 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
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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

³⁰Examples 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.

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.

4.3.3 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
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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
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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 authorities³¹.

It is henceforth mandatory to display the energy consumption of all existing public buildings³² in the Region (Action 9). This process allows an energy cadastre of the regional buildings to be built up at the same time. 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

³¹Directive 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."

³²The 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 public buildings in the Region is designed to raise public awareness [37]. It also stimulates managers and users of buildings to reduce their consumption.

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
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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
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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.